webpage. The server will retrieve and store input received from various sensors such as Bluetooth LE beacons, image capturing devices located around the retailer's shop, for purpose of tracking, monitoring, obtaining, and/or deriving one or more parameters associated with the retailer. Examples of such one or more parameters include number of shoppers in a retailer shop. Such data may be provided on a real-time or near real-time basis displayed on the user interface. The data obtained may be further analyzed to provide business intelligence information useful for the retailer. Such business intelligence information may include shopper traffic in the retailer shop, busiest period of a weekday or weekend, busiest period over one or more months, etc.

In some embodiments, the system may be linked up with other commercial databases related to cruise ship services for example, to provide users with information such as Qualifying Cruise Ships eligible for tourist refund, as well as pre-populating travel itinerary to achieve certain level of convenience for the users of the system.

The described embodiments are advantageous as they provide a three-tier checking and verification process. In particular, a first level of check/verification is performed when a user (tourist) registers with the central processor 110. The second level of check/verification is performed before or during the generation of the eTRS ticket, and the third level of check/verification is performed at the point of departure prior to the generation of an electronic notification indicating the success or failure of the refund transaction.

Further, it is to be appreciated that the capturing of detailed information at the point of user registration allows a tourist to specify a desired account for refund upfront. Such an arrangement is useful to alleviate any time pressure that a tourist may face when he is leaving the country, as he needs to complete all form of formalities prior to boarding the aircraft / cruise ship. By shifting the data collection point to prior to the tourist embarking on his trip or

at the point of registration, precious time is saved for the tourist when he faces the most time pressure.

The above is a description of embodiments of systems and methods for facilitating refunds, in particular tax refunds to tourists in accordance with the present invention. It is envisioned that those skilled in the art can design alternative embodiments of this invention that falls within the scope of the invention. In particular, it is to be appreciated that features from various embodiment(s) may be combined to form one or more additional embodiments. Further, the following are non-exhaustive examples of features that may be combined with the described embodiments to form further embodiments that falls within the scope of the invention:-

- In the single device embodiment, the user (tourist) may send both the retailer identifier and the transaction details to the server 110 for further processing upon scanning the retailer QR code. As a pre-requisite, the server 110 will however process the transaction details if and only if the retailer identifier is verified.
- The verification or scanning of the retailer's identifier may be performed either during the refund qualifying transaction is made or after. In the former case, the transaction details are captured before the retailer identifier is scanned before transmission to the server 110. This is particularly relevant for the single device embodiment. In the latter case, the retailer identifier may be verified or scanned for purpose of opening the transaction session before either the user or an authorized representative of the retailer retrieves the transaction details.

WE CLAIM

1. A system for facilitating refund to a user comprising:

a mobile device having means to communicate with a central processor for the generation of a refund account and a unique identifier; the unique identifier associated with the user;

a computer device operable to access the unique identifier for verification upon receipt of a refund qualifying transaction associated with the user, the computer device further operable to receive and send information relating to the refund qualifying transaction and generate a refund request upon successful verification; and

the central processor operable to be in data communication with the computer device to receive or send information relating to verification of the unique identification and the refund qualifying transaction and process the verification or refund request, the central processor further configured to generate an electronic ticket to be sent to the mobile device for the generation of a refund upon successful process of the refund request.

2. The system according to claim 1, wherein the refund is a tax refund and in the form of an intermediate value.

3. The system according to claim 2, wherein the intermediate value is derived from the actual value of refund based on a conversion rate.

4. The system according to claim 1, wherein the computer device is a point-of-sale device, the point-of-sale device is configured to directly send information relating to the refund qualifying transaction to the central processor.

5. The system according to claim 1, wherein the unique identifier is encoded as a quick response (QR) code and the computer device accesses the unique identifier by scanning the QR code displayed on the mobile device.

6. The system according to claim 1, wherein the central processor is operable to send the electronic ticket to a third party server for further verification of the refund qualifying transaction and confirmation of the refund.

7. The system according to claim 6, wherein the central processor stores the information relating to the refund qualifying transaction in a database before the electronic ticket is generated and sent to the third party server.

8. The system according to claim 1, wherein the mobile device is operable to send an electronic notification related to a requirement being met.

9. The system according to claim 8, wherein the requirement is a confirmation of departure.

10. The system according to claim 8, wherein the requirement is a Declaration of Eligibility.

11. The system according to claim 10, wherein the mobile device is operable to receive a notification of refund issued by a third party server once the electronic ticket is processed successfully.

12. The system according to claim 1, wherein the central processor is operable to receive a notification of refund issued by a third party server once the at least one electronic ticket is processed successfully and the central processor is operable to send a notification of refund to the mobile device.

13. The system according to claim 1, wherein the unique identifier associated with the user is generated based on a passport information of the user.

14. The system according to claim 13, wherein the unique identifier is generated after a registration process by the user.

15. The system according to claim 13, wherein the unique identifier is further associated with an image capture of the passport.

16. The system according to any one of the preceding claims, wherein the mobile device is integrated with the computing device.

17. The system according to any one of the preceding claims, wherein the central processor is operable to send a notification to the mobile device indicating the success or failure of the refund request.

18. The system according to claim 1, wherein there comprises another unique identifier associated with a retailer using the computer device.

19. The system according to claim 18, wherein the another unique identifier is generated after a registration process by the retailer.

20. The system according to claim 18, wherein the another unique identifier is further associated with an image capture of one or more account information associated with the retailer.

21. The system according to claim 1, wherein if the unique identifier is not accessible by the computer device, the computer device is operable to obtain an alternative identifier for verification and send the alternative identifier to the central processor.

22. The system according to claim 21, wherein upon receipt of the alternative identifier, the central processor is operable to determine whether a corresponding refund account associated with the user is present and if not, the central processor is operable to generate the refund account and the unique identifier based on the alternative identifier.

23. The system according to claim 2, wherein the central processor comprises a database for storing at least one retailer list of goods and

services eligible for tax refund.

24. The system according to claim 23, wherein the central processor is operable to receive a wish-list of goods and services from the mobile device and upon receipt of the wish-list, compare the wish-list with the at least one retailer list of goods and services.

25. The system according to claim 24, wherein when there is a match between the wish-list and the at least one retailer list, the central processor is operable to provide a matched list to the mobile device.

26. The system according to claim 1, wherein the electronic ticket is a provisional electronic ticket, the provisional electronic ticket comprises a plurality of electronic receipts.

27. The system according to claim 26, wherein the provisional electronic ticket is converted to a final electronic ticket at an approved departure point.

28. The system according to claim 1, the central processor arranged in data communication with at least one third party server to retrieve information related to the identity of the user, and sends the information related to the identity of the user to the computer device

29. A method for facilitating a refund to a user comprising the steps of:

communicating via a mobile device with a central processor for the generation of a refund account and a unique identifier, the unique identifier associated with the user;

via a computer device,

accessing the unique identifier for verification on receipt of a refund qualifying transaction associated with the user;

generating a refund request upon successful verification; and

sending information relating to the refund qualifying transaction

via a central processor,

receiving and processing the refund request;,

wherein the central processor is further configured to generate an electronic ticket to be sent to the mobile device for the generation of a refund upon successful process of the refund request.

30. The method of claim 29, further including the step of converting the refund to an intermediate value after the generation of the refund.

31. The method of claim 30 wherein the intermediate value is derived from the actual value of refund based on a conversion rate.

32. The method of claim 29 further comprising the step of exporting the information relating to the refund qualifying transaction via a point-of-sale (POS) device in data communication with the computer device, the point-of-sale device is configured to directly send information relating to the refund qualifying transaction to the central processor.

33. The method of claim 29 wherein the computer device accesses the unique identifier by scanning an image shown on the mobile device.

34. The method according to claim 29, further comprising the step of sending the electronic ticket to a government server for further verification of the refund qualifying transaction and confirmation of the refund.

35. The method according to claim 34, wherein the mobile device is operable to send an electronic notification related to a requirement being met.

36. The method according to claim 35, wherein the requirement is a confirmation of departure.

37. The method according to claim 35, wherein the requirement is a Declaration of Eligibility.

38. The method of claim 29 wherein the generation of electronic ticket is based upon one or more requirements being met.

39. The method of claim 35 further comprising the step of sending an electronic notification to the mobile device indicating the success or failure of the refund request.

40. The method according to claim 29, further comprises a step of obtaining an alternative identifier for verification and sending the alternative identifier to the central processor if the unique identifier is not accessible by the computer device.

41. The method according to claim 29, wherein upon receipt of the alternative identifier, the central processor is operable to determine whether a corresponding refund account associated with the user is present and if not, the central processor is operable to generate the refund account and the unique identifier based on the alternative identifier.

42. The method according to claim 29, wherein the central processor comprises a database for storing at least one retailer list of goods and services eligible for tax refund.

43. The method according to claim 31, wherein the central processor is operable to receive a wish-list of goods and services from the mobile device and upon receipt of the wish-list, compare the wish-list with the at least one retailer list of goods and services.

44. The method according to claim 32, wherein when there is a match between the wish-list and the at least one retailer list, the central processor is operable to provide a matched list to the mobile device.

45. The method according to claim 29, wherein the electronic ticket is a

provisional electronic ticket, the provisional electronic ticket comprises a plurality of electronic receipts.

46. The method according to claim 45, wherein the provisional electronic ticket is converted to a final electronic ticket at an approved departure point.

47. A non-transitory computer readable medium containing executable software instructions thereon wherein when executed on a mobile device and/or a computer device performs the method of facilitating a refund to a user comprising the steps of:

communicating via the mobile device with a central processor for the generation of a refund account and a unique identifier, the unique identifier associated with the user;

accessing the unique identifier for verification via a computer device on receipt of a refund qualifying transaction associated with the user;

sending information relating to the refund qualifying transaction;

generating a refund request upon successful verification; and

receiving and processing the refund request by a central processor,

wherein the central processor is further configured to generate an electronic ticket to be sent to the mobile device for the generation of a refund upon successful process of the refund request.

48. The non-transitory computer readable medium according to claim 47, further comprising a software instruction to send an electronic notification to the mobile device indicating the success or failure of the refund request.

49. The system of claim 1, wherein if the refund request is not successfully processed, the central processor is arranged in data communication with another computer device provided to an authorized personnel to perform further processing.

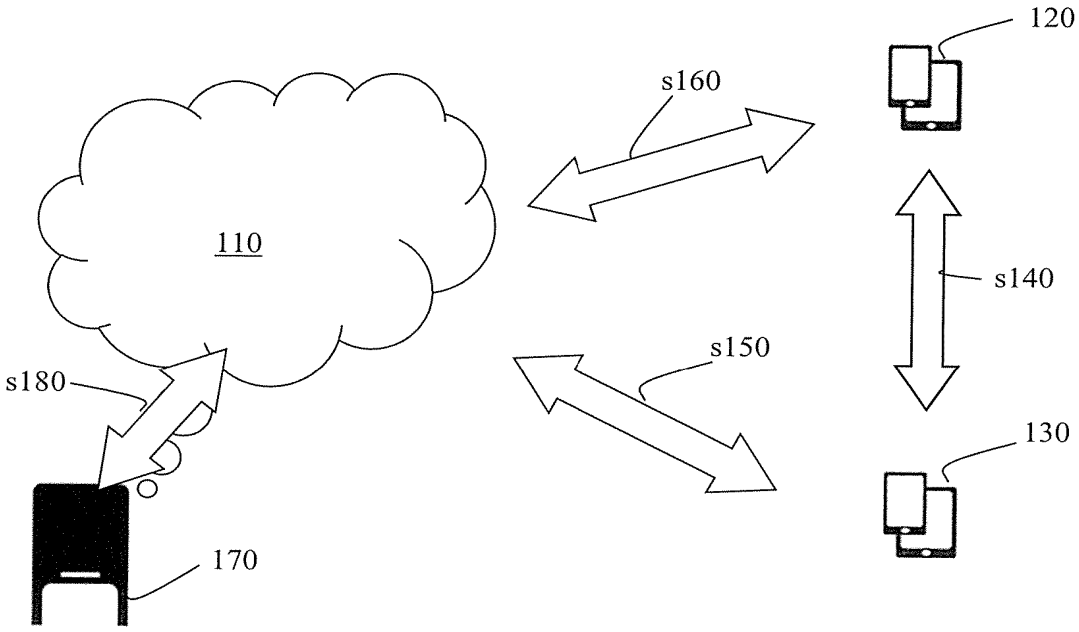

FIG. 1

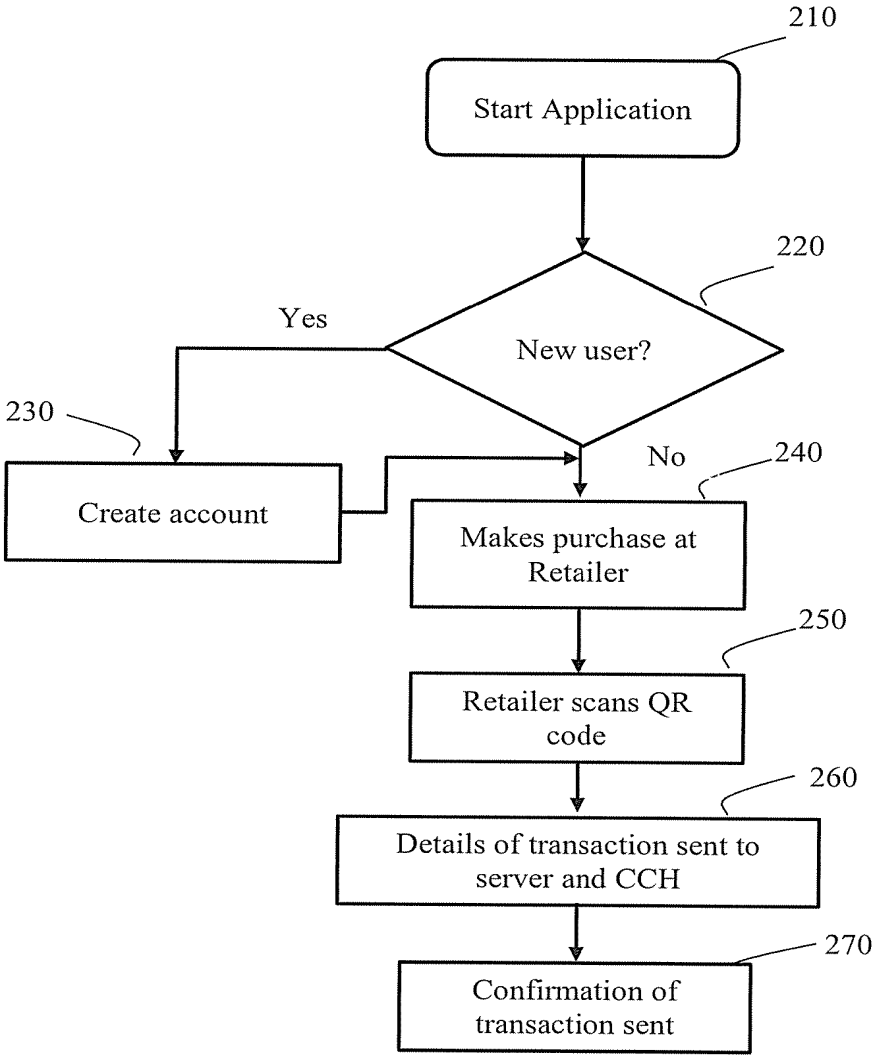
210
Start Application
220
New user?
Yes
230
Create account
No
240
Makes purchase at Retailer
250
Retailer scans QR code
260
Details of transaction sent to server and CCH
270
Confirmation of transaction sent

FIG. 2

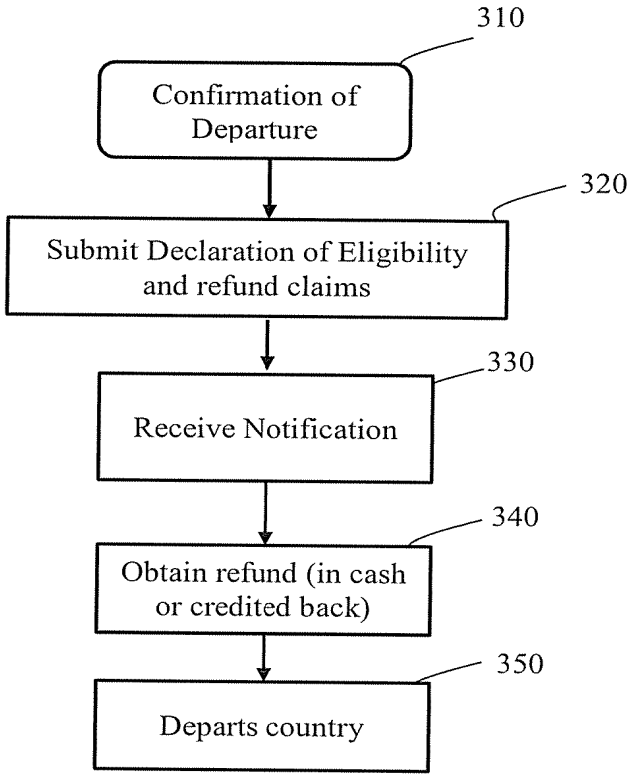
310
Confirmation of Departure
320
Submit Declaration of Eligibility and refund claims
330
Receive Notification
340
Obtain refund (in cash or credited back)
350
Departs country

FIG. 3

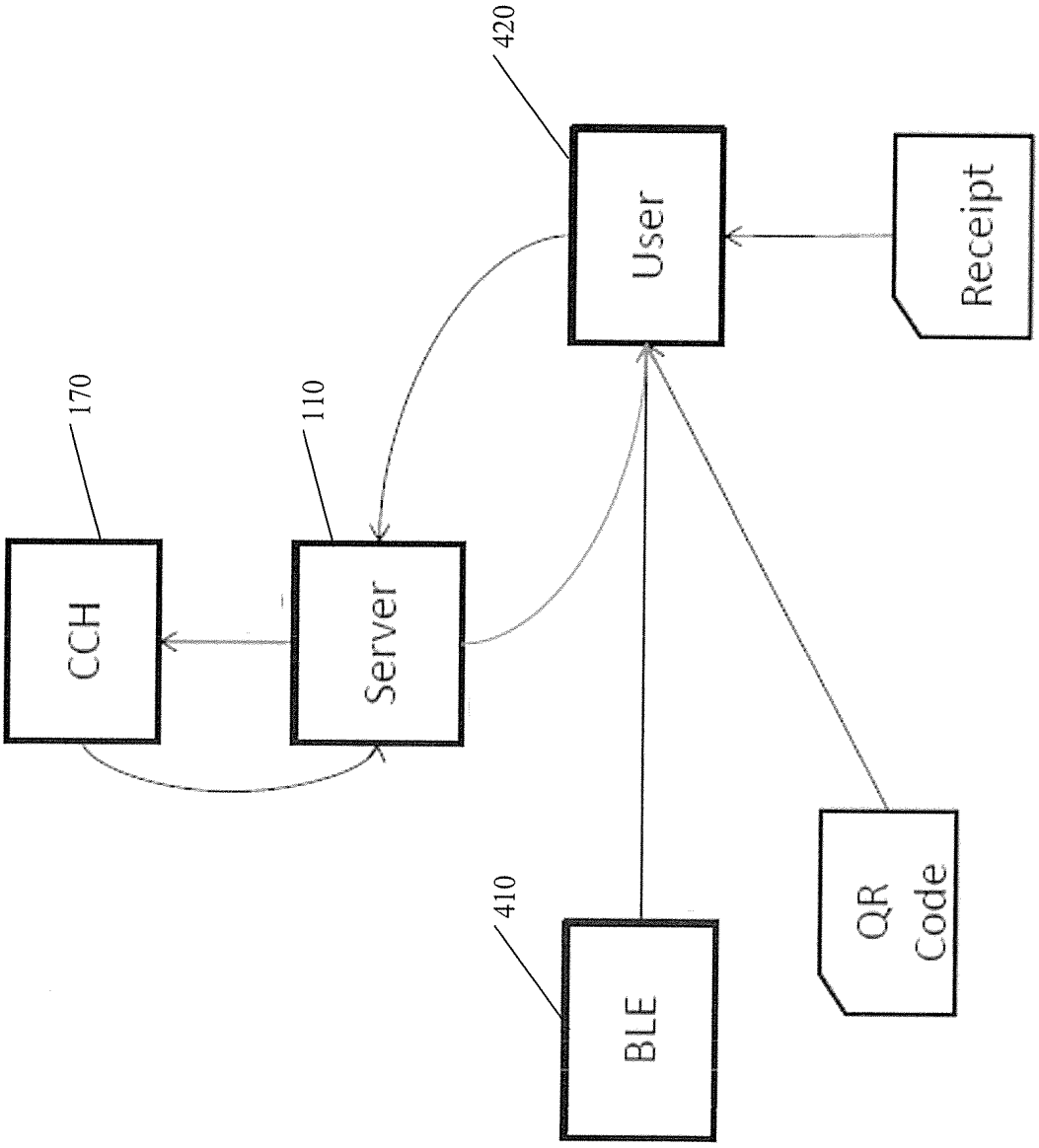

FIG. 4

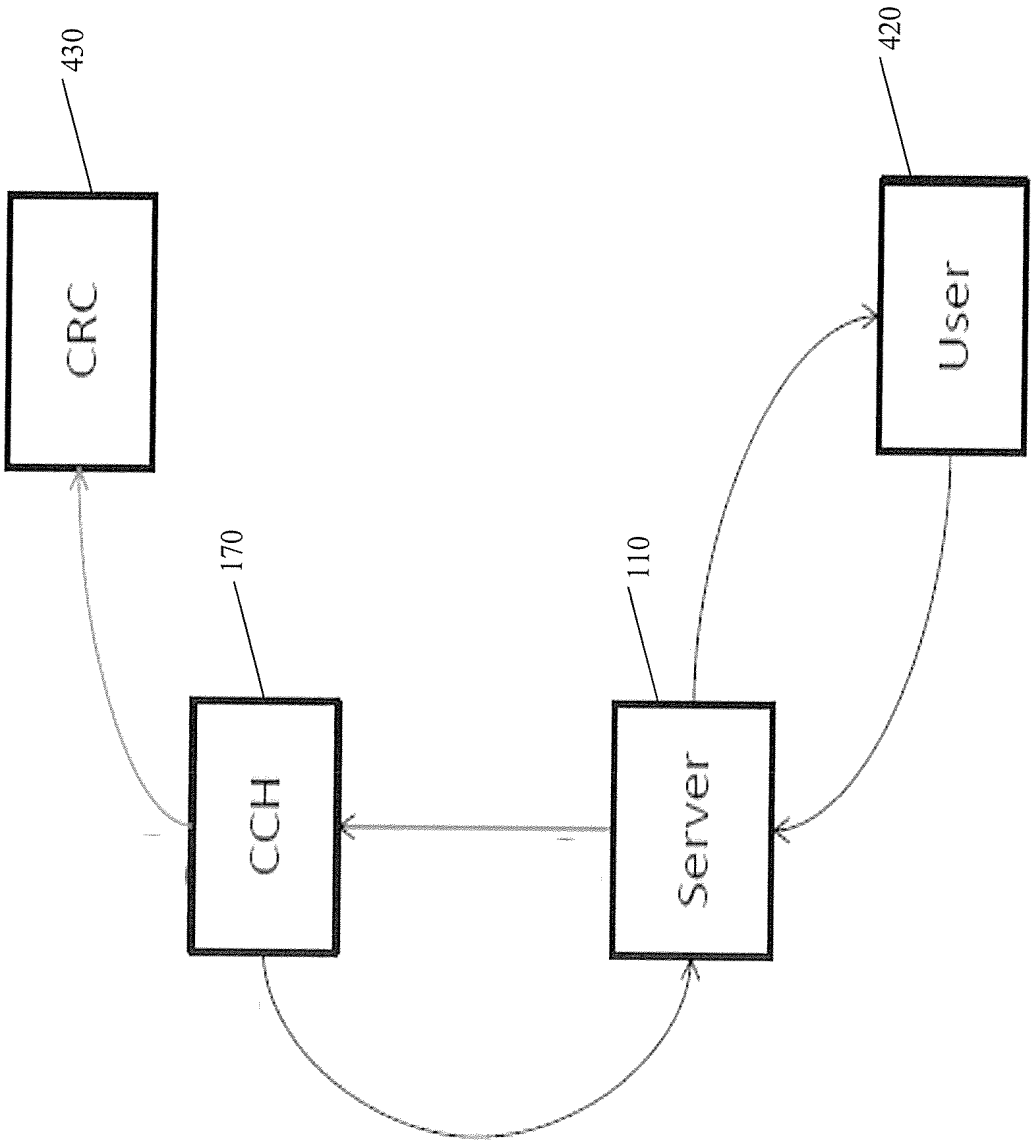

FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SG2016/050297

A. CLASSIFICATION OF SUBJECT MATTER

G06Q 20/32 (2012.01) ***G06Q 40/02 (2012.01)***

According to International Patent Classification (IPC)

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G06Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

FAMPAT: mobile device, smartphone, tax, VAT, GST, refund, rebate, reimbursement, electronic ticket, voucher, QR code and other related terms

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 10-2014-0032089 A (KTIS CORPORATION) 14 March 2014 paragraphs [0001], [0025], [0068]-[0071], [0076], [0077], [0086]-[0088], [0113], [0114], [0124], [0125] of the machine translation	1-49
A	WO 2011/147912 A1 (GLOBAL BLUE HOLDINGS AB) 1 December 2011 paragraphs [0069], [00143], [00153]	-
A	US 2015/0127534 A1 (BHAMBHANI, M. M.) 7 May 2015 paragraph [0035]	-
A L	How VAT refund claim on purchases works. 6 July 2015 [Retrieved on 2016-09-28 from https://web.archive.org/web/20150706170705/http://www.optimal-tax-free.com/en/vat-refund/; for the purpose of establishing publication date of this citation] the whole document	-

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

*Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
28/09/2016 *(day/month/year)*	30/09/2016 *(day/month/year)*
Name and mailing address of the ISA/SG **Intellectual Property Office of Singapore** 51 Bras Basah Road #01-01 Manulife Centre Singapore 189554 Email: pct@ipos.gov.sg	Authorized officer Lee Yi Chau IPOS Customer Service Tel. No.: (+65) 6339 8616

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/SG2016/050297

Note: This Annex lists known patent family members relating to the patent documents cited in this International Search Report. This Authority is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR 10-2014-0032089 A	14/03/2014	WO 2014/038775 A1	13/03/2014
WO 2011/147912 A1	01/12/2011	AU 2011257210 A1	06/12/2012
		AU 2011257210 B2	21/05/2015
		AU 2011257210 B8	11/06/2015
		EP 2577592 A1	10/04/2013
		EP 2577593 A1	10/04/2013
		EP 2577595 A1	10/04/2013
		EP 2577596 A1	20/04/2013
		GB 2480662 A	30/11/2011
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		KR 2013-0050943 A	16/05/2013
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		WO 2011/147914 A1	01/12/2011
		WO 2011/147918 A1	01/12/2011
US 2015/0127534 A1	07/05/2015	NONE	

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

24341 7590 01/26/2024

Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

EXAMINER	
POINVIL, FRANTZY	
ART UNIT	PAPER NUMBER
3698	

DATE MAILED: 01/26/2024

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/197,071	05/14/2023	Paresh K. Patel	104402-5075-US	9843

TITLE OF INVENTION: METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	04/26/2024

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 40% the amount of undiscounted fees, and micro entity fees are 20% the amount of undiscounted fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via the USPTO patent electronic filing system.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of this issue fee in order not to jeopardize copendency.**

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

24341 7590 01/26/2024
Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via the USPTO patent electronic filing system or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/197,071	05/14/2023	Paresh K. Patel	104402-5075-US	9843

TITLE OF INVENTION: METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	04/26/2024

EXAMINER	ART UNIT	CLASS-SUBCLASS
POINVIL, FRANTZY	3698	705-044000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑ Issue Fee ❑ Publication Fee (if required)

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via the USPTO patent electronic filing system ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

❑ Applicant asserting small entity status. See 37 CFR 1.27

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

❑ Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/197,071	05/14/2023	Paresh K. Patel	104402-5075-US	9843

24341 7590 01/26/2024

Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

EXAMINER	
POINVIL, FRANTZY	
ART UNIT	PAPER NUMBER
3698	

DATE MAILED: 01/26/2024

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. The United States Patent and Trademark Office (USPTO) collects the information in this record under authority of 35 U.S.C. 2. The USPTO's system of records is used to manage all applicant and owner information including name, citizenship, residence, post office address, and other information with respect to inventors and their legal representatives pertaining to the applicant's/ owner's activities in connection with the invention for which a patent is sought or has been granted. The applicable Privacy Act System of Records Notice for the information collected in this form is COMMERCE/PAT-TM-7 Patent Application Files, available in the Federal Register at 78 FR 19243 (March 29, 2013).
https://www.govinfo.gov/content/pkg/FR-2013-03-29/pdf/2013-07341.pdf

Routine uses of the information in this record may include disclosure to:

1) law enforcement, in the event that the system of records indicates a violation or potential violation of law;
2) a federal, state, local, or international agency, in response to its request;
3) a contractor of the USPTO having need for the information in order to perform a contract;
4) the Department of Justice for determination of whether the Freedom of Information Act (FOIA) requires disclosure of the record;
5) a Member of Congress submitting a request involving an individual to whom the record pertains, when the individual has requested the Member's assistance with respect to the subject matter of the record;
6) a court, magistrate, or administrative tribunal, in the course of presenting evidence, including disclosures to opposing counsel in the course of settlement negotiations;
7) the Administrator, General Services Administration (GSA), or their designee, during an inspection of records conducted by GSA under authority of 44 U.S.C. 2904 and 2906, in accordance with the GSA regulations and any other relevant (i.e., GSA or Commerce) directive, where such disclosure shall not be used to make determinations about individuals;
8) another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c));
9) the Office of Personnel Management (OPM) for personnel research purposes; and
10) the Office of Management and Budget (OMB) for legislative coordination and clearance.

If you do not furnish the information requested on this form, the USPTO may not be able to process and/or examine your submission, which may result in termination of proceedings, abandonment of the application, and/or expiration of the patent.

Notice of Allowability	Application No. 18/197,071	Applicant(s) Patel, Paresh K.	
	Examiner FRANTZY POINVIL	Art Unit 3698	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to the response filed 11/15/2023.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 1-20 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some* c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☑ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 12/6/2023.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/FRANTZY POINVIL/
Primary Examiner, Art Unit 3698

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Allowable Subject Matter

2. The following is an examiner's statement of reasons for allowance:

Claims 1-20 are allowable over the art of record.

Particularly, the prior art taken alone or in combination failed to teach or suggest :

The prior art taken alone or in combination failed to teach or disclose :the limitations of claims 1, 13 and 15.

Particularly, the prior art failed to teach or suggest:

"displaying a user interface of the mobile payment application on the display of the mobile device, the user interface being configured to display a visual indication of the one or more payment accepting units and accept user input selecting an available payment accepting unit of the one or more payment accepting units, after establishing the wireless communication path, enabling user interaction with the user interface of the mobile payment application to complete a transaction with the available payment accepting unit, wherein the user interface includes a visual representation of the available payment accepting unit, an indication of a balance, and an affordance that, in response to a user input, indicates completion of the transaction, exchanging information with the available payment accepting unit via the one or more radio transceivers, in conjunction with the transaction, and after exchanging the information, displaying, on the display, an updated user interface of the mobile payment application to the user of the mobile device" as recited in independent claims 1, 13 and 15.

The above recited limitations provide meaningful limitations that transforms the abstract idea into patent eligible. The claims as a whole effect an improvement to another technology or technical field. These limitations in combination provide meaningful limitations beyond generally linking the use of the abstract idea to a practical application.

3. The following prior art is deemed relevant but failed to teach or suggest the above noted limitations.

Maeng (US Patent No. 11010759 B1) discloses a system, computer-readable storage medium and method provide a secure transaction by receiving, from a mobile wallet a request to assign a vendor specific payment account identifier (VSPAI) to a payment account identifier (PAI) associated with a user of the mobile wallet. Identifying information is verified of: (i) an issuer of the PAI, (ii) a specific vendor; and (iii) the user of the mobile wallet. In response to verifying, a unique VSPAI is created that is associated with the PAI of the user and the specific vendor. Then, when a payment request is received including the unique VSPAI for a transaction with a particular vendor, the particular vendor is verified as the specific vendor associated with the unique VSPAI. In response to verifying that the particular vendor, payment of the transaction by the issuer using the PAI associated with the unique VSPAI is facilitated.

Giordano (US Pub. No. 20020152123 A1) discloses a method and apparatus for processing retail non-cash transaction at a kiosk or other similar self-service station. A terminal located at the kiosk is similar to online consumer computer 710 except that a product database similar to that found in online merchant computer 734 is stored in the mass storage device. In operation, the customer in merchant store 12 approaches a kiosk in the store, indicates a food,

merchandise or service selection, and provides a customer/transmitter ID using input device 920, customer transceiver 50 or a combination of the two. In doing so, the customer has placed an order for the desired article of food, merchandise or service and simultaneously initiated payment processing. Once the transaction is authorized, a receipt is printed on printer 990 and the purchase is delivered to the customer, either at the kiosk or at another predetermined location.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to FRANTZY POINVIL whose telephone number is (571)272-6797. The examiner can normally be reached on M-Th 7:00AM to 5:30PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Anderson can be reached on 571-270-0508. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/FP/

/FRANTZY POINVIL/
Primary Examiner, Art Unit 3698

January 12, 2024

Notice of References Cited	Application/Control No. 18/197,071	Applicant(s)/Patent Under Reexamination Patel, Paresh K.	
	Examiner FRANTZY POINVIL	Art Unit 3698	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Name	CPC Classification	US Classification
*	A	US-11010759-B1	2021-05-18	Maeng; Joon	G06Q20/401	1/1
*	B	US-20140279537-A1	2014-09-18	Cicoretti; Dean L.	G06Q20/40	705/44
*	C	US-20120158528-A1	2012-06-21	Hsu; Wesley	G06Q20/322	705/16
*	D	US-20020152123-A1	2002-10-17	Giordano, Joseph	G06Q20/20	705/14.36
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	Mobile payments head to the United States, Mobile Internet 6.10: 1. Information Gatekeepers, Inc., Dialog Accession No. 123850832, October (Year: 2004).
	V	"During the period 2--5 to 2009, the total number of wireless data connections used for retail applications in Europe can be expected to rise from less than 1 million to around 3 million", M2 PressWire 28 February (Year: 2006).
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in YYYY-MM-DD format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/197,071	Patel, Paresh K.
	Examiner	Art Unit
	FRANTZY POINVIL	3698

CPC - Searched*		
Symbol	**Date**	**Examiner**
G06Q20/40; G06Q20/18; G06Q20/322; G06Q20/3226; G06Q20/327; G06Q20/3278; G07F7/0893; G07F9/023	08/01/2023	FP
G06Q20/40; G06Q20/18; G06Q20/322; G06Q20/3226; G06Q20/327; G06Q20/3278; G07F7/0893; G07F9/023	11/28/2023	FP

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**
705	3-44	08/01/2023	FP
705	3-44	11/28/2023	FP

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	**Date**	**Examiner**
See the attached DAV and Proquest searches.	08/01/2023	FP
See the attached DAV and Proquest searches.	11/28/2023	FP
CBM2020-00026 Reviewed EX2004 – Tushie Disclosure.	11/30/2023	FP
CBM2020-00026 Reviewed Document Id. EX2002 – US Pat. No. 8,489,140 issued to Weiner.	11/30/2023	FP
CBM2020-00026 Reviewed Document Id. EX2001 – US Pub. No. 20130166448A1 issued to Narayanan.	11/30/2023	FP

/FRANTZY POINVIL/ Primary Examiner, Art Unit 3698	

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/197,071	Patel, Paresh K.
	Examiner	Art Unit
	FRANTZY POINVIL	3698

CBM2020-00026 Reviewed Document Id. 1008 – Plaintiff – Claim Charts of U.S. Patent No. 9,659,296.	11/30/2023	FP
CBM2020-00026 Reviewed Document Id. 1007 – Declaration of David R. Tushie.	11/30/2023	FP
CBM2020-00026 Reviewed Document Id. 1006 - US Patent No. 9,659,296, Patent Prosecution history,	11/30/2023	FP
CBM2020-00026 Reviewed Document Id. 1004 - US Patent No. 9,898,884 issued to Arora.	11/30/2023	FP
CBM2020-00026 Reviewed Document Id. 1003 - US Pub. No. 2012/0029691 to Mockus.	11/23/2023	FP
CBM2020-00026 Reviewed Document Id. 1001 – U.S. Patent No. 9,659,296.	11/30/2023	FP
CBM2020-00026 Reviewed Patent Owner's Preliminary Response, Paper No. 7.	11/30/2023	FP
CBM2020-00026 Reviewed Petitioners' Updated Mandatory Notices, Paper No. 6.	11/30/2023	FP
IPR2021-00086 Reviewed Document Id. EX2008 Docket Entry Listings.	11/30/2023	FP
IPR2021-00086 Reviewed Document Id. EX2004 Tushie Disclosure.	11/30/2023	FP
IPR2021-00086 Reviewed Document Id. EX2003 – Defendants' Second Supplemental Disclosure.	11/30/2023	FP
IPR2021-00086 Reviewed Document Id. EX2002 – US Pat. No. 8,489,140 issued to Weiner.	11/30/2023	FP
IPR2021-00086 Reviewed Document Id. EX2001 US Pub. No. 20130166448A1 issued to Narayanan.	11/30/2023	FP
IPR2021-00086 Reviewed Document Id. EX1013 of Defendants' KioSoft Technologies LLC and TechTres, Inc. on 9/9/2020.	11/30/2023	FP
IPR2021-00086 Reviewed Document Id. EX1009 US Patent No. 9,898,884 issued to Arora.	11/30/2023	FP
IPR2021-00086 Reviewed Document Id. EX1008 - Plaintiff Claim Charts of U.S. Patent No. 9,659,296 filed 10/20/2020.	11/30/2023	FP
IPR2021-00086 Reviewed Document Id. EX1007 – Declaration of David R. Tushie.	11/30/2023	FP

/FRANTZY POINVIL/ Primary Examiner, Art Unit 3698	

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/197,071	Patel, Paresh K.
	Examiner	Art Unit
	FRANTZY POINVIL	3698

IPR2021-00086 Reviewed Document Id. EX1006 - US Patent No. 9,659,296, Patent Prosecution history.	11/30/2023	FP
IPR2021-00086 Reviewed Document Id. EX1004 U.S. Patent No. 8,903,737 issued to Cameron.	11/30/2023	FP
IPR2021-00086 Reviewed Document Id. EX1003 U.S. Pub. No. 20030130892A1 by Athwal.	11/30/2023	FP
IPR2021-00086 Reviewed Document Id. EX1001 U.S. Patent No. 9,659,296 issued to Patel.		FP
	11/30/2023	
IPR2023-01186 Reviewed All filed Documents	11/30/2023	FP
PGR2021-00093 Reviewed all Filed Documents.	11/30/2023	FP
PGR2023-00042 Reviewed All filed Documents.	11/30/2023	FP
PGR2023-00050 Reviewed All filed Documents.	11/30/2023	FP
CBM2020-00026 Reviewed Document Id. EX2003 – Defendant's Second SupplementaL Disclosure.	11/30/2023	FP
CBM2020-0026 Petition for Covered Business Review of U.S. Patent No. 9,659,296, Paper No. 2.	11/30/2023	
PR2021-00086 Trial Instituted Document, Paper No. 12.	11/30/2023	FP
IPR2021-00086 Petitioner's Second Updated Mandatory Notices, Paper No. 8.	11/30/2023	FP
IPR2021-00086 Patent Owner's Preliminary Response, Paper No. 9.	11/30/2023	FP
IPR2021-00086 Petition for Inter Partes Review of U.S. Patent No .9,659,296, Paper No. 3.	11/30/2023	FP
Updated above	01/12/2024	FP

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**
705	44	01/12/2024	FP

/FRANTZY POINVIL/ Primary Examiner, Art Unit 3698	

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/197,071	Patel, Paresh K.
	Examiner	**Art Unit**
	FRANTZY POINVIL	3698

CPC						
Symbol					**Type**	**Version**
G06Q	/	20	/	40	F	2013-01-01
G06Q	/	20	/	327	I	2013-01-01
G06Q	/	20	/	18	I	2013-01-01
G06Q	/	20	/	322	I	2013-01-01
G06Q	/	20	/	3226	I	2013-01-01
G06Q	/	20	/	3278	I	2013-01-01
G07F	/	7	/	0893	I	2013-01-01
G07F	/	9	/	023	I	2013-01-01

CPC Combination Sets								
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	20	
/FRANTZY POINVIL/ Primary Examiner, Art Unit 3698	12 January 2024	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	8A

Petitioner Exhibit 1002-4047

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/197,071	Patel, Paresh K.
	Examiner	**Art Unit**
	FRANTZY POINVIL	3698

INTERNATIONAL CLASSIFICATION				
CLAIMED				
G06Q	/	20	/	40

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**
705	44

CROSS REFERENCES(S)							
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**						
705	44						

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	20	
/FRANTZY POINVIL/ Primary Examiner, Art Unit 3698	12 January 2024	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	8A

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/197,071	Patel, Paresh K.
	Examiner	**Art Unit**
	FRANTZY POINVIL	3698

☑ Claims renumbered in the same order as presented by applicant ☐ CPA ☑ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	10	10	19	19										
2	2	11	11	20	20										
3	3	12	12												
4	4	13	13												
5	5	14	14												
6	6	15	15												
7	7	16	16												
8	8	17	17												
9	9	18	18												

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	20	
/FRANTZY POINVIL/ Primary Examiner, Art Unit 3698	12 January 2024	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	8A

U.S. Patent and Trademark Office

Part of Paper No.: 20240112

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/197,071	Patel, Paresh K.
	Examiner	**Art Unit**
	FRANTZY POINVIL	3698

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS

☑ Claims renumbered in the same order as presented by applicant ☐ CPA ☑ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	08/01/2023	01/12/2023							
1	1	=	=							
2	2	✓	=							
3	3	=	=							
4	4	=	=							
5	5	=	=							
6	6	=	=							
7	7	=	=							
8	8	=	=							
9	9	=	=							
10	10	=	=							
11	11	=	=							
12	12	=	=							
13	13	=	=							
14	14	=	=							
15	15	=	=							
16	16	✓	=							
17	17	=	=							
18	18	=	=							
19	19	=	=							
20	20	=	=							

Petitioner Exhibit 1002-4050

Mobile payment heads to the U.S.

Publication Info: Mobile Internet 6.10: 1. Information Gatekeepers, Inc. (Oct 2004)
ProQuest document link

Abstract (English): Wireless Payments by SMS or micro-browsers have long been a mainstay in high mobile-penetration markets like Japan. The most famous example of this is probably Cmode--Coca Cola vending machines where thirsty users purchase soda using their phones. Following the recent announcement that KDDI would be joining DoCoMo's mobile payment effort by including FeliCa chips in future handsets, Coke is joining in too. New Cmode2 vending machines will support FeliCa chips, as well as current payment methods. However neither of these technologies are in widespread use in the U.S., and they are set to launch, or at least test-launch, nearly simultaneously.

Full text: Wireless Payments by SMS or micro-browsers have long been a mainstay in high mobile-penetration markets like Japan. The most famous example of this is probably Cmode--Coca Cola vending machines where thirsty users purchase soda using their phones. Following the recent announcement that KDDI would be joining DoCoMo's mobile payment effort by including FeliCa chips in future handsets, Coke is joining in too. New Cmode2 vending machines will support FeliCa chips, as well as current payment methods. However neither of these technologies are in widespread use in the U.S., and they are set to launch, or at least test-launch, nearly simultaneously.

AT&T Wireless announced a partnership with USA Technologies to bring e-Port, a wireless payment system, to stateside vending machines and other automated purchase devices. AT&T's part in this is minor, as it will simply provide the wireless access (over GPRS) for USA Technologies to send and process transactions. Vendors that choose to include e-Port in their machines or kiosks will only have to worry about electric supply and not a phone line, even if they want to enable credit card transactions on their machine. This is a more U.S.-centric version of Cmode-like payments, since the wireless aspect is part of the vending machine, not in a handset. Since mobile penetration has only recently crossed 50 percent in the U.S., and since different carriers have different capabilities and technologies, it is probably too difficult to rely on handsets for purchases yet.

E-Port may provide a stop-gap until efforts to deploy Near Field Communication (NFC) systems like FeliCa have gained momentum. To that end, Motorola announced that it would launch a few handsets that include MasterCard's PayPass, an NFC solution, in a few test markets. As on FeliCa handsets, PayPass-equipped phones will include a secure application space allowing subscribers to use them for ticketing, public transportation, and other situations in addition to payments. Nokia, Samsung, and Visa have previously announced that they would support this same protocol. Support from the top three manufacturers and two largest credit cards in the West should all but assure that this will be the standard to replace the ubiquitous magnetic stripe. Since it will be some time before NFC could dominate payment technology in the U.S., AT&T's e-Port partnership capitalizes on near-term demand for wireless payment. Like Cmode, this may even put AT&T and USA Technologies at an advantage when NFC takes off.

Subject: All company;All product and service information;Applications;Joint venture;Product introduction; Computer;Mobile communications;Telecom equipment;Telecom services;Telecommunications

Location: North America;United States

Company / organization: AT&T WIRELESS SERVICES INC (AT&T CORP); USA TECHNOLOGIES INC; AT&T CORP

Product classification: 357100: Computers;366301: Radio communications systems;366308: Cellular phones;481218: Cellular telephone services

Alternate title: Business

Publication title: Mobile Internet

Volume: 6

Issue: 10

Pagination: 1

Publication date: Oct 2004

Publisher: Information Gatekeepers, Inc.

Place of publication: United States

Journal code: MOBIINTE

Source type: Newsletter

Language of publication: English

Document type: Magazine/Journal

Source attribution: Gale Group Business And Industry, © Publisher specific

Accession number: 123850832

Document URL: https://dialog.proquest.com/professional/docview/1083884138?accountid=131444

Updates: 2012-10-05

First available: 2012-10-05

Database: Business &Industry (1994 - 2018)

PE2E SEARCH - Search History (Prior Art)

There are no Prior Art searches to show.

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N1	13	(radio AND transceiver$1 AND mobile AND identif$ AND wireless AND transaction AND interface$1 AND exchang$ AND product AND payment$1 AND unit).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:26 AM

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				Application Number	18/197,071
				Filing Date	May 14, 2023
				First Named Inventor	Paresh K. Patel
				Art Unit	3698
				Examiner Name	Frantzy POINVIL
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		Patel et al., Notice of Allowance, US15/893,514, 12JUL2023, 13 pgs.
		Patel et al., Notice of Allowance, US17/973,506, 26JUL2023, 13 pgs.
		Katy Jacob, "Are mobile payments the smart cards of the aughts?", Scientific and Technical Information Center, Report Information from Dialog, July 14, 2023 – 11:33, ProQuest, Publication Info: Chicago Fed Letter 240: 1-4. Federal Reserve Bank of Chicago. (Jul 2007), 9 pgs.
		Patel et al., Notice of Allowance, US17/963,170, 04AUG2023, 16 pgs.
		USA Technologies Announces Cashless Solution to Be Offered by Blackboard Inc., Scientific and Technical Information Center, Report Information from Dialog, July 25, 2023, ProQuest, Publication Info: Business Wire 18 July 2007: NA, 6 pgs.
		Hossain et al., " COMPREHENSIVE STUDY OF BLUETOOTH SIGNAL PARAMETERS FOR LOCALIZATION", Department of Electrical & Computer EngineeringNational University of Singapore, 5 pgs. Email: {g0500774, weeseng}@nus.edu.sg,
		HANDS-FREE PROFILE 1.5, Doc. No. HFP1.5_SPEC, 2005-11-25, 93 pgs.
		DEX and MDB: A Primer For Vendors | Vending Market Watch, Feb 7th, 2008, 5 pgs. https://www.vendingmarketwatch.com/print/content/10272928
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		Gruber et al., "THE COMMODITY VENDING MACHINE", FORUM WARE INTERNATIONAL 2005/02, 11 pgs.
		Michael L. Kasavana, Innovative VDI Standards: Moving an Industry Forward, The Journal of International Management, Volume 4, Number 3, December 2009, 10 pgs.
		SDFL Administrative Order 2021-33, April 6, 2021, 5 pgs.
		The New York Times by David Poque, In Arrived of 2 iPhones, 3 Lessons, Sept. 17, 2013, 4 pgs. https://www./nytime.com/2013/09/18/technology/personaltech/In-Arrived-of-2-iPhones-3-Lessons.html
		Cnet, John Thompson, How to use S Beam on your Samsung Galaxy S3, June 21, 2012, 5 pgs. https://www.cnet.com/how-to/how-to-use-s-beam-on-your-samsung-galaxy-s3/
		iPhone, User Guide For iOS 6.1 Software, 156 pgs.
		Apple Reports Fourth Quarter Results, October 28, 2013, 4 pgs.
		Apple Announces iPhone 5s—The Most Forward - Thinking Smartphone in the World, September 10, 2013, 5 pgs.
		cNet, by Marguerite Reardon, Motion sensing comes to mobile phones, June 11, 2007, 4 pgs.
		Multi-Drop Bus – Internal Communication Protocol, MDB / ICP, Version 3, March 26, 2003, 270 pgs.

Examiner Signature	/FRANTZY POINVIL/	Date Considered	01/12/2024

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /F.P/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT Substitute for Form 1449-PTO				Electronically filed December 6, 2023	
				Application Number	18/197,071
				Filing Date	May 14, 2023
				First Named Inventor	Paresh K. Patel
				Art Unit	3698
				Examiner Name	Frantzy POINVIL
Sheet	17	of	17	Attorney Docket Number	104402-5075-US

		Weidong Kou, Payment Technologies for E-Commerce, University of Hong Kong Pokfulam Road, Hong Kong, ACM Subject Classification (1998): H.4, K.4.4, J.1, 339 pgs.
		Specification for RFID Air Interface, EPC™ Radio-Frequency Identity Protocols, Class-1 Generation-2 UHF RFID, Protocol for Communications at 860 MHz – 960 MHz, Version 1.2.0, EPCglobal Inc., 23 October 2008, 108 pgs.
		Baier et al., "Principles of Model Checking", The MIT Press Cambridge, Massachusetts, London, England, 2008, 994 pgs.
		Patel, Notice of Allowance, US17/983,311, 04OCT2023,11 pgs.
		Patel, Non-Final Office Action, US18/197,070, 27SEP2023, 8 pgs.

Examiner Signature	/FRANTZY POINVIL/	Date Considered	01/12/2024

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /F.P/

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Search Strategy from Dialog

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Search Strategy

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Set#	Searched for	Results
S1	((vending pre/5 machine[*1]) or kiosk[*1]) pre/15 (mobile* or phone[*1] or transceiv*)	47351
S2	S1 and ((payment[*1] or paying) pre/8 (trigg* or transaction[*1]))	2229
S3	(((Select* or chos* or choos* or accept*) or pre/15 or (payee* or seller[*1])) or pre/15 or (terminal[*1] or computer[*1] or mobile or phone or device[*1]))	286299031
S4	S2 and S3	2229
S5	S4 and mobile and accelerat*	844
S6	S1 and S3	47289
S7	S5 and S6	844
S8	S7 and (radio or dispens* or range or transceiver[*1])	740
S9	S8 and (wireless or wifi) and (identif* or id[*1])	66°

° Duplicates are removed from the search and from the result count.

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/08/17 06:47 AM
L2	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/08/17 06:50 AM
L3	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/08/17 07:01 AM
L4	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/08/17 07:06 AM
L5	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/08/17 07:16 AM
L6	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/08/17 07:34 AM
L7	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/08/17 07:44 AM
L8	16188	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR kiosk$1) SAME (mobile OR phone OR device$1) SAME (pay$ OR card$1)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 09:04 AM
L9	1358296	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 09:05 AM
L10	379486	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 09:09 AM
L11	38322	L9 AND l10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT;	OR	ON	ON	2023/08/17 09:13 AM

			IBM_TDB)				
L12	4573	L8 AND I11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 09:14 AM
L13	7	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 09:42 AM
L14	4858	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 09:42 AM
L15	101	L14 AND I12	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 09:43 AM
L16	146744	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 10:34 AM
L17	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2023/08/17 10:35 AM
L18	134	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/17 10:36 AM
L19	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 10:39 AM
L20	1548	(payee$ OR vendor$1	(US-PGPUB; USPAT;	OR	ON	ON	2023/08/17

		OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) SAME (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				12:52 PM
L21	18	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 12:52 PM
L22	392	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 12:56 PM
L23	141	L22 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 01:47 PM
L24	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/09/25 07:49 AM
L25	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/09/25 07:49 AM
L26	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/09/25 07:49 AM
L27	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/09/25 07:49 AM
L28	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/09/25 07:49 AM
L29	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/09/25 07:49 AM
L30	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/09/25 07:49 AM
L31	16284	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR kiosk$1) SAME (mobile	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT;	OR	ON	ON	2023/09/25 07:49 AM

		OR phone OR device$1) SAME (pay$ OR card$1)	IBM_TDB)				
L32	1374202	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/09/25 07:49 AM
L33	383115	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/09/25 07:49 AM
L34	38712	L9 AND I10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/09/25 07:49 AM
L35	4602	L8 AND I11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/09/25 07:49 AM
L36	7	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/09/25 07:49 AM
L37	4951	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/09/25 07:49 AM
L38	101	L14 AND I12	(US-PGPUB; USPAT; USOCR; FIT (AP, AT,	OR	ON	ON	2023/09/25 07:49 AM

			AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L39	147408	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/09/25 07:49 AM
L40	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2023/09/25 07:49 AM
L41	146	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2023/09/25 07:49 AM
L42	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/09/25 07:49 AM
L43	1561	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) SAME (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/09/25 07:49 AM
L44	21	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/09/25 07:49 AM
L45	396	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/09/25 07:49 AM
L46	142	L22 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AP, AT,	OR	ON	ON	2023/09/25 07:49 AM

			AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L47	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L48	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L49	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L50	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L51	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L52	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L53	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L54	16422	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR kiosk$1) SAME (mobile OR phone OR device$1) SAME (pay$ OR card$1)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L55	1388309	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L56	389146	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L57	39432	L9 AND I10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO;	OR	ON	ON	2023/11/24 09:45 AM

			JPO; DERWENT; IBM_TDB)				
L58	4662	L8 AND I11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L59	7	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L60	5091	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L61	105	L14 AND I12	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L62	148744	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L63	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L64	149	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2023/11/24 09:45 AM
L65	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM

L66	1583	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) SAME (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L67	20	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L68	403	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L69	143	L22 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L70	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L71	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L72	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L73	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L74	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L75	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L76	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L77	16422	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO;	OR	ON	ON	2023/11/24 09:45 AM

		kiosk$1) SAME (mobile OR phone OR device$1) SAME (pay$ OR card$1)	JPO; DERWENT; IBM_TDB)				
L78	1388309	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L79	389146	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L80	39432	L9 AND I10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L81	4662	L8 AND I11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L82	7	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L83	5091	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L84	105	L14 AND I12	(US-PGPUB; USPAT;	OR	ON	ON	2023/11/24

			USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				09:45 AM
L85	148744	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L86	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L87	149	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2023/11/24 09:45 AM
L88	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L89	1583	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) SAME (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L90	20	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L91	403	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L92	143	L22 AND I16	(US-PGPUB; USPAT;	OR	ON	ON	2023/11/24

			USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				09:45 AM
L93	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L94	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L95	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L96	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L97	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L98	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L99	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L100	16433	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR kiosk$1) SAME (mobile OR phone OR device$1) SAME (pay$ OR card$1)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L101	1390514	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L102	389697	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L103	39482	L9 AND I10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU,	OR	ON	ON	2023/11/28 06:51 AM

			SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L104	4667	L8 AND I11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L105	7	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L106	5106	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L107	105	L14 AND I12	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L108	148858	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L109	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L110	149	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2023/11/28 06:51 AM
L111	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT;	OR	ON	ON	2023/11/28 06:51 AM

			IBM_TDB)				
L112	1585	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) SAME (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L113	20	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L114	403	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L115	143	L22 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L116	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L117	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L118	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L119	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L120	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L121	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L122	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L123	16433	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU,	OR	ON	ON	2023/11/28 06:51 AM

		computer$1 OR kiosk$1) SAME (mobile OR phone OR device$1) SAME (pay$ OR card$1)	SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L124	1390514	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L125	389697	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L126	39482	L9 AND I10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L127	4667	L8 AND I11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L128	7	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L129	5106	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM

L130	105	L14 AND I12	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L131	148858	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L132	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L133	149	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2023/11/28 06:51 AM
L134	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L135	1585	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) SAME (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L136	20	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L137	403	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM

L138	143	L22 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L139	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L140	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L141	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L142	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L143	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L144	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L145	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L146	16433	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR kiosk$1) SAME (mobile OR phone OR device$1) SAME (pay$ OR card$1)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L147	1390514	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L148	389697	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L149	39482	L9 AND I10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR,	OR	ON	ON	2023/11/28 06:51 AM

			GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L150	4667	L8 AND I11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L151	7	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L152	5106	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L153	105	L14 AND I12	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L154	148858	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L155	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L156	149	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2023/11/28 06:51 AM
L157	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO;	OR	ON	ON	2023/11/28 06:51 AM

			JPO; DERWENT; IBM_TDB)				
L158	1585	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) SAME (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L159	20	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L160	403	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L161	143	L22 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L162	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L163	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L164	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L165	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L166	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L167	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L168	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L169	16433	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR,	OR	ON	ON	2023/11/28 06:51 AM

		SAME (terminal$1 OR computer$1 OR kiosk$1) SAME (mobile OR phone OR device$1) SAME (pay$ OR card$1)	GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L170	1390514	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L171	389697	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L172	39482	L9 AND I10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L173	4667	L8 AND I11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L174	7	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L175	5106	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM

L176	105	L14 AND I12	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L177	148858	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L178	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2023/11/28 06:51 AM
L179	149	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2023/11/28 06:51 AM
L180	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L181	1585	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) SAME (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L182	20	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L183	403	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM

L184	143	L22 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/28 06:51 AM
L185	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L186	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L187	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L188	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L189	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L190	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L191	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L192	16520	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR kiosk$1) SAME (mobile OR phone OR device$1) SAME (pay$ OR card$1)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L193	1403183	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L194	393785	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L195	39921	L9 AND I10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR,	OR	ON	ON	2024/01/12 10:57 AM

			GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L196	4700	L8 AND I11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L197	9	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L198	5177	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L199	106	L14 AND I12	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L200	149734	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L201	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L202	151	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2024/01/12 10:57 AM
L203	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO;	OR	ON	ON	2024/01/12 10:57 AM

			JPO; DERWENT; IBM_TDB)				
L204	1598	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) SAME (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L205	20	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L206	404	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L207	143	L22 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L208	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L209	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L210	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L211	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L212	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L213	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L214	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L215	16520	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR,	OR	ON	ON	2024/01/12 10:57 AM

		SAME (terminal$1 OR computer$1 OR kiosk$1) SAME (mobile OR phone OR device$1) SAME (pay$ OR card$1)	GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L216	1403183	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L217	393785	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L218	39921	L9 AND I10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L219	4700	L8 AND I11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L220	9	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L221	5177	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM

L222	106	L14 AND I12	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L223	149734	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L224	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L225	151	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2024/01/12 10:57 AM
L226	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L227	1598	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) SAME (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L228	20	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L229	404	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM

L230	143	L22 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L231	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L232	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L233	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L234	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L235	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L236	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L237	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L238	16520	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR kiosk$1) SAME (mobile OR phone OR device$1) SAME (pay$ OR card$1)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L239	1403183	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L240	393785	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L241	39921	L9 AND I10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR,	OR	ON	ON	2024/01/12 10:57 AM

			GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L242	4700	L8 AND I11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L243	9	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L244	5177	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L245	106	L14 AND I12	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L246	149734	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L247	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L248	151	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2024/01/12 10:57 AM
L249	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO;	OR	ON	ON	2024/01/12 10:57 AM

			JPO; DERWENT; IBM_TDB)				
L250	1598	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) SAME (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L251	20	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L252	404	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L253	143	L22 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L254	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L255	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L256	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L257	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L258	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L259	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L260	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L261	16520	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR,	OR	ON	ON	2024/01/12 10:57 AM

		SAME (terminal$1 OR computer$1 OR kiosk$1) SAME (mobile OR phone OR device$1) SAME (pay$ OR card$1)	GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L262	1403183	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L263	393785	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L264	39921	L9 AND I10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L265	4700	L8 AND I11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L266	9	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L267	5177	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM

L268	106	L14 AND I12	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L269	149734	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L270	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L271	151	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2024/01/12 10:57 AM
L272	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L273	1598	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) SAME (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L274	20	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L275	404	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM

L276	143	L22 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L277	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L278	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L279	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L280	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L281	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L282	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L283	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L284	16520	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR kiosk$1) SAME (mobile OR phone OR device$1) SAME (pay$ OR card$1)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L285	1403183	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L286	393785	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L287	39921	L9 AND I10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR,	OR	ON	ON	2024/01/12 10:57 AM

			GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L288	4700	L8 AND I11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L289	9	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L290	5177	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L291	106	L14 AND I12	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L292	149734	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L293	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L294	151	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2024/01/12 10:57 AM
L295	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO;	OR	ON	ON	2024/01/12 10:57 AM

			JPO; DERWENT; IBM_TDB)				
L296	1598	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) SAME (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L297	20	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L298	404	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L299	143	L22 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L300	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L301	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L302	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L303	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L304	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L305	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L306	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L307	16520	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR,	OR	ON	ON	2024/01/12 10:57 AM

		SAME (terminal$1 OR computer$1 OR kiosk$1) SAME (mobile OR phone OR device$1) SAME (pay$ OR card$1)	GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L308	1403183	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L309	393785	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L310	39921	L9 AND I10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L311	4700	L8 AND I11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L312	9	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L313	5177	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM

L314	106	L14 AND I12	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L315	149734	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L316	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L317	151	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2024/01/12 10:57 AM
L318	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L319	1598	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) SAME (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L320	20	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L321	404	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM

L322	143	L22 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L323	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L324	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L325	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L326	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L327	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L328	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L329	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L330	16520	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR kiosk$1) SAME (mobile OR phone OR device$1) SAME (pay$ OR card$1)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L331	1403183	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L332	393785	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L333	39921	L9 AND I10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR,	OR	ON	ON	2024/01/12 10:57 AM

			GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L334	4700	L8 AND I11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L335	9	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L336	5177	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L337	106	L14 AND I12	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L338	149734	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L339	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L340	151	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2024/01/12 10:57 AM
L341	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO;	OR	ON	ON	2024/01/12 10:57 AM

			JPO; DERWENT; IBM_TDB)				
L342	1598	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) SAME (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L343	20	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L344	404	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L345	143	L22 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L346	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L347	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L348	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L349	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L350	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L351	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L352	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L353	16520	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR,	OR	ON	ON	2024/01/12 10:57 AM

		SAME (terminal$1 OR computer$1 OR kiosk$1) SAME (mobile OR phone OR device$1) SAME (pay$ OR card$1)	GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L354	1403183	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L355	393785	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L356	39921	L9 AND I10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L357	4700	L8 AND I11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L358	9	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L359	5177	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM

L360	106	L14 AND I12	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L361	149734	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L362	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2024/01/12 10:57 AM
L363	151	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2024/01/12 10:57 AM
L364	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L365	1598	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) SAME (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L366	20	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L367	404	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM

L368	143	L22 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 10:57 AM
L369	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L370	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L371	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L372	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L373	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L374	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L375	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L376	16520	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR kiosk$1) SAME (mobile OR phone OR device$1) SAME (pay$ OR card$1)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L377	1403183	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L378	393785	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L379	39921	L9 AND I10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR,	OR	ON	ON	2024/01/12 11:01 AM

			GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L380	4700	L8 AND I11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L381	9	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L382	5177	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L383	106	L14 AND I12	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L384	149734	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L385	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L386	151	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2024/01/12 11:01 AM
L387	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO;	OR	ON	ON	2024/01/12 11:01 AM

			JPO; DERWENT; IBM_TDB)				
L388	1598	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) SAME (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L389	20	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L390	404	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L391	143	L22 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L392	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L393	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L394	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L395	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L396	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L397	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L398	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L399	16520	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR,	OR	ON	ON	2024/01/12 11:01 AM

		SAME (terminal$1 OR computer$1 OR kiosk$1) SAME (mobile OR phone OR device$1) SAME (pay$ OR card$1)	GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L400	1403183	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L401	393785	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L402	39921	L9 AND I10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L403	4700	L8 AND I11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L404	9	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L405	5177	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM

L406	106	L14 AND I12	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L407	149734	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L408	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L409	151	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2024/01/12 11:01 AM
L410	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L411	1598	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) SAME (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L412	20	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L413	404	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM

L414	143	L22 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L415	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L416	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L417	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L418	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L419	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L420	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L421	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L422	16520	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR kiosk$1) SAME (mobile OR phone OR device$1) SAME (pay$ OR card$1)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L423	1403183	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L424	393785	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L425	39921	L9 AND I10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR,	OR	ON	ON	2024/01/12 11:01 AM

			GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L426	4700	L8 AND I11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L427	9	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L428	5177	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L429	106	L14 AND I12	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L430	149734	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L431	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L432	151	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2024/01/12 11:01 AM
L433	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO;	OR	ON	ON	2024/01/12 11:01 AM

			JPO; DERWENT; IBM_TDB)				
L434	1598	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) SAME (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L435	20	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L436	404	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L437	143	L22 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L438	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L439	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L440	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L441	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L442	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L443	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L444	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L445	16520	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR,	OR	ON	ON	2024/01/12 11:01 AM

		SAME (terminal$1 OR computer$1 OR kiosk$1) SAME (mobile OR phone OR device$1) SAME (pay$ OR card$1)	GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L446	1403183	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L447	393785	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L448	39921	L9 AND I10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L449	4700	L8 AND I11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L450	9	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L451	5177	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM

L452	106	L14 AND I12	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L453	149734	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L454	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L455	151	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2024/01/12 11:01 AM
L456	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L457	1598	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) SAME (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L458	20	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L459	404	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM

L460	143	L22 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L461	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L462	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L463	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L464	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L465	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L466	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L467	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L468	16520	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR kiosk$1) SAME (mobile OR phone OR device$1) SAME (pay$ OR card$1)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L469	1403183	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L470	393785	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L471	39921	L9 AND I10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR,	OR	ON	ON	2024/01/12 11:01 AM

			GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L472	4700	L8 AND I11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L473	9	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L474	5177	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L475	106	L14 AND I12	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L476	149734	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L477	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L478	151	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2024/01/12 11:01 AM
L479	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO;	OR	ON	ON	2024/01/12 11:01 AM

			JPO; DERWENT; IBM_TDB)				
L480	1598	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) SAME (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L481	20	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L482	404	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L483	143	L22 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L484	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L485	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L486	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L487	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L488	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L489	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L490	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L491	16520	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR,	OR	ON	ON	2024/01/12 11:01 AM

		SAME (terminal$1 OR computer$1 OR kiosk$1) SAME (mobile OR phone OR device$1) SAME (pay$ OR card$1)	GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L492	1403183	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L493	393785	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L494	39921	L9 AND I10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L495	4700	L8 AND I11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L496	9	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L497	5177	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM

L498	106	L14 AND I12	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L499	149734	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L500	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L501	151	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2024/01/12 11:01 AM
L502	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L503	1598	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) SAME (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L504	20	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L505	404	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM

L506	143	L22 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L507	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L508	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L509	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L510	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L511	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L512	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L513	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L514	16520	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR kiosk$1) SAME (mobile OR phone OR device$1) SAME (pay$ OR card$1)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L515	1403183	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L516	393785	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L517	39921	L9 AND I10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR,	OR	ON	ON	2024/01/12 11:01 AM

			GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L518	4700	L8 AND I11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L519	9	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L520	5177	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L521	106	L14 AND I12	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L522	149734	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L523	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L524	151	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2024/01/12 11:01 AM
L525	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO;	OR	ON	ON	2024/01/12 11:01 AM

			JPO; DERWENT; IBM_TDB)				
L526	1598	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) SAME (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L527	20	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L528	404	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L529	143	L22 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM
L530	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L531	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L532	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L533	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L534	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L535	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L536	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/12 11:01 AM
L537	16520	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR,	OR	ON	ON	2024/01/12 11:01 AM

		SAME (terminal$1 OR computer$1 OR kiosk$1) SAME (mobile OR phone OR device$1) SAME (pay$ OR card$1)	GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L538	1403183	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/12 11:01 AM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

Bibliographic Data

Application No: 18/197,071

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☑ No ☐ Met After Allowance

Verified and Acknowledged: /FRANTZY POINVIL/ Examiner's Signature | Initials

Title: METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
05/14/2023	705	3698	104402-5075-US
RULE			

APPLICANTS

PAYRANGE INC.,

INVENTORS

Paresh K. Patel, Portland, OR, UNITED STATES

CONTINUING DATA

This application is a CON of 17973507 10/25/2022

17973507 is a CON of 17654732 03/14/2022 PAT 11481772

17654732 is a CON of 17147305 01/12/2021 PAT 11501296

17147305 is a CON of 15603400 05/23/2017 PAT 10891614

15603400 is a CON of 14458199 08/12/2014 PAT 9659296

14458199 is a CIP of 14456683 08/11/2014 PAT 9256873

14456683 is a CON of 14335762 07/18/2014 PAT 9547859

14335762 is a CON of 14214644 03/14/2014 PAT 8856045

14214644 is a CIP of 29477025 12/18/2013 PAT D755183

14214644 has PRO of 61917936 12/18/2013

FOREIGN APPLICATIONS

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05/31/2023

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UNITED STATES

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$2,400

During the period 2005 to 2009, the total number of wireless data connections used for retail applications in Europe can be expected to rise from less than 1 million to around 3 million

Publication info: M2 Presswire 28 Feb 2006: NA.

Abstract (English): M2 PRESSWIRE-28 February 2006-Research and Markets: During the period 2005 to 2009, the total number of wireless data connections used for retail applications in Europe can be expected to rise from less than 1 million to around 3 million(C)1994-2006 M2 COMMUNICATIONS LTD
RDATE:02032006
Research and Markets (http://www.researchandmarkets.com/reports/c14771) has announced the addition of Wireless M2M Communication and Retail to their offering.
What is the status for wireless M2M communication in the European retail sector?

Full text: M2 PRESSWIRE-28 February 2006-Research and Markets: During the period 2005 to 2009, the total number of wireless data connections used for retail applications in Europe can be expected to rise from less than 1 million to around 3 million(C)1994-2006 M2 COMMUNICATIONS LTD
RDATE:02032006
Research and Markets (http://www.researchandmarkets.com/reports/c14771) has announced the addition of Wireless M2M Communication and Retail to their offering.
What is the status for wireless M2M communication in the European retail sector? POS terminals and on street parking solutions are two areas where the new technology is already widely adopted. Remote management solutions for vending machines are expected to take off on a large scale in 2005. Learn more about the opportunities associated with the transformation of the European vending industry and the implementation for the EMV standard for secure card payments in this new report.
The highlights of this report are as follow:
- Overview of the European card payment, vending, parking and transportation ticketing industries.
- Introduction to key applications for wireless M2M communication in the retail sector.
- Analysis and forecasts of adoption of mobile communication for retail.
- Case studies of the implementation of wireless M2M communication solutions by industry leaders such as Parkeon, Selecta and VeriFone.
- Profiles of 65 leading POS terminal vendors, vending machine manufacturers, vending operators and parking and ticketing solution vendors.
Key questions answered by the report:
- What is the potential market size for wireless M2M communication in the retail sector? - Which are the key applications that offer sizable business opportunities? - How can the mobile industry benefit from deployment of 13 million EMV compliant POS terminals? - At what rate are wireless M2M communication solutions being adopted in the vending industry? - What are the opportunities for the mobile industry in the areas of parking and ticketing solutions?
Retail is one of the first sectors in Europe that has seen some significant breakthroughs for wireless M2M communication technology in certain application areas. Wireless POS terminals are widely used to enable card payments in businesses where mobility is required and modern on street parking management solutions rely on information transferred over wireless networks. The vending industry is expected to become the next segment where remote management systems enabled by mobile data communication will be deployed on a large scale from 2005 and onwards.
During the period 2005 to 2009, the total number of wireless data connections used for retail applications in

Europe can be expected to rise from less than 1 million to around 3 million.
Growth could however be many times higher if the mobile industry is able to take advantage of the ongoing migration to EMV in the card payments industry. As European merchants prepare to replace well over 10 million POS terminals to meet the new security standard, the mobile industry has a unique opportunity to initiate a shift from landline to wireless connections as primary means of communication for card payment systems. Such a development will however require tailored solutions that combine inexpensive, reliable terminals with secure high performance communication services.
Topics covered in this report include:
- Vending Machines - Parking and Ticketing Machines - Market Opportunity for Mobile Industry Players - Case Studies
For more information visit http://www.researchandmarkets.com/reports/c14771
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Vending machine with Baidu Wallet payment function

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Abstract of CN204375056 (U)

A vending machine with a Baidu Wallet payment function comprises a door body, a paper money device, a one-card card reader, a coin device, a touch control all-in-one machine, an induction card reader, a main control panel, a wireless router and a display window. The paper money device, the one-card card reader and the coin device are arranged on the left portion of the door body. The paper money device, the one-card card reader and the coin device are all connected with the main control panel. The induction card reader and the touch control all-in-one machine are arranged above the main control panel. The touch control all-in-one machine is connected with the main control panel. The touch control all-in-one machine comprises a touch screen, a display screen and an industrial personal computer, wherein the display screen and the industrial personnel computer are arranged above the touch screen. The wireless router and the display window are arranged on the right portion of the door body. The wireless router is connected with the touch control all-in-one machine through a cable. The vending machine is convenient to install, easy to use and operate, novel, powerful in function, rapid, easy and convenient to use, safe, reliable and worthy of vigorous popularization, and the vending machine has the Baidu Wallet payment function.

Notice

DESCRIPTION CN204375056U

10 A vending machine with Paypay payment function

[0001]

14 Technical field

[0002]

18 The utility model relates to the field of automatic vending machines, in particular to an automatic vending machine with a Baifu payment function.

[0003]

23 Background technique

[0004]

27 There are generally two types of vending machines on the market based on payment methods: cash purchases and card purchases.

29 The first method is the most traditional method, and the second method has begun to transition to cashless sales, but it is limited to small payments, and the proximity cards in various industries and regions are not unified. There are many consumer cards, which can no longer satisfy people. Growing consumer demand.

32 With the increasing popularity of smartphones, the gradual rise of online shopping has given rise to an emerging consumption model - mobile shopping.

34 Mobile shopping is shopping through mobile terminals and mobile networks, that is, a business model in which users use their mobile phones to pay for the goods or services they consume. Currently, banks, mobile operators, and third-party online payment companies all have different service models to meet the needs of different users. In recent years, mobile shopping has developed rapidly in the Chinese market. If this

convenient touch shopping terminal with mobile phone payment function is embedded in a vending machine, not only can the traditional functions of the vending machine be retained, the advertising media function can be enriched and developed, but also the payment function of the vending machine can be improved. The function has achieved a qualitative leap.

[0005]

Utility model content

[0006]

The utility model aims to provide a vending machine that is easy to install, simple to use and operate, and has a BaiFuba payment function. The product is novel, powerful, quick and easy to use, safe and reliable, and has a BaiFuba payment function. .

[0007]

In order to achieve the above purpose, the present utility model provides the following technical solution: a vending machine with Baifu payment function, including a door body, a banknote dispenser, a card reader, a coin dispenser, a touch-control integrated machine, and an induction card reader. , main control board, wireless router and display window, the banknote device, card reader and coin device are located on the left side of the door, and the banknote device, card reader and coin device are all connected to the main control board; An induction card reader and a touch-control all-in-one machine are provided above the main control board, in which the touch-control all-in-one machine is connected to the main control board; the touch-control all-in-one machine includes a touch screen, a display screen and an industrial computer, wherein the display screen and the industrial computer are equipped with Above the touch screen; the wireless router and the display window are located on the right side of the door, and the wireless router is connected to the touch all-in-one machine through a network cable.

[0008]

As a further solution of the present invention: the one-card card reader is connected to the main control board through the vending machine MDB interface or serial port.

[0009]

As a further solution of the present invention: the induction card reader is connected to the main control board through a serial port.

[0010]

As a further solution of the present invention: the touch-integrated machine is connected to the main control

board through an RS232 communication line.

[0011]

84 As a further solution of the present invention: a vending machine with a BaiFuba payment function is connected to a merchant server.

[0012]

89 Compared with the existing technology, the beneficial effects of the present utility model are: the vending machine with BaiFuba payment function can effectively and flexibly manage sales data and sales amounts, solving many management shortcomings of cash shopping in the past; mobile phone Installed with the Baidu client, the mobile Baidu shopping terminal only includes a touch-control all-in-one machine. Consumers can scan codes to pay for shopping through the mobile Baidu terminal. The mobile Baidu shopping terminal can be embedded in a vending machine, and The main control system of the vending machine is connected with the software to realize the shopping function of Baidu Pay on the mobile phone.

96 Baidu Wallet is associated with the consumer's Baidu Pay account. When the consumer pays, the mobile Baidu Pay scans the QR code to realize the docking payment between the consumer's mobile phone and the Baidu Pay shopping terminal. The merchant server is set up by the operator. to receive payment information and process refunds.

100 This product is universal among consumer groups, because mobile phones have become a must-have item for the public, and the use of Baidu clients is also increasing across the country. This payment method is very conducive to promotion, very convenient for consumers, and good for operators. It solves many management shortcomings of cash shopping.

104 This product is easy to install, simple to use and operate, and has Baifu payment function. It is novel, powerful, quick and easy to use, safe and reliable, and deserves to be vigorously promoted.

[0013]

109 Description of the drawings

[0014]

113 Figure 1 is an overall schematic diagram of the utility model;

[0015]

117 Figure 2 is an overall schematic diagram of the merchant server.

[0016]

121 Detailed ways

[0017]

125 The technical solutions in the embodiments of the present utility model will be clearly and completely described below with reference to the accompanying drawings in the embodiments of the present utility model. Obviously, the described embodiments are only part of the embodiments of the present utility model, not all implementations. example.

129 Based on the embodiments of the present utility model, all other embodiments obtained by those of ordinary skill in the art without creative efforts fall within the scope of protection of the present utility model.

[0018]

134 Please refer to Figures 1-2. In the embodiment of the present invention, a vending machine with a BaiFuba payment function includes a door 1, a banknote dispenser 2, a card reader 3, a coin dispenser 4, and a touch-control integrated machine. 5. Inductive card reader 6, main control board 7, wireless router 8 and display window 12. The banknote machine 2, card reader 3 and coin machine 4 are located on the left side of the door 1. The card reader 3 and the coin machine 4 are both connected to the main control board 7. The card reader 3 communicates with the main control board 7 through the vending machine MDB interface or serial port; an induction card reader is provided above the main control board 7. 6 and touch all-in-one machine 5, in which the induction card reader 6 is used to read UnionPay cards, the induction card reader 6 is connected to the main control board 7 through the serial port, and the touch all-in-one machine 5 is connected to the main control board 7 through the RS232 communication line , the software provided in the touch-control all-in-one machine 5 has the BaiFubao payment method, and consumers can scan the code to pay for shopping on the vending machine through BaiFubao on their mobile phones; the touch-control all-in-one machine 5 includes a touch screen 9, a display screen 10 and industrial computer 11, in which the display screen 10 and the industrial computer 11 are located above the touch screen 9; the wireless router 8 and the display window 12 are located on the right side of the door 1, and the wireless router 8 is connected to the touch all-in-one machine 5 through a network cable. Connection: The vending machine with Baifu payment function is connected to the merchant server 13. The merchant server 13 is set up by the operator to receive payment information, issue payment results to the vending machine and process refunds.

[0019]

155 When shopping, select the product you want to buy through the product selection buttons on the display window 12. At this time, you can not only choose traditional coin shopping, one-card shopping, UnionPay proximity card, but also mobile phone shopping.

158 After selecting the product to be purchased on the display window 12, select "Baidu Pay" as the shopping method of the sales software in the touch all-in-one machine 5. At this time, the sales software will splice a URL according to the rules of the document. Access to this URL will be based on the splicing time. Depending on the request parameters, a short URL or a QR code image corresponding to the short URL is returned. If a short URL is returned, the sales software will generate a QR code. At the same time, the sales software will open a long link to communicate with the merchant server and send a query whether the order

payment was successful. Request, wait for scanning and payment, the user only needs to open the Baidu client on the smartphone, enter "My Wallet", click "Scan", align the scanned box with the QR code, and the client will display After confirming the name and price of the product to be purchased, make the payment through the mobile Baidu payment platform. After the payment is successful, the Baidu payment platform will send the payment result to the merchant server. This notification can be sent within a few seconds after the payment is completed, ensuring real-time and retry after failure to ensure that the data can reach the operator's server. Then the merchant server responds to the payment success request sent by the sales software. The sales software transmits the transaction success information to the vending machine main control system. The vending machine main control system It will control the shipping organization to sell the goods purchased by the customer, and the front-end will ship the goods and send the successful shipment information to the merchant server, so that the merchant server will modify the order status.

175 When encountering overtime payment or shipment failure, the sales software will send a refund request to the server. The server can submit the refund request to the Baidu payment platform, and the Baidu payment platform will verify the signature. After the signature verification is passed, the refund will be executed. After the payment is successful, the Baidu payment platform will notify the merchant server of the payment result, so that the merchant server can promptly modify the refund status of the order.

[0020]

183 It is obvious to those skilled in the art that the present invention is not limited to the details of the above exemplary embodiments, and the present invention can be implemented in other specific forms without departing from the spirit or basic characteristics of the present invention.

186 Therefore, from any point of view, the embodiments should be regarded as exemplary and non-restrictive. The scope of the present invention is defined by the appended claims rather than the above description, and it is therefore intended that all claims falling within the rights All changes within the meaning and scope of the required equivalents are included in the present invention.

190 Any reference signs in the claims shall not be construed as limiting the claim in question.

[0021]

194 In addition, it should be understood that although this specification is described in terms of implementations, not each implementation only contains an independent technical solution. This description of the specification is only for the sake of clarity, and those skilled in the art should take the specification as a whole. , the technical solutions in each embodiment can also be appropriately combined to form other implementations that can be understood by those skilled in the art.

Notice

CLAIMS CN204375056U

1.

13 A vending machine with a Baidu payment function, including a door (1), a banknote machine (2), a card reader (3), a coin machine (4), a touch-control integrated machine (5), and an induction reader Card device (6), main control board (7), wireless router (8) and display window (12), characterized in that the banknote device (2), all-in-one card reader (3) and coin device (4) Located on the left side of the door (1), the banknote machine (2), card reader (3) and coin machine (4) are all connected to the main control board (7); above the main control board (7) It is provided with an induction card reader (6) and a touch all-in-one machine (5), wherein the touch all-in-one machine (5) is connected to the main control board (7); the touch all-in-one machine (5) includes a touch screen (9), Display screen (10) and industrial computer (11), wherein the display screen (10) and industrial computer (11) are located above the touch screen (9); the wireless router (8) and display window (12) are located on the door (1) On the right side, the wireless router (8) is connected to the touch all-in-one machine (5) through a network cable.

2.

27 A vending machine with BaiFuba payment function according to claim 1, characterized in that the one-card reader (3) is connected to the main control board (7) through the vending machine MDB interface or serial port.

3.

33 A vending machine with BaiFuba payment function according to claim 1, characterized in that the induction card reader (6) is connected to the main control board (7) through a serial port.

4.

38 A vending machine with a BaiFuba payment function according to claim 1, characterized in that the touch-integrated machine (5) is connected to the main control board (7) through an RS232 communication line.

5.

43 An automatic vending machine with BaiFubao payment function according to claim 1, characterized in that the vending machine with BaiFubao payment function is connected to the merchant server (13).

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(12)实用新型专利

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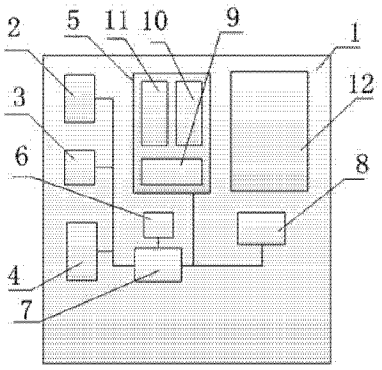
(54)实用新型名称

一种具有百付宝支付功能的自动售货机

(57)摘要

一种具有百付宝支付功能的自动售货机，包括门体、纸币器、一卡通读卡器、硬币器、触控一体机、感应读卡器、主控板、无线路由器和展示窗，所述纸币器、一卡通读卡器和硬币器设于门体左部，该纸币器、一卡通读卡器和硬币器均与主控板连接；所述主控板的上方设有感应读卡器和触控一体机，其中触控一体机与主控板连接；所述触控一体机包括触摸屏、显示屏和工控机，其中显示屏和工控机设于触摸屏的上方；所述无线路由器和展示窗设于门体右部，其中无线路由器通过网线与触控一体机连接；本产品安装方便，使用、操作简单，具有百付宝支付功能，产品新颖，功能强大，使用快捷简便，安全可靠，值得大力推广。



CN 204375056 U

1. 一种具有百付宝支付功能的自动售货机，包括门体(1)、纸币器(2)、一卡通读卡器(3)、硬币器(4)、触控一体机(5)、感应读卡器(6)、主控板(7)、无线路由器(8)和展示窗(12)，其特征在于，所述纸币器(2)、一卡通读卡器(3)和硬币器(4)设于门体(1)左部，该纸币器(2)、一卡通读卡器(3)和硬币器(4)均与主控板(7)连接；所述主控板(7)的上方设有感应读卡器(6)和触控一体机(5)，其中触控一体机(5)与主控板(7)连接；所述触控一体机(5)包括触摸屏(9)、显示屏(10)和工控机(11)，其中显示屏(10)和工控机(11)设于触摸屏(9)的上方；所述无线路由器(8)和展示窗(12)设于门体(1)右部，其中无线路由器(8)通过网线与触控一体机(5)连接。

2. 根据权利要求 1 所述的一种具有百付宝支付功能的自动售货机，其特征在于，所述一卡通读卡器(3)通过售货机 MDB 接口或串口与主控板(7)连接。

3. 根据权利要求 1 所述的一种具有百付宝支付功能的自动售货机，其特征在于，所述感应读卡器(6)通过串口与主控板(7)连接。

4. 根据权利要求 1 所述的一种具有百付宝支付功能的自动售货机，其特征在于，所述触控一体机(5)通过 RS232 通讯线与主控板(7)连接。

5. 根据权利要求 1 所述的一种具有百付宝支付功能的自动售货机，其特征在于，一种具有百付宝支付功能的自动售货机与商户服务器(13)连接。

一种具有百付宝支付功能的自动售货机

技术领域

[0001] 本实用新型涉及自动售货机领域，尤其是一种具有百付宝支付功能的自动售货机。

背景技术

[0002] 市面上自动售货机按照支付方式分类大体有两种：现金购物和刷卡购物。第一种方式是最传统的方式，第二种方式已经开始向无钞售卖过渡，但是仅限于小额支付，并且各个行业、各个地区的感应卡不统一，消费者卡片繁多，已经不能满足人们日益增长的消费需求。随着智能手机的使用日益普及，网络购物的逐渐兴起，催生了一种新兴的消费模式——手机购物。手机购物就是通过移动终端手机网络进行购物，即用户用其手机对所消费的商品或服务进行账务支付的一种商业模式。目前银行、移动运营商、第三方在线支付公司都有各自不同的服务模式，来满足不同用户的使用需求。近年来，手机购物在中国市场发展迅速。如果在自动售货机中嵌入这种便捷的具有支持手机支付功能的触控购物终端，不仅能使自动售货机的传统功能保留，广告媒体功能得到丰富和发展，而且还能使自动售货机的支付功能得到质的飞跃。

实用新型内容

[0003] 本实用新型旨在提供一种安装方便，使用、操作简单，具有百付宝支付功能的自动售货机，产品新颖，功能强大，使用快捷简便，安全可靠的具有百付宝支付功能的自动售货机。

[0004] 为实现上述目的，本实用新型提供如下技术方案：一种具有百付宝支付功能的自动售货机，包括门体、纸币器、一卡通读卡器、硬币器、触控一体机、感应读卡器、主控板、无线路由器和展示窗，所述纸币器、一卡通读卡器和硬币器设于门体左部，该纸币器、一卡通读卡器和硬币器均与主控板连接；所述主控板的上方设有感应读卡器和触控一体机，其中触控一体机与主控板连接；所述触控一体机包括触摸屏、显示屏和工控机，其中显示屏和工控机设于触摸屏的上方；所述无线路由器和展示窗设于门体右部，其中无线路由器通过网线与触控一体机连接。

[0005] 作为本实用新型的进一步方案：所述一卡通读卡器通过售货机 MDB 接口或串口与主控板连接。

[0006] 作为本实用新型的进一步方案：所述感应读卡器通过串口与主控板连接。

[0007] 作为本实用新型的进一步方案：所述触控一体机通过 RS232 通讯线与主控板连接。

[0008] 作为本实用新型的进一步方案：一种具有百付宝支付功能的自动售货机与商户服务器连接。

[0009] 与现有技术相比，本实用新型的有益效果是：该具有百付宝支付功能的自动售货机，可以有效灵活的管理销售数据及销售金额，解决了以前现金购物存在的诸多管理弊端；

手机安装有百度客户端，手机百付宝购物终端仅仅包括触控一体机，消费者可以通过手机百付宝终端进行扫码支付购物，该手机百付宝购物终端可以嵌入到自动售货机上，与自动售货机的主控系统进行软件对接，实现手机百付宝购物功能。百度钱包关联消费者的百付宝账户，当消费者支付时，手机百付宝以扫描二维码的方式，实现消费者手机与百付宝购物终端的对接支付，商户服务器由运营商架设，来接收支付信息及处理退款。本产品具有消费群体的普遍性，因为手机已经成为大众必备用品，而且百度客户端的使用在全国范围内也在日渐增多，该支付方式非常利于推广，对消费者来说非常便捷，对运营商来说，解决了现金购物存在的诸多管理弊端。本产品安装方便，使用、操作简单，具有百付宝支付功能，产品新颖，功能强大，使用快捷简便，安全可靠，值得大力推广。

附图说明

[0010] 图 1 为本实用新型的整体示意图；

[0011] 图 2 为商户服务器的整体示意图。

具体实施方式

[0012] 下面将结合本实用新型实施例中的附图，对本实用新型实施例中的技术方案进行清楚、完整地描述，显然，所描述的实施例仅仅是本实用新型一部分实施例，而不是全部的实施例。基于本实用新型中的实施例，本领域普通技术人员在没有做出创造性劳动前提下所获得的所有其他实施例，都属于本实用新型保护的范围。

[0013] 请参阅图 1-2，本实用新型实施例中，一种具有百付宝支付功能的自动售货机，包括门体 1、纸币器 2、一卡通读卡器 3、硬币器 4、触控一体机 5、感应读卡器 6、主控板 7、无线路由器 8 和展示窗 12，所述纸币器 2、一卡通读卡器 3 和硬币器 4 设于门体 1 左部，该纸币器 2、一卡通读卡器 3 和硬币器 4 均与主控板 7 连接，一卡通读卡器 3 通过售货机 MDB 接口或串口与主控板 7 连接通讯；所述主控板 7 的上方设有感应读卡器 6 和触控一体机 5，其中感应读卡器 6 用于读取银联卡，感应读卡器 6 通过串口与主控板 7 连接，触控一体机 5 通过 RS232 通讯线与主控板 7 连接，触控一体机 5 内设有的软件具有百付宝支付方式，消费者可通过手机百付宝在自动售货机上进行扫码支付购物；所述触控一体机 5 包括触摸屏 9、显示屏 10 和工控机 11，其中显示屏 10 和工控机 11 设于触摸屏 9 的上方；所述无线路由器 8 和展示窗 12 设于门体 1 右部，其中无线路由器 8 通过网线与触控一体机 5 连接；该一种具有百付宝支付功能的自动售货机与商户服务器 13 连接，商户服务器 13 由运营商架设，来接收支付信息、给售货机下发支付结果及处理退款。

[0014] 在购物时通过展示窗 12 的选货按键选择想要购买的商品，此时不但可以选择传统的钱币购物，一卡通购物，银联感应卡，还可以选择手机购物。在展示窗 12 上面选择需要购买的商品之后，触控一体机 5 中售卖软件的购物方式选择“百度支付”，此时售卖软件将按照文档的规则拼接一个 URL，访问这个 URL 将根据其拼接时请求参数的不同返回短 URL 或短 URL 对应的二维码图片，如果返回短 URL，再由售卖软件生成二维码，同时售卖软件打开一个长链接和商户服务器通信，发送订单是否付款成功的查询请求，等待扫描并支付，用户只要打开智能手机上的百度客户端，进入“我的钱包”，点击“扫一扫”，将扫一扫的方框对准二维码，客户端上将显示要购买的商品的名称及价格，确认后通过手机百度支付平台进行

付款，支付成功后，百度支付平台将发送支付结果到商户服务器上，这个通知可在支付完成后几秒钟内发送，保证实时性，并在失败后重试，保证数据能到达运营商的服务器，然后商户服务器应答售卖软件发出的付款成功请求，售卖软件将交易成功信息传给自动售货机主控系统，售货机主控系统就会控制出货机构售出顾客所选购的商品，前端出货并发送出货成功的信息到商户服务器，这样商户服务器将此订单状态进行修改。遇到超时付款或出货失败的情况时，售卖软件将向服务器发送退款请求，服务器可以提交退款请求到百度支付平台，由百度支付平台进行验签，验签通过后执行退款，退款成功后，百度支付平台会通知商户服务器支付结果，这样，商户服务器就可以及时修改订单的退款状态。

[0015] 对于本领域技术人员而言，显然本实用新型不限于上述示范性实施例的细节，而且在不背离本实用新型的精神或基本特征的情况下，能够以其他的具体形式实现本实用新型。因此，无论从哪一点来看，均应将实施例看作是示范性的，而且是非限制性的，本实用新型的范围由所附权利要求而不是上述说明限定，因此旨在将落在权利要求的等同要件的含义和范围内的所有变化囊括在本实用新型内。不应将权利要求中的任何附图标记视为限制所涉及的权利要求。

[0016] 此外，应当理解，虽然本说明书按照实施方式加以描述，但并非每个实施方式仅包含一个独立的技术方案，说明书的这种叙述方式仅仅是为清楚起见，本领域技术人员应当将说明书作为一个整体，各实施例中的技术方案也可以经适当组合，形成本领域技术人员可以理解的其他实施方式。

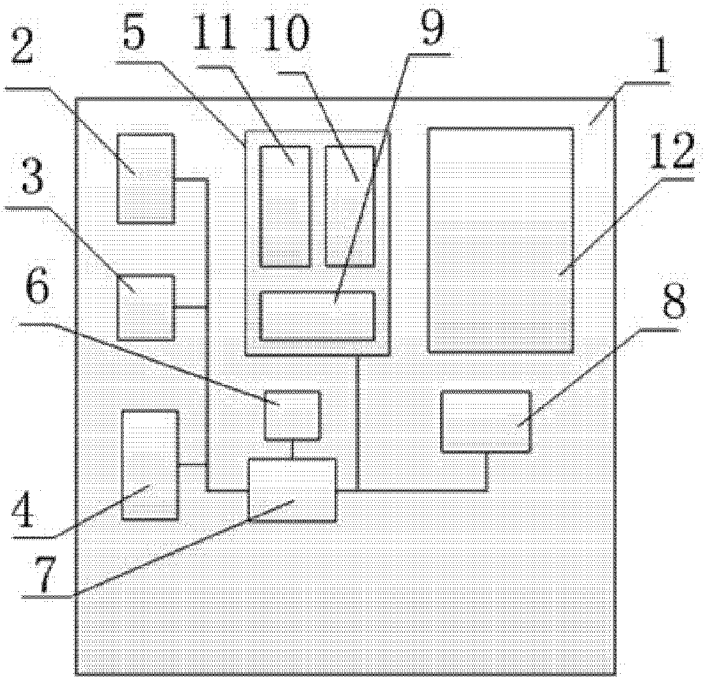


图 1

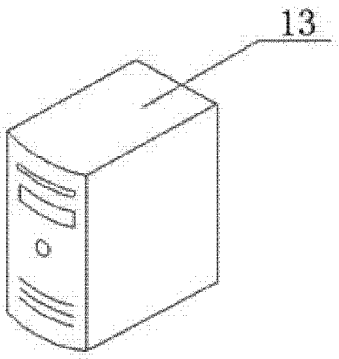


图 2

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Table of contents

Slick self-service options: as staffing remains lean grocers are using advanced self-service checkouts and kiosks to augment customer service

Publication info: Grocery Headquarters 76.12: 74(3). MacFadden Communications Group LLC. (Dec 2010)

Abstract (English): Successful supermarkets have learned to differentiate themselves by deploying technology that offers value to customers and advances loyalty. As a result, some forward-thinking supermarkets are taking the plunge and investing in next-generation self-service solutions that provide a customized shopping experience and offer a high level of customer service, even if there are fewer employees in the store.
[ILLUSTRATION OMITTED]
Since labor remains one of retailers' top three operating expenses, many chains are focused on reducing those costs, deploying self-checkout systems and other in-store technologies to fill the gap.
"You cannot reduce labor without having a way to educate shoppers in store," says Frank Riso, senior director of retail solutions, Motorola's Enterprise Mobility division, based in Holtsville, N.Y.

Full text: Successful supermarkets have learned to differentiate themselves by deploying technology that offers value to customers and advances loyalty. As a result, some forward-thinking supermarkets are taking the plunge and investing in next-generation self-service solutions that provide a customized shopping experience and offer a high level of customer service, even if there are fewer employees in the store.
[ILLUSTRATION OMITTED]
Since labor remains one of retailers' top three operating expenses, many chains are focused on reducing those costs, deploying self-checkout systems and other in-store technologies to fill the gap.
"You cannot reduce labor without having a way to educate shoppers in store," says Frank Riso, senior director of retail solutions, Motorola's Enterprise Mobility division, based in Holtsville, N.Y. "That just kills customer service, and as a result, a brand's reputation," "However, those who reduced labor and supplemented the reduction with a combination of technology and remaining associates familiar with the tool fared better than those chains that just let people go."
What was the technology of choice for these successful retailers? Self-service kiosks. Chains have been dabbling in the technology for the better part of 15 years, but between thin operating margins, and consumers' demand for even more store-level convenience, the units are becoming much more commonplace. So much so that retailer investments in kiosks could hit $5.8 billion by 2013, according to the study, Self-Service and Customer Interaction Management Solutions, released by Natick, Mass.-based technology research firm VDC Research.
Experts say that many shoppers are taking advantage of these systems, as $775 billion in transactions pass through these units, according to IHL Consulting Group, based in Franklin, Tenn. By 2013, that number is expected to jump to $2.3 trillion.
"As the economy strengthens, retailers will continue making investments in store-level technologies," Riso says. "As long as they can find a balance of solutions that provide the best store-level operations, self-service will continue moving forward."
While there have been plenty of arguments--from retailers and consumers alike--that self-service technology is replacing a slashed workforce, savvy retailers are learning to use the technology to positively augment the tasks of existing associates.
"When we look at implementations we don't consider self-service as a catalyst for labor reduction, but as a way to free up associates normally tethered to cash registers or other devices," says John Saccomanno, industry

marketing director at Atlanta-based NCR Corp. "Retailers are able to use self-service as a way to introduce new service to customers without incurring additional labor costs. The units are not forcing retailers to get rid of labor, but instead they automate processes that previously needed more labor to manage."

CHECKING OUT SELF-CHECKOUT

National and regional chains alike--from Pleasanton, Calif.-based Safeway to Bowling Green, Ky.-based Houchens--are investigating self-checkout technologies, experts note.

While the regional chains still prefer the "personal touch that manned checkout experiences provide," Jo Natale, director of media relations at Rochester, N.Y.-based Wegmans Food Markets, said in a recent Washington Post article, it hasn't stopped chains from deploying the technology, albeit on a case-by-case basis.

What is further spurring the adoption of self-service is the innovative solutions that promise to deliver what the shopper really wants: "the need for convenience; to get in and out of the store quickly, and the option to make decisions at their own pace, anywhere in the store," says Wayne Stellmach, manager of marketing communications, Cummins-Allison Corp., based in Mr. Prospect, Ill.

This formula pushed Stop &Shop, a division of Ahold USA, based in Quincy, Mass., to develop a "mobile" self-scanning solution with the help of Motorola. The chain is using Motorola MC17 wireless handheld scanners, which run software provided by Quincy, Mass.-based Modiv Media. The units are prominently displayed near each store's customer service counter, and shoppers retrieve a device simply by swiping their loyalty card over a dedicated scanner on the display fixture.

As shoppers pick merchandise from store shelves, they use the device to scan item barcodes, and then they place products into their shopping cart. The scanners also deliver electronic coupons and promotions to various customer segments. All orders are electronically totaled, and transactions can be tendered at a dedicated stationary self-checkout lane.

More than 260 stores feature the units and they process approximately 10% of stores' sales. To add more customer service, the chain augmented the project with its "Order It!" program, an integrated kiosk- and LCD screen-based deli ordering system.

Shoppers scan their loyalty card at the kiosk, and the touch screen directs shoppers through the ordering process, which includes a history of recent orders and a price tally. Fresh food manufacturers can also deliver targeted discounts and promotions to users based on their order history.

Upon completion, shoppers receive an order number. They can also input their cell phone number to receive a text message once the order is complete.

Orders placed through the kiosk are electronically transmitted to a work management system that integrates all orders--those placed via kiosk or verbally with store associates. The system allows all orders to be viewed by the deli's preparation line, and an LCD screen also displays order statuses.

Innovations beyond the front-end could spur even more self-service adoption. Minneapolis-based Target for example, steers clear of self-checkout, but is well-entrenched in the self-service game.

[ILLUSTRATION OMITTED]

"For us, it is about good customer engagement," said Chris Borek, Target's senior manager, multi-channel interactive experience, during "Bull's-Eye! Keeping Your Eye on the Target--Successful Strategies of Customer Engagement Technologies," a keynote session during the recent Customer Engagemeat Technology World convention, held in New York City.

[ILLUSTRATION OMITTED]

"We want to help our guests find, learn about and buy merchandise," he said. "Leveraging digital technologies are they key to addressing these goals, especially in complex categories."

One of these categories is grocery. Calling 2010 the "year of the remodel," Target spent a "considerable amount of capital," he said, changing the floor plans away from a cookie-cutter format, and modifying its focus on the categories that help engage guests, including a revamped, blown-out fresh grocery section.

[ILLUSTRATION OMITTED]

"We don't have self-checkout, but we are exploring new ways to make our shopper's life simpler, especially in the key categories of grocery and pet," he told Grocery Headquarters following the session. While he declined to share specific self-service applications that will be added, he did say "self-directed applications are priorities for us as our goal is to make shopping simple."

In the meantime, Target is showing the potential for this simplicity in its photo processing department with a kiosk that enables shoppers to process prints from their Facebook accounts. Shoppers can access their Facebook profile right at a web-enabled kiosk, and download files to make prints and gifts.

"We are learning the importance of merging social and the cross-channel experiences," he said. "You can also become a 'fan' of Target Photo on Facebook, upload photo files to be printed, them pick them up at a local store. It is a program we are learning from and hope to do more with."

MAKING CHANGE COUNT

To take some of the burden off of customer service desks, some grocers are refocusing efforts on coin redemption options. The market, which is driven by consumers' desire for convenience and retailers' need to drive more operational efficiencies, has exploded. The automated units gained popularity as they turned shoppers' loose coins into receipts for cash, even gift cards that can be used at the grocer's store, or other non-competing retail specialty chains.

These systems are gaining attention from national chains to independent retailers, such as Waukegan, Ill.-based Lewis Fresh Market, a one-store operator that has a Cummins-Allison JetCoin unit. Shoppers pour their coins into the kiosk's hopper, and receive a printed receipt that can be exchanged for cash at the service desk or checkout register.

Besides being a revenue generator for the grocer, the unit also automatically sorts all coins by denomination into separate bags, enabling the retailer to recycle the coins they need right back into their cash drawers, if needed. Within its first month online, the unit took in $10,000 in coins.

The system also provides incentives for shoppers, according to officials at Cummins-Allison. "Through our Fast Pay program, shoppers have the option of converting their coins into cash," Stellmach explains. "Offering cash on the spot is even more convenient than interacting with an associate, and it makes the transaction that much more valuable for the shopper."

HEALTHY CHOICES

The supermarket pharmacy continues to be one of the most pivotal departments within the grocery store. With more information available online, and not all of it relevant, it is not surprising that more consumers are considering its grocers' pharmacists as trusted "health care partners" of sorts, and leveraging them to learn mare about medication, illness symptoms, and other details they can use to spur well-being.

St. Louis-based Schnuck Markets is using this as a springboard to offer in-store health-related tools to further empower consumers to maintain their health. In addition to blood pressure machines that are used at many pharmacies, the grocer also features The EyeSight Kiosk, from Duluth, Ga.-based SoloHealth, a free self-service vision test kiosk focused on shoppers' eye health.

The unit conducts screenings and then an analytical engine evaluates these results, as well as the consumer's age, ethnicity and potential risk factors. The unit delivers individualized reports on vision status, information on eye health, product information and promotions. Shoppers can also set up appointments with local eye care professionals directly through the unit.

Based on a variety of data, including age, gender, ethnicity and symptoms, Schnuck officials can learn more about the demographics of the shoppers using the kiosk and create promotions and programs to educate shoppers on eye disease and prevention.

The chain features 30 units, and the chain has approximately 10,000 users each month, according to Mike Juergensmeyer, the chain's vice president of fuel and pharmacy.

BEYOND THE SHELVES

With selling square footage at a premium, kiosks could be the catalyst needed to expand assortments and categories, especially those that may not have a category champion in-house. "Some units in France dispense glasses of wine; others feature high-end health and beauty merchandise, and still others may feature personal consumer electronics and accessories," explains NCR's Saccomanno. "The units provide a sense of security, a better merchandising environment and unique branding opportunities as well."

They can also be the final piece in the SKU rationalization conundrum. As chains continually need to weed out SKUs that may be underperforming, or slow turners, Web-based kiosks can act as an "endless aisle." Shoppers can use the kiosk to research a product not found on shelves and using a GUI integrated with the grocer's e-commerce application, they can order the merchandise to be picked at store-level or delivered to their home within a couple of days.

Who's at the kiosk?

Kiosks that offer a more personalized experience by gathering data on shopper preferences and past purchases may play a key role in building loyalty going forward, experts say.

Evolving mobile solutions promise to tap this concept, however grocers need to find a way to get in the game early. By adding analytics to existing kiosk applications, retailers could find themselves ahead of the curve once mobile solutions mature.

"As shoppers use their loyalty card or personal identification codes to 'check in' at a kiosk, grocers should be recognizing this shopper and every one of her preferences," says John Saccomanno, industry marketing director for Atlanta-based NCR.

These systems will become even more customized to individual shoppers going forward, Saccomanno says.

[ILLUSTRATION OMITTED]

"At self-checkout for example, the unit should not display peaches on the produce search option menu if she doesn't buy them. Or if she is left-handed, the scanner should be able to pick up barcodes from specific angles," he says. "These small personalized details allows retailers to better connect transactions with shoppers and interact with its customer base."

Subject: Exhibitions -- Booths;Kiosks;Supermarkets

Identifier (keyword): Trade

NAICS classification: 44511: Supermarkets and Other Grocery (except Convenience) Stores

Product classification: 5411100: Supermarkets

SIC classification: 5411: Grocery stores

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Fruit vending machine and system of selling

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Classification: **- international:** ***G07F11/00; G07F11/16; G07F11/72; G07F9/02; G07F9/10***

- cooperative:

Application number: CN201721745444U 20171214

Priority number(s): CN201721745444U 20171214

Abstract of CN207663510 (U)

The utility model relates to a fruit vending machine and system of selling. This fruit vending machine still includes including selling cabinet body: the setting inside selling cabinet body, be used for depositing the fruit accommodate device of fruit, the setting inside selling cabinet body, be used for the electronic scale of weighing for the fruit of selecing, the setting inside selling cabinetbody, be used for choosing the sieving mechanism of fruit, fruit that the sieving mechanism was chosen is placed on the electronic scale automatic weighing and is calculated the cost, selling cabinetbody and being provided with the take goods open who is used for taing eoff away fruit, take goods open opens after accomplishing the payment. Through implementing the utility model discloses, do notneed artifical the participation, what client can accomplish fruit automatically selects, weighs, pays the bill, gets goods, the machine of should selling can be put to roadside, on -site, the officebuilding in, and occupation space is little, makes things convenient for people to purchase fruit at any time.

Notice

DESCRIPTION CN207663510U

10 A fruit vending machine and vending system

[0001]

14 Technical field

[0002]

18 The utility model relates to the field of vending machines, and more specifically, to a fruit vending machine and a vending system.

[0003]

23 Background technique

[0004]

27 Fruit is an indispensable source of nutrients in people's daily diet.

28 At present, the main form of fruit sales is still manual sales, including in large supermarkets, fruit shops, temporary roadside sales points, etc. This sales method requires human participation and requires renting a store, which greatly increases the cost of fruit.

31 In addition, in some office buildings and factories, there are few dedicated shops for selling fruits, causing factory personnel to carry them themselves or go to distant shopping malls to buy them, causing inconvenience to users.

[0005]

37 Utility model content

[0006]

41 The technical problem to be solved by this utility model is to provide a fruit vending machine and vending system in view of the defects of the prior art that the above-mentioned manual participation leads to high costs and inconvenience for purchasing fruits in some places.

[0007]

47 The technical solution adopted by this utility model to solve the technical problem is to construct a fruit vending machine, which includes a vending machine cabinet and also includes:

[0008]

52 A fruit storage device provided inside the vending machine cabinet for storing fruits;

[0009]

56 An electronic scale installed inside the cabinet of the vending machine for weighing the selected fruits;

[0010]

60 A screening device for selecting fruits is provided inside the cabinet of the vending machine. The fruits selected by the screening device are placed on the electronic scale and automatically weighed and the price is calculated;

[0011]

66 The vending machine cabinet is provided with a pick-up port for taking away fruits, and the pick-up port is opened after payment is completed.

[0012]

71 Preferably, in the fruit vending machine of the present invention, the storage device includes at least two sub-storage devices, and each of the sub-storage devices can respectively place different fruits.

[0013]

76 Preferably, in the fruit vending machine of the present invention, the screening device includes a manual screening device, and the manual screening device includes: a gripper, a mechanical arm, a driving module, and a control module, wherein,

[0014]

82 The gripper is provided on the mechanical arm for grabbing fruits; the drive module is connected to and drives the mechanical arm; the control module is provided outside the vending machine cabinet and connected to the drive module. The control module receives the user's selection operation and generates corresponding control signals to the control module.

[0015]

89 Preferably, in the fruit vending machine of the present invention, the screening device includes an automatic screening device, and the automatic screening device includes a device disposed between the fruit containing device and the electronic scale for removing the fruit from the fruit. The accommodating device moves to the transmission device of the electronic scale;

[0016]

96 A receiving module connected to the transmission device and used to receive purchase information sent by the user, where the purchase information is one of fruit weight, fruit quantity, and purchase amount.

[0017]

101 Preferably, the fruit vending machine of the present invention further includes: a packaging device for packaging the fruits on the electronic scale;

[0018]

106 The packaging device is arranged on the electronic scale, the packaging device places the packaging bag on the electronic scale, and the fruits selected by the screening device are directly placed in the packaging bag; or

[0019]

111 The packaging device is arranged at the pickup port, and after completing the weighing and payment, the fruit in the electronic scale is transferred to the packaging bag at the pickup port.

[0020]

116 Preferably, in the fruit vending machine of the present invention, the vending machine cabinet is provided with a preservation module for fruit preservation; and/or

[0021]

121 The vending machine cabinet is provided with a refrigeration module for fruit refrigeration; and/or

[0022]

125 The vending machine cabinet is provided with a cleaning module for cleaning fruits.

[0023]

129 Preferably, in the fruit vending machine of the present invention, the vending machine cabinet is provided with a display screen for displaying product information, operating procedures, advertising information, reminder information, and payment information; and/or

[0024]

135 Audio playback module for playing audio signals.

[0025]

139 Preferably, the fruit vending machine of the present invention also includes a communication module for sending and receiving information. The communication module includes a wired communication module and/or a wireless communication module. The wireless communication module includes a 3G communication module. , 4G communication module, WIFI communication module, Bluetooth communication module, one or more;

[0026]

147 A positioning module connected to the communication module and used to obtain the position information of the vending machine. The position information is sent out through the communication module. The positioning module is a Beidou positioning module, a GPS positioning module, and a base station positioning module. one or more types;

[0027]

154 A power supply module that supplies power to each part of the vending machine. The power supply module includes a mains power supply module and/or a battery power supply module.

[0028]

159 Preferably, the fruit vending machine of the present invention further includes a fruit peeling and cutting module arranged inside the vending machine cabinet for peeling and cutting fruits;

[0029]

164 Some panels of the vending machine cabinet are transparent panels.

[0030]

168 In addition, the utility model also provides an automatic fruit vending system, which includes the above-mentioned fruit automatic vending machine, a mobile terminal and a server, the vending machine is connected to the server, and the mobile terminal is connected to the server;

[0031]

174 The vending machine generates a payment QR code, the mobile terminal scans the payment QR code and makes payment, the payment information is uploaded to the server, and the server issues control instructions to the vending machine. The machine opens the pickup port.

[0032]

180 Implementing a fruit vending machine and vending system of the present invention has the following beneficial effects: the fruit vending machine includes a vending machine cabinet, and also includes: a fruit containing device arranged inside the vending machine cabinet for storing fruits; An electronic scale used to weigh the selected fruits inside the cabinet of the vending machine; a screening device installed inside the cabinet of the vending machine for selecting fruits. The fruits selected by the screening device are placed on the electronic scale to automatically weigh and calculate the price; The vending machine cabinet is provided with a pick-up port for taking away fruits, which is opened after payment is completed.

187 By implementing the utility model, no manual participation is required, and customers can automatically complete the selection, weighing, payment, and pickup of fruits; the vending machine can be placed on the roadside, in a factory, or in an office building, and takes up little space, making it convenient for people to use at any time. Buy fruit.

[0033]

194 Description of the drawings

[0034]

198 The utility model will be further described below in conjunction with the accompanying drawings and examples. In the accompanying drawings:

[0035]

203 Figure 1 is a schematic structural diagram of a first embodiment of a fruit vending machine according to the present invention;

[0036]

208 Figure 2 is a schematic structural diagram of a second embodiment of a fruit vending machine according to the present invention;

[0037]

213 Figure 3 is a schematic structural diagram of an automatic fruit vending system of the present invention.

[0038]

217 Detailed ways

[0039]

221 In order to have a clearer understanding of the technical features, purposes and effects of the present utility model, the specific implementation manner of the present utility model will be described in detail with reference to the accompanying drawings.

[0040]

227 Figure 1 is a schematic structural diagram of a first embodiment of a fruit vending machine according to the present invention.

[0041]

232 Specifically, the fruit vending machine in this embodiment includes a vending machine cabinet. Some panels of the vending machine cabinet are transparent panels, such as tempered glass. Users can observe the fruits in the cabinet through the transparent panels.

235 It also includes: accommodation device, screening device, electronic scale, pick-up port, power supply module, etc., among which,

[0042]

240 The accommodating device is arranged inside the vending machine cabinet and is used to store fruits; in particular, the accommodating device is located at the upper part of the vending machine cabinet, and the lower part of the vending machine cabinet is used to install other equipment of the vending machine.

243 Preferably, the storage device may include at least two sub-storage devices, each sub-storage device is respectively placed with different fruits, for example, an apple storage device, an orange storage device, a banana storage device, etc. are respectively provided.

246 The size and shape of the sub-containing device can be different, and the adaptive setting can be made according to the shape and characteristics of the fruit placed therein to better preserve the fruit.

248 As an option, in order to improve the shelf life and appearance of the fruits, the fruits can be simply pre-packaged, for example, in fresh-keeping bags, in boxes, etc.

[0043]

253 The electronic scale is installed inside the cabinet of the vending machine and is used for weighing the selected fruits. The electronic scale is connected to the containing device.

255 The electronic scale is equipped with a fruit plate. The user can move the selected fruits to the fruit plate through the screening device, and the electronic scale automatically weighs and calculates the price.

257 Furthermore, because different fruits have different prices, when the storage device includes more than two sub-storage devices, multiple corresponding electronic scales need to be set, and each electronic scale is set with a corresponding fruit price.

260 Or, because the prices of different fruits are different, when the holding device includes more than two sub-holding devices, and there is only one electronic scale, the electronic scale sets the corresponding price according to the type of fruit selected by the user, and at the same time, the moving position of the screening device needs to be restricted, that is, After the user selects the fruit, the screening device can only move in the corresponding selection area to select the specified type of fruit.

265 For example, the holding device includes an apple holding device and an orange holding device, each occupying half of the space of the holding device.

267 Then the user chooses to buy apples, and the electronic scale is set to the price of apples. At the same time, the screening device can only move within the area of the apple containing device where the apples are located, and can only select apples.

[0044]

273 The pick-up port is used to take away fruits. The pick-up port can be set at the location of the electronic scale. The pick-up port is equipped with a baffle and a baffle drive module. Before payment, the baffle is closed; after the user completes the online payment Finally, the baffle drive module drives the baffle to move, and the baffle is in the open state.

277 After the user completes the online payment, the pickup port automatically opens, and the user can directly take away the fruit on the electronic scale.

279 By arranging the pick-up port adjacent to the electronic scale, the fruit only needs to be moved once during the entire purchase process, reducing operating time and avoiding damage to the fruit.

281 It is understandable that because the electronic scale is connected to the holding device, it is necessary to set up an enclosure guardrail around the electronic scale to prevent users from taking the fruit directly through the electronic scale after the pickup port is opened.

284 As an option, an adjustable baffle can be set between the position of the electronic scale and the holding device. During the fruit screening process, the pick-up port is closed and the baffle is opened so that the user can screen the fruits; after payment is completed, the pick-up port When the baffle is opened and the baffle is closed, the user can only take out the fruits that have been purchased, but cannot take away the fruits in the containing device.

[0045]

292 The screening device is installed inside the vending machine cabinet and is used to select fruits. The screening device places the selected fruits on the electronic scale, and the electronic scale automatically weighs and calculates the price.

295 The screening device can complete actions such as grabbing, moving, and releasing fruits, thereby realizing fruit selection.

297 It can be understood that the moving and grabbing parts of the screening device need to be installed inside the vending machine cabinet, and the control module needs to be installed outside the vending machine cabinet for user operation.

300 The screening device will be described below through several embodiments.

301 Screening devices include manual screening devices and automatic screening devices, where,

[0046]

305 As an option, the manual screening device includes: a gripper, a robotic arm, a drive module, and a control module. The gripper is set on the robotic arm for grabbing fruits. In order to prevent the fruit from being scratched or damaged, it is necessary to install the gripper on the gripper. Set with soft cushioning pads.

308 The drive module connects and drives the robotic arm. The drive module can be installed on the track. The drive module drives the robotic arm to move on the track. For example, the drive module is driven by a motor, and the drive motor drives the rollers to move on the track to realize the movement of the robotic arm.

312 The robotic arm has a telescopic structure, which means it can retract up and down.

313 The control module is set outside the vending machine cabinet and is connected to the drive module. The control module receives the user's selection operation and generates corresponding control signals to the control module. The control module includes buttons or operating levers, etc. The control signals include position movement signals and grabbing signals. , release signal, etc.

317 For example, the robotic arm has a telescopic structure and can move up and down through telescoping; the drive module drives the robotic arm to move on the track to complete movement in the horizontal direction. In this way, the screening device can move to any position, thereby grabbing fruits and Place on electronic scale.

[0047]

324 As an option, the manual screening device includes: a gripper, a robotic arm, a drive module, and a control module. The gripper is set on the robotic arm for grabbing fruits. In order to prevent the fruit from being scratched or damaged, it is necessary to install the gripper on the gripper. Set with soft cushioning pads.

327 One end of the robotic arm is fixed on the inner wall of the vending machine cabinet, and the other end is provided with a gripper.

329 The robotic arm includes at least two sections, and the connecting nodes between each section can rotate at multiple angles.

331 The drive module drives each robotic arm to move to complete the grabbing, moving and releasing of fruits,

similar to how a person grabs fruits by hand.

[0048]

336 As an option, the manual screening device also includes a gripper, a robotic arm, a driving module, and a short-range wireless communication module that receives wireless control signals, such as Bluetooth, WIFI, etc.

339 The manual screening device is connected to a mobile terminal through a short-range wireless communication module, and an APP for controlling the manual screening device is installed on the mobile terminal.

342 The mobile terminal sends control signals, which include position movement signals, grabbing signals, release signals, etc.; the driving module controls the mechanical arm and gripper to work according to the control signals to grab the fruit.

345 For example, the robotic arm has a retractable structure and can move up and down; the drive module drives the robotic arm to move on the track to complete movement in the horizontal direction. In this way, the screening device can move to any position, and then can grab fruits and place them on on the electronic scale.

[0049]

351 The above two manual screening devices can complete fruit screening under the user's operation, allowing users to have more self-service choices; at the same time, operating the mechanical arm movement has a certain degree of fun, which increases the fun of purchasing fruits.

[0050]

357 Alternatively, the automatic screening device includes a transmission device and a receiving module, wherein the transmission device is disposed between the fruit holding device and the electronic scale and is used to move the fruit from the fruit holding device to the electronic scale.

360 The receiving module is connected to the transmission device and is used to receive purchase information sent by the user. The purchase information is one of fruit weight, fruit quantity, and purchase amount. For example, the user can choose to buy 2Kg of apples, or he can choose to buy 2 apples, or You can choose to buy apples worth 20 yuan.

364 Since the electronic scale can only obtain the weight parameter, if the user inputs the purchase amount, the automatic screening device converts the purchase amount into the corresponding weight based on the fruit price and sends it to the electronic scale.

367 It can be understood that there is feedback regulation between the electronic scale and the transmission device. When the fruit in the electronic scale does not reach the preset weight, the electronic scale sends a signal to continue adding fruit to the transmission device, and the transmission device continues to add fruit; when the fruit in the electronic scale When the preset weight is reached, the electronic scale sends a stop adding fruit signal to the transmission device, and the transmission device stops adding fruit.

372 The automatic screening device only requires users to enter purchasing information and does not require users to manually select fruits, which can improve purchasing efficiency.

[0051]

377 The power supply module supplies power to each part of the vending machine. The power supply module includes a mains power supply module and/or a battery pack power supply module.

379 In some places where mains power is not easily accessible, such as squares, parks, roadsides, etc., the battery pack power supply module can be used to provide power, thereby improving the adaptability of the vending machine.

382 Preferably, for vending machines placed outdoors, a solar charging module can also be installed to charge the battery pack, thereby reducing battery maintenance and saving management costs.

[0052]

387 Figure 2 is a schematic structural diagram of a second embodiment of a fruit vending machine according to the present invention.

[0053]

392 Specifically, based on the first embodiment, the fruit vending machine of this embodiment also includes a communication module for sending and receiving information. The communication module includes a wired communication module and/or a wireless communication module. The wireless communication module includes but It is not limited to 3G communication module, 4G communication module, WIFI communication module, etc. The connection and settings of the communication module can refer to the settings of the existing communication module, which will not be described again here.

398 Preferably, in order to provide a better signal to the wireless communication module, the signal antenna can be installed on the top of the vending machine.

[0054]

403 Alternatively, the vending machine in this embodiment further includes a positioning module connected to the communication module and used to obtain the location information of the vending machine, and the obtained location information is sent to the server through the communication module.

406 Positioning modules include but are not limited to Beidou positioning module, GPS positioning module, Galileo positioning module, base station positioning module, etc.

408 The vending machine uploads location information to the server at preset time intervals so that the location information of the vending machine can be updated in time.

410 In particular, considering that the vending machine will basically not move after being placed, the location information of the vending machine can be uploaded to the server when it is placed for the first time, and the server will save it. Then the vending machine does not need a positioning module. After moving the vending machine, manually Just modify it.

[0055]

417 Alternatively, the vending machine cabinet in this embodiment is provided with a display screen for displaying product information, operating procedures, advertising information, reminder information, payment information and other information. For example, the payment information may be a payment QR code.

420 And an audio playback module for playing audio signals. The audio playback module can play audio signals such as operation prompts, payment prompts, pickup prompts, advertisements, and promotional information.

423 The content displayed on the display screen and the content played by the audio playback module can be obtained through the communication module, that is, remotely issued by the server.

425 For example, the display screen scrolls and plays fruit price information. As the fruit is stored for a longer period of time, the price of the fruit can be appropriately reduced for promotion.

427 In particular, the price information sent by the server can be received through the communication module and displayed on the display screen.

429 Because there are a large number of fruit vending machines and they are widely distributed, the price can be adjusted remotely through the communication module, which greatly improves management efficiency.

431 For another example, the server sends the advertising information to the vending machine through the communication module, and then plays it on the display screen and audio playback module to update the advertising on the vending machine.

[0056]

437 In some embodiments, the fruit vending machine further includes a packaging device for packaging fruits on an electronic scale. The packaging device is arranged on the electronic scale. The packaging device places the packaging bag on the electronic scale, and the fruits selected by the screening device are placed directly. In the packing bag.

441 Alternatively, the packaging device is installed at the pick-up port, and after completing the weighing and payment, the fruit in the electronic scale is transferred to the packing bag at the pick-up port.

443 Alternatively, the packaging device only provides packaging bags to the user, and after the pickup port is opened, the user can package the packaging himself.

[0057]

448 In some embodiments, because fruits are fresh commodities and need to be kept fresh and stored, the fruit vending machine also includes: a fresh-keeping module for keeping fruits fresh is provided in the vending machine cabinet, and the fresh-keeping module is connected with the accommodation device in the vending machine, so that The fruit in the container is kept fresh.

452 It can be understood that since different fruits require different preservation conditions, the preservation module can provide corresponding preservation environments for different sub-containing devices.

454 Preferably, the freshness preservation module includes a temperature adjustment module, a humidity adjustment module, and an oxygen content adjustment module. At the same time, in order to ensure the balance of temperature and humidity in the accommodation device, the freshness preservation module includes a corresponding temperature detection sensor, a humidity detection sensor, and an oxygen content

adjustment module. Oxygen sensor enables dynamic adjustment of temperature, humidity, and oxygen content in the containment device.

[0058]

463 In some embodiments, a refrigeration module for refrigeration of fruits is provided in the vending machine cabinet. The refrigeration module is connected with the storage device to refrigerate the fruits in the storage device.

466 For example, keep watermelons refrigerated in the summer.

467 The refrigeration module is connected to the temperature detection sensor to keep the temperature in the containing device within a preset range.

[0059]

472 In some embodiments, some fruits that are perishable after cleaning can be cleaned after the user purchases them.

474 The fruit vending machine also includes: a cleaning module for cleaning fruits is provided in the cabinet of the vending machine. The cleaning module includes a water storage module, a cleaning tank, and a sewage collection module.

477 After the fruit is weighed and paid online, the fruit is moved to the cleaning tank. The water storage module outputs clean water to the cleaning tank; the automatic cleaning module cleans the fruit. After the cleaning is completed, the fruit is taken out through the shipping port.

480 Afterwards, the sewage in the cleaning tank is discharged to the sewage collection module.

[0060]

484 In some embodiments, the fruit vending machine further includes a fruit peeling and cutting module disposed inside the vending machine cabinet for peeling and cutting fruits. The fruit peeling and cutting module includes a knife for cutting. For example, when cutting watermelon, it can Use the cut melon mold.

487 Furthermore, the vending machine also includes a garbage collection module, which is connected to the fruit peeling and cutting module and is used to collect garbage generated by the fruit peeling and cutting module.

[0061]

492 In some embodiments, the fruit vending machine further includes a lighting lamp for illuminating the vending machine. Preferably, the lighting lamp is installed inside the vending machine cabinet.

[0062]

497 In some embodiments, the fruit vending machine also includes a monitoring device for monitoring the area where the vending machine is located, and the monitoring device sends monitoring information to the server through the communication module.

500 Through monitoring devices, the management efficiency of vending machines can be improved.

[0063]

504 Figure 3 is a schematic structural diagram of an automatic fruit vending system of the present invention.

[0064]

508 Specifically, the fruit automatic vending system includes the above-mentioned fruit vending machine, and also includes mobile terminals and servers. The mobile terminals include but are not limited to smartphones, tablet computers, smart watches, etc.

511 The vending machine is connected to the server, and the mobile terminal is connected to the server.

512 After the user selects and weighs the fruit, the vending machine generates a payment QR code. The mobile terminal scans the payment QR code and makes payment. Payment methods include Alipay, WeChat payment, UnionPay payment, etc.

515 The payment information is uploaded to the server, the server issues control instructions to the vending machine, and the vending machine opens the pickup port.

517 Preferably, the server records the transaction information of each transaction. The transaction information includes vending machine number, type of fruit sold, fruit weight, sales price and other information.

[0065]

522 When the user needs to purchase fruit, he sends a purchase request to the server through the mobile terminal, and the purchase request includes the location information of the mobile terminal.

524 The server searches based on the location information of the mobile terminal, sends the address information of the vending machine within a preset distance from the location information to the mobile terminal, and displays it on the mobile terminal, for example, on an electronic map, or in a list. show.

527 Users can know the locations of all fruit vending machines around them and make selections based on their needs.

529 Further, the server generates a route based on the user's location information and the vending machine's address information to guide the user.

[0066]

534 It can be understood that when the merchant stores fruits, the quantity of stored fruits is sent to the server, and the server saves it.

536 During the sales process, the type and quantity of fruits for each transaction are uploaded to the server, and the server can know the number of fruits remaining in the current vending cabinet, thereby achieving remote monitoring, reasonable replenishment, and improving the management efficiency of the vending machine.

[0067]

542 By implementing the utility model, no manual participation is required, and customers can automatically complete the selection, weighing, payment, and pickup of fruits; the vending machine can be placed on the roadside, in a factory, or in an office building, and takes up little space, making it convenient for people to use at any time. Buy fruit.

[0068]

549 The above embodiments are only for illustrating the technical concepts and characteristics of the present invention. Their purpose is to allow those familiar with this technology to understand the contents of the present invention and implement them accordingly, and they cannot limit the scope of protection of the present invention.

553 All equivalent changes and modifications made to the scope of the claims of this utility model shall fall within the scope of the claims of this utility model.

Notice

CLAIMS CN207663510U

1.

13 A fruit vending machine, including a vending machine cabinet, is characterized in that it also includes:

14 A fruit storage device provided inside the vending machine cabinet for storing fruits;

15 An electronic scale installed inside the cabinet of the vending machine for weighing the selected fruits;

16 A screening device for selecting fruits is provided inside the cabinet of the vending machine. The fruits selected by the screening device are placed on the electronic scale and automatically weighed and the price is calculated;

19 The vending machine cabinet is provided with a pick-up port for taking away fruits, and the pick-up port is opened after payment is completed.

2.

24 The fruit vending machine according to claim 1, wherein the storage device includes at least two sub-storage devices, and each of the sub-storage devices holds different fruits.

3.

29 The fruit vending machine according to claim 1, wherein the screening device includes a manual screening device, and the manual screening device includes: a gripper, a mechanical arm, a driving module, and a control module, wherein,

32 The gripper is provided on the mechanical arm for grabbing fruits; the drive module is connected to and drives the mechanical arm; the control module is provided outside the vending machine cabinet and connected to the drive module. The control module receives the user's selection operation and generates corresponding control signals to the control module.

4.

39 The fruit vending machine according to claim 1, characterized in that the screening device includes an automatic screening device, and the automatic screening device includes a device disposed between the fruit containing device and the electronic scale for removing fruits from all locations. The fruit holding device moves to the transmission device of the electronic scale;

43 A receiving module connected to the transmission device and used to receive purchase information sent by the user, where the purchase information is one of fruit weight, fruit quantity, and purchase amount.

5.

48 The fruit vending machine according to claim 1, further comprising: a packaging device for packaging fruits on the electronic scale;

50 The packaging device is arranged on the electronic scale, the packaging device places the packaging bag on the electronic scale, and the fruits selected by the screening device are directly placed in the packaging bag; or

52 The packaging device is arranged at the pickup port, and after completing the weighing and payment, the fruit in the electronic scale is transferred to the packaging bag at the pickup port.

6.

57 The fruit vending machine according to claim 1, wherein a preservation module for fruit preservation is provided in the cabinet of the vending machine; and/or

59 The vending machine cabinet is provided with a refrigeration module for fruit refrigeration; and/or

60 The vending machine cabinet is provided with a cleaning module for cleaning fruits.

7.

64 The fruit vending machine according to claim 1, wherein the vending machine cabinet is provided with a display screen for displaying product information, operating procedures, advertising information, reminder information, and payment information; and/or

67 Audio playback module for playing audio signals.

8.

71 The fruit vending machine according to claim 1, further comprising a communication module for sending and receiving information, the communication module includes a wired communication module and/or a wireless communication module, the wireless communication module includes 3G One or more of communication modules, 4G communication modules, WIFI communication modules, and Bluetooth communication modules;

76 A positioning module connected to the communication module and used to obtain the position information of the vending machine. The position information is sent out through the communication module. The positioning module is a Beidou positioning module, a GPS positioning module, and a base station positioning module. one or more types;

80 A power supply module that supplies power to each part of the vending machine. The power supply module includes a mains power supply module and/or a battery power supply module.

9.

85 The fruit vending machine according to claim 1, further comprising a fruit peeling and cutting module arranged inside the vending machine cabinet for peeling and cutting fruits;

87 Some panels of the vending machine cabinet are transparent panels.

10.

91 A fruit automatic vending system, characterized in that it includes the fruit automatic vending machine according to any one of claims 1 to 9, and also includes a mobile terminal and a server, the vending machine is connected to the server, and the mobile terminal is connected to the server. Described server;

94 The vending machine generates a payment QR code, the mobile terminal scans the payment QR code and makes payment, the payment information is uploaded to the server, and the server issues control instructions to the vending machine. The machine opens the pickup port.

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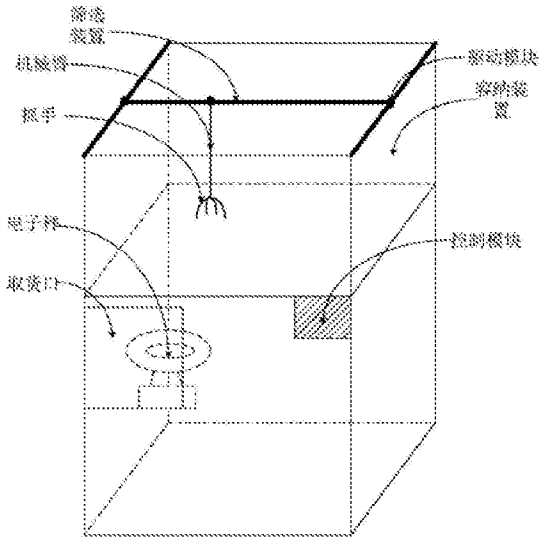
权利要求书2页 说明书6页 附图2页

(54)实用新型名称

一种水果自动售卖机及售卖系统

(57)摘要

本实用新型涉及一种水果自动售卖机及售卖系统。该水果自动售卖机包括售卖机柜体,还包括:设置在售卖机柜体内部、用于存放水果的水果容纳装置;设置在售卖机柜体内部、用于为选取的水果称重的电子秤;设置在售卖机柜体内部、用于选取水果的筛选装置,筛选装置选取的水果放置在电子秤上自动称重并计算价款;售卖机柜体设置有用于取走水果的取货口,取货口在完成付款后打开。通过实施本实用新型,不需要人工参与,顾客可自动完成水果的挑选、称重、付款、取货;该售卖机可摆放至路边、厂区内、写字楼内,占用空间小,方便人们随时购买水果。



CN 207663510 U

1.一种水果自动售卖机，包括售卖机柜体，其特征在于，还包括：

设置在所述售卖机柜体内部、用于存放水果的水果容纳装置；

设置在所述售卖机柜体内部、用于为选取的水果称重的电子秤；

设置在所述售卖机柜体内部、用于选取水果的筛选装置，所述筛选装置选取的水果放置在所述电子秤上自动称重并计算价款；

所述售卖机柜体设置有用于取走水果的取货口，所述取货口在完成付款后打开。

2.根据权利要求1所述的水果自动售卖机，其特征在于，所述容纳装置包括至少两个子容纳装置，每个所述子容纳装置分别放置不同的水果。

3.根据权利要求1所述的水果自动售卖机，其特征在于，所述筛选装置包括人工筛选装置，所述人工筛选装置包括：抓手、机械臂、驱动模块、控制模块，其中，

所述抓手设置在所述机械臂上，用于抓取水果；所述驱动模块连接并驱动所述机械臂；所述控制模块设置在所述售卖机柜体外侧、连接所述驱动模块，所述控制模块接收用户的选择操作，并产生对应的控制信号至所述控制模块。

4.根据权利要求1所述的水果自动售卖机，其特征在于，所述筛选装置包括自动筛选装置，所述自动筛选装置包括设置在所述水果容纳装置和电子秤之间、用于将水果从所述水果容纳装置移动至所述电子秤的传动装置；

与所述传动装置连接、用于接收用户发送的购买信息的接收模块，所述购买信息为水果重量、水果数量、购买金额中的一种。

5.根据权利要求1所述的水果自动售卖机，其特征在于，还包括：用于将所述电子秤上的水果打包的打包装置；

所述打包装置设置在所述电子秤上，所述打包装置将打包袋放置在所述电子秤上，所述筛选装置选择的水果直接放置在所述打包袋内；或者

所述打包装置设置在所述取货口，在完成称重付款后，将所述电子秤内的水果转移至所述取货口的打包袋内。

6.根据权利要求1所述的水果自动售卖机，其特征在于，所述售卖机柜体内设置有用于水果保鲜的保鲜模块；和/或

所述售卖机柜体内设置有用于水果冷藏的冷藏模块；和/或

所述售卖机柜体内设置有用于清洗水果的清洗模块。

7.根据权利要求1所述的水果自动售卖机，其特征在于，所述售卖机柜体上设置有用于显示商品信息、操作流程、广告信息、提醒信息、付款信息的显示屏；和/或

用于播放音频信号的音频播放模块。

8.根据权利要求1所述的水果自动售卖机，其特征在于，还包括用于发送和接收信息的通信模块，所述通信模块包括有线通信模块和/或无线通信模块，所述无线通信模块包括3G通信模块、4G通信模块、WIFI通信模块、蓝牙通信模块中的一种或几种；

与所述通信模块连接、用于获取所述售卖机的位置信息的定位模块，所述位置信息通过所述通信模块发送出去，所述定位模块为北斗定位模块、GPS定位模块、基站定位模块中的一种或几种；

为所述售卖机各部分供电的供电模块，所述供电模块包括市电供电模块和/或电池组供电模块。

9.根据权利要求1所述的水果自动售卖机，其特征在于，还包括设置在所述售卖机柜体内部、用于将水果进行剥切的水果剥切模块；

所述售卖机柜体的部分面板为透明面板。

10.一种水果自动售卖系统，其特征在于，包括权利要求1-9任一项所述的水果自动售卖机，还包括移动终端和服务器，所述售卖机连接所述服务器，所述移动终端连接所述服务器；

所述售卖机生成付款二维码，所述移动终端扫描所述付款二维码并付款，所述付款信息上传至所述服务器，所述服务器下发控制指令至所述售卖机，所述售卖机打开取货口。

一种水果自动售卖机及售卖系统

技术领域

[0001] 本实用新型涉及售卖机领域，更具体地说，涉及一种水果自动售卖机及售卖系统。

背景技术

[0002] 水果是人们日常饮食中不可缺少的营养来源。目前水果的主要售卖形式依旧是人工贩卖，包括在大型超市、水果店、路边临时售卖点等，这种贩卖方式需要人为参与，并且需要租赁店面，大大提高了水果成本。另外，在一些写字楼和厂区，很少有专门的商铺用于出售水果，导致厂区人员要自己携带或到较远的商场购买，给用户带来不便。

实用新型内容

[0003] 本实用新型要解决的技术问题在于，针对现有技术的上述人工参与导致成本过高、一些地方不方便购买水果的缺陷，提供一种水果自动售卖机及售卖系统。

[0004] 本实用新型解决其技术问题所采用的技术方案是：构造一种水果自动售卖机，包括售卖机柜体，还包括：

[0005] 设置在所述售卖机柜体内部、用于存放水果的水果容纳装置；

[0006] 设置在所述售卖机柜体内部、用于为选取的水果称重的电子秤；

[0007] 设置在所述售卖机柜体内部、用于选取水果的筛选装置，所述筛选装置选取的水果放置在所述电子秤上自动称重并计算价款；

[0008] 所述售卖机柜体设置有用于取走水果的取货口，所述取货口在完成付款后打开。

[0009] 优选地，本实用新型所述的水果自动售卖机，所述容纳装置包括至少两个子容纳装置，每个所述子容纳装置分别放置不同的水果。

[0010] 优选地，本实用新型所述的水果自动售卖机，所述筛选装置包括人工筛选装置，所述人工筛选装置包括：抓手、机械臂、驱动模块、控制模块，其中，

[0011] 所述抓手设置在所述机械臂上，用于抓取水果；所述驱动模块连接并驱动所述机械臂；所述控制模块设置在所述售卖机柜体外侧、连接所述驱动模块，所述控制模块接收用户的选择操作，并产生对应的控制信号至所述控制模块。

[0012] 优选地，本实用新型所述的水果自动售卖机，所述筛选装置包括自动筛选装置，所述自动筛选装置包括设置在所述水果容纳装置和电子秤之间、用于将水果从所述水果容纳装置移动至所述电子秤的传动装置；

[0013] 与所述传动装置连接、用于接收用户发送的购买信息的接收模块，所述购买信息为水果重量、水果数量、购买金额中的一种。

[0014] 优选地，本实用新型所述的水果自动售卖机，还包括：用于将所述电子秤上的水果打包的打包装置；

[0015] 所述打包装置设置在所述电子秤上，所述打包装置将打包袋放置在所述电子秤上，所述筛选装置选择的水果直接放置在所述打包袋内；或者

[0016] 所述打包装置设置在所述取货口，在完成称重付款后，将所述电子秤内的水果转

移至所述取货口的打包袋内。

[0017] 优选地，本实用新型所述的水果自动售卖机，所述售卖机柜体内设置有用于水果保鲜的保鲜模块；和/或

[0018] 所述售卖机柜体内设置有用于水果冷藏的冷藏模块；和/或

[0019] 所述售卖机柜体内设置有用于清洗水果的清洗模块。

[0020] 优选地，本实用新型所述的水果自动售卖机，所述售卖机柜体上设置有用于显示商品信息、操作流程、广告信息、提醒信息、付款信息的显示屏；和/或

[0021] 用于播放音频信号的音频播放模块。

[0022] 优选地，本实用新型所述的水果自动售卖机，还包括用于发送和接收信息的通信模块，所述通信模块包括有线通信模块和/或无线通信模块，所述无线通信模块包括3G通信模块、4G通信模块、WIFI通信模块、蓝牙通信模块中的一种或几种；

[0023] 与所述通信模块连接、用于获取所述售卖机的位置信息的定位模块，所述位置信息通过所述通信模块发送出去，所述定位模块为北斗定位模块、GPS定位模块、基站定位模块中的一种或几种；

[0024] 为所述售卖机各部分供电的供电模块，所述供电模块包括市电供电模块和/或电池组供电模块。

[0025] 优选地，本实用新型所述的水果自动售卖机，还包括设置在所述售卖机柜体内部、用于将水果进行剥切的水果剥切模块；

[0026] 所述售卖机柜体的部分面板为透明面板。

[0027] 另，本实用新型还提供一种水果自动售卖系统，包括上述的水果自动售卖机，还包括移动终端和服务器，所述售卖机连接所述服务器，所述移动终端连接所述服务器；

[0028] 所述售卖机生成付款二维码，所述移动终端扫描所述付款二维码并付款，所述付款信息上传至所述服务器，所述服务器下发控制指令至所述售卖机，所述售卖机打开取货口。

[0029] 实施本实用新型的一种水果自动售卖机及售卖系统，具有以下有益效果：该水果自动售卖机包括售卖机柜体，还包括：设置在售卖机柜体内部、用于存放水果的水果容纳装置；设置在售卖机柜体内部、用于为选取的水果称重的电子秤；设置在售卖机柜体内部、用于选取水果的筛选装置，筛选装置选取的水果放置在电子秤上自动称重并计算价款；售卖机柜体设置有用于取走水果的取货口，取货口在完成付款后打开。通过实施本实用新型，不需要人工参与，顾客可自动完成水果的挑选、称重、付款、取货；该售卖机可摆放至路边、厂区内、写字楼内，占用空间小，方便人们随时购买水果。

附图说明

[0030] 下面将结合附图及实施例对本实用新型作进一步说明，附图中：

[0031] 图1是本实用新型一种水果自动售卖机第一实施例的结构示意图；

[0032] 图2是本实用新型一种水果自动售卖机第二实施例的结构示意图；

[0033] 图3是本实用新型一种水果自动售卖系统的结构示意图。

具体实施方式

[0034] 为了对本实用新型的技术特征、目的和效果有更加清楚的理解，现对照附图详细说明本实用新型的具体实施方式。

[0035] 图1是本实用新型一种水果自动售卖机第一实施例的结构示意图。

[0036] 具体的，本实施例的水果自动售卖机包括售卖机柜体，售卖机柜体的部分面板为透明面板，例如钢化玻璃，用户可通过透明面板观察柜体内的水果。还包括：容纳装置、筛选装置、电子秤、取货口、供电模块等，其中，

[0037] 容纳装置设置在售卖机柜体内部、用于存放水果；特别地，容纳装置位于售卖机柜体的上部，售卖机柜体的下部用于安装售卖机的其他设备。优选地，容纳装置可包括至少两个子容纳装置，每个子容纳装置分别放置不同的水果，例如分别设置苹果容纳装置、橘子容纳装置、香蕉容纳装置等。子容纳装置的大小和形状可不同，根据其内放置水果的形状和特性进行适应性设置，以更好的保存水果。作为选择，为提高水果的保质期、外观等，可将水果进行简单预包装，例如，使用保鲜袋包装，使用盒子包装等。

[0038] 电子秤设置在售卖机柜体内部、用于为选取的水果称重，电子秤与容纳装置连通。电子秤上设置有果盘，用户可将选择的水果通过筛选装置移动至果盘上，电子秤自动称重并计算价款。进一步，因不同水果的价格不同，当容纳装置包括两个以上了容纳装置时，需要设置对应多个电子秤，每个电子秤设置对应的水果价格。或者，因不同水果的价格不同，当容纳装置包括两个以上子容纳装置时，电子秤仅有一个，则电子秤根据用户选择的水果类型设置对应价格，同时需要限制筛选装置的移动位置，即用户选定水果后，筛选装置仅能在对应的选择区域运动，选择指定类型的水果。例如，容纳装置包括苹果容纳装置和橘子容纳装置，各占容纳装置的一半空间。则用户选择购买苹果，电子秤设置为苹果的价格，同时，筛选装置仅能在苹果所处的苹果容纳装置的区域内运动，仅能选择苹果。

[0039] 取货口用于取走水果，可将取货口设置在电子秤所在的位置，取货口设置有挡板和挡板驱动模块，在付款之前，挡板处于关闭状态；在用户完成在线付款后，挡板驱动模块带动挡板移动，挡板处于打开状态。用户完成在线付款后，取货口自动打开，则用户可直接取走电子秤上的水果。通过使取货口与电子秤相邻设置，整个购买过程中仅需要移动水果一次，减少操作时间，同时避免水果的磕碰损坏。可以理解，因电子秤与容纳装置连通，需要在电子秤周围设置围闭护栏，防止取货口打开后用户通过电子秤处直接取走水果。作为选择，可在电子秤所处位置和容纳装置之间设置可调节的挡板，在筛选水果过程中，取货口关闭，挡板打开，用户可筛选水果；在付款完成后，取货口打开，挡板关闭，则用户仅可取出已经购买的水果，无法取走容纳装置内的水果。

[0040] 筛选装置设置在售卖机柜体内部、用于选取水果，筛选装置将选取的水果放置在电子秤上，电子秤自动称重并计算价款。筛选装置可完成水果的抓取、移动、释放等动作，从而实现水果的挑选。可以理解，该筛选装置的移动及抓取部分需安装在售卖机柜体内部，控制模块需安装在售卖机柜体外部，以供用户操作。以下分别通过几个实施方式对筛选装置进行说明。筛选装置包括人工筛选装置和自动筛选装置，其中，

[0041] 作为选择，人工筛选装置包括：抓手、机械臂、驱动模块、控制模块，其中，抓手设置在机械臂上，用于抓取水果，为避免水果被抓伤、抓坏，需要在抓手上设置柔软的缓冲垫。驱动模块连接并驱动机械臂，驱动模块可安装在轨道上，驱动模块驱动机械臂在轨道上移动，例如，驱动模块为电机驱动，驱动电机带动滚轮在轨道上移动，实现机械臂的移动。机械臂

为可伸缩结构，即能上下收缩。控制模块设置在售卖机柜体外侧、连接驱动模块，控制模块接收用户的选择操作，并产生对应的控制信号至控制模块，控制模块包括按键或操作杆等，控制信号包括位置移动信号、抓取信号、释放信号等。例如，机械臂为可伸缩结构，通过伸缩完成上下移动；驱动模块驱动机械臂在轨道到移动，完成水平方向上的运动，这样，筛选装置可完成任意位置的移动，进而可抓取水果，并放置在电子秤上。

[0042] 作为选择，人工筛选装置包括：抓手、机械臂、驱动模块、控制模块，其中，抓手设置在机械臂上，用于抓取水果，为避免水果被抓伤、抓坏，需要在抓手上设置柔软的缓冲垫。机械臂的一端固定在售卖机柜体内壁上，另一端设置有抓手。机械臂包括至少两节，每节之间的连接节点可进行多角度转动。驱动模块驱动每节机械臂移动，完成水果的抓取、移动、释放，类似于人用手抓取水果。

[0043] 作为选择，人工筛选装置还包括抓手、机械臂、驱动模块、接收无线控制信号的短距离无线通信模块，例如蓝牙、WIFI等。人工筛选装置通过短距离无线通信模块连接移动终端，移动终端上安装有用于控制人工筛选装置的APP。移动终端发送控制信号，控制信号包括位置移动信号、抓取信号、释放信号等；驱动模块根据控制信号控制机械臂和抓手工作，抓取水果。例如，机械臂为可伸缩结构，完成上下移动；驱动模块驱动机械臂在轨道到移动，完成水平方向上的运动，这样，筛选装置可完成任意位置的移动，进而可抓取水果，并放置在电子秤上。

[0044] 上述两种人工筛选装置在用户的操作下即可完成水果的筛选，使用户具有更多的自助选择权；同时，因操作机械臂移动具有一定的趣味性，增加了购买水果的趣味性。

[0045] 作为选择，自动筛选装置包括传动装置和接收模块，其中，传动装置设置在水果容纳装置和电子秤之间、用于将水果从水果容纳装置移动至电子秤。接收模块与传动装置连接、用于接收用户发送的购买信息，购买信息为水果重量、水果数量、购买金额中的一种，例如，用户可选择买2Kg苹果，也可选择买2个苹果，也可选择买价值20元的苹果。因电子秤仅能获取重量参数，所以，如果用户输入的是购买金额，则自动筛选装置根据水果价格将购买金额转换为对应重量，发送至电子秤。可以理解，电子秤和传动装置之间存在反馈调节，当电子秤内的水果未达到预设重量时，电子秤发送继续添加水果信号至传动装置，传动装置继续添加水果；当电子秤内的水果达到预设重量时，电子秤发送停止添加水果信号至传动装置，传动装置停止添加水果。自动筛选装置仅需要用户输入购买信息，不需要用户手动挑选水果，可提高购买效率。

[0046] 供电模块为售卖机各部分供电，供电模块包括市电供电模块和/或电池组供电模块。在一些市电不易接到的场合，例如广场、公园、路边等，可使用电池组供电模块供电，从而提高售卖机的适应性。优选地，对于放置在室外的售卖机，还可设置太阳能充电模块，为电池组进行充电，从而减少电池的维护，节省管理成本。

[0047] 图2是本实用新型一种水果自动售卖机第二实施例的结构示意图。

[0048] 具体的，在第一实施例的基础上，本实施例的水果自动售卖机还包括用于发送和接收信息的通信模块，通信模块包括有线通信模块和/或无线通信模块，无线通信模块包括但不限于3G通信模块、4G通信模块、WIFI通信模块等，通信模块的连接和设置可参考现有通信模块的设置，在此不再赘述。优选地，为使无线通信模块由较好的信号，可将信号天线安装在售卖机顶端。

[0049] 作为选择，本实施例的售卖机还包括与通信模块连接、用于获取售卖机的位置信息的定位模块，获取的位置信息通过通信模块发送至服务器。定位模块包括但不限于北斗定位模块、GPS定位模块、伽利略定位模块、基站定位模块等。售卖机按照预设时间间隔上传位置信息至服务器，使售卖机的位置信息能及时更新。特别地，考虑到售卖机在放置后基本不会移动，可在首次放置时将售卖机的位置信息上传至服务器，服务器进行保存，则售卖机可不需要定位模块，移动售卖机后，再进行手动修改即可。

[0050] 作为选择，本实施例的售卖机柜体上设置有用于显示商品信息、操作流程、广告信息、提醒信息、付款信息等信息的显示屏，例如付款信息可为付款二维码。以及用于播放音频信号的音频播放模块，音频播放模块可播放操作提示、付款提示、取货提示、广告、促销信息等音频信号。显示屏显示的内容和音频播放模块播放的内容可通过通信模块获取，即由服务器远程下发。例如，显示屏滚动播放水果价格信息，随着水果的存放时间，可适当降低水果的价格进行促销。特别的，可通过通信模块接收服务器下发的价格信息，并在显示屏上显示。因水果自动售卖机的数量较多，且分布广泛，通过通信模块远程调整价格，大大提高管理效率。又例如，服务器将广告信息通过通信模块下发至售卖机，进而在显示屏和音频播放模块上播放，实现售卖机上的广告更新。

[0051] 一些实施例中，水果自动售卖机还包括用于将电子秤上的水果打包的打包装置，打包装置设置在电子秤上，打包装置将打包袋放置在电子秤上，筛选装置选择的水果直接放置在打包袋内。或者，打包装置设置在取货口，在完成称重付款后，将电子秤内的水果转移至取货口的打包袋内。或者，打包装置仅为用户提供包装袋，取货口打开后，用户自己进行打包。

[0052] 一些实施例中，因水果属于生鲜类商品，需要进行保鲜存储，所以水果自动售卖机还包括：售卖机柜体内设置有用于水果保鲜的保鲜模块，保鲜模块与售卖机内的容纳装置连通，使容纳装置内的水果保鲜。可以理解，因不同水果需要的保鲜条件不同，保鲜模块可分别为不同的子容纳装置提供对应的保鲜环境。优选地，保鲜模块包括温度调节模块、湿度调节模块、以及含氧量调节模块，同时，为保证容纳装置内的温度和湿度的平衡，保鲜模块包括对应的温度检测传感器、湿度检测传感器、以及含氧量传感器，实现对容纳装置内温度、湿度、含氧量的动态调节。

[0053] 一些实施例中，售卖机柜体内设置有用于水果冷藏的冷藏模块，冷藏模块与容纳装置连通，将容纳装置内的水果进行冷藏。例如，夏天时将西瓜进行冷藏。冷藏模块与温度检测传感器连接，保持容纳装置内的温度在预设范围内。

[0054] 一些实施例中，对于一些清洗后易坏的水果，可在用户购买后进行清洗。水果自动售卖机还包括：售卖机柜体内设置有用于清洗水果的清洗模块，该清洗模块包括储水模块、清洗池、污水收集模块。水果完成称重和在线付款后，将水果移动至清洗池，储水模块将清水输出至清洗池；自动清洗模块对水果进行清洗，清洗完成后，水果通过出货口取出。之后，将清洗池内的污水排放至污水收集模块。

[0055] 一些实施例中，水果自动售卖机还包括设置在售卖机柜体内部、用于将水果进行剥切的水果剥切模块，水果剥切模块包括用于切割的刀具，例如，在切西瓜时，可使用切瓜模具。进一步，售卖机还包括垃圾回收模块，垃圾回收模块与水果剥切模块连接，用于收集水果剥切模块产生的垃圾。

[0056] 一些实施例中，水果自动售卖机还包括用于为售卖机照明的照明灯，优选地，该照明灯安装在售卖机柜体内部。

[0057] 一些实施例中，水果自动售卖机还包括用于监控售卖机所处区域的监控装置，监控装置通过通信模块将监控信息发送至服务器。通过监控装置，可提高售卖机的管理效率。

[0058] 图3是本实用新型一种水果自动售卖系统的结构示意图。

[0059] 具体的，该水果自动售卖系统包括上述的水果自动售卖机，还包括移动终端和服务器，移动终端包括但不限于智能手机、平板电脑、智能手表等。售卖机连接服务器，移动终端连接服务器。售卖机完成用户挑选水果称重后，生成付款二维码，移动终端扫描付款二维码并付款，付款方式包括支付宝支付、微信支付、银联支付等。付款信息上传至服务器，服务器下发控制指令至售卖机，售卖机打开取货口。优选地，服务器记录每次交易的交易信息，交易信息包括售卖机编号、销售水果种类、水果重量、销售价格等信息。

[0060] 用户需要购买水果时，通过移动终端发送购买请求至服务器，该购买请求包括移动终端的位置信息。服务器根据移动终端的位置信息进行查找，将距离该位置信息在预设距离内的售卖机的地址信息下发至移动终端，并在移动终端显示，例如，在电子地图上显示，或以列表形式显示。用户即可获知自己周围的所有水果售卖机的位置，根据需求进行选择。进一步，服务器根据用户的位置信息和售卖机的地址信息生成路线，为用户进行指引。

[0061] 可以理解，在商家存放水果时，将存放水果的数量发送至服务器，服务器进行保存。在售卖过程中，每笔交易的水果种类和数量上传至服务器，则服务器即可获知当前售卖柜中剩余水果的数量，从而实现远程监控，合理补货，提高了售卖机的管理效率。

[0062] 通过实施本实用新型，不需要人工参与，顾客可自动完成水果的挑选、称重、付款、取货；该售卖机可摆放至路边、厂区内、写字楼内，占用空间小，方便人们随时购买水果。

[0063] 以上实施例只为说明本实用新型的技术构思及特点，其目的在于让熟悉此项技术的人士能够了解本实用新型的内容并据此实施，并不能限制本实用新型的保护范围。凡跟本实用新型权利要求范围所做的均等变化与修饰，均应属于本实用新型权利要求的涵盖范围。

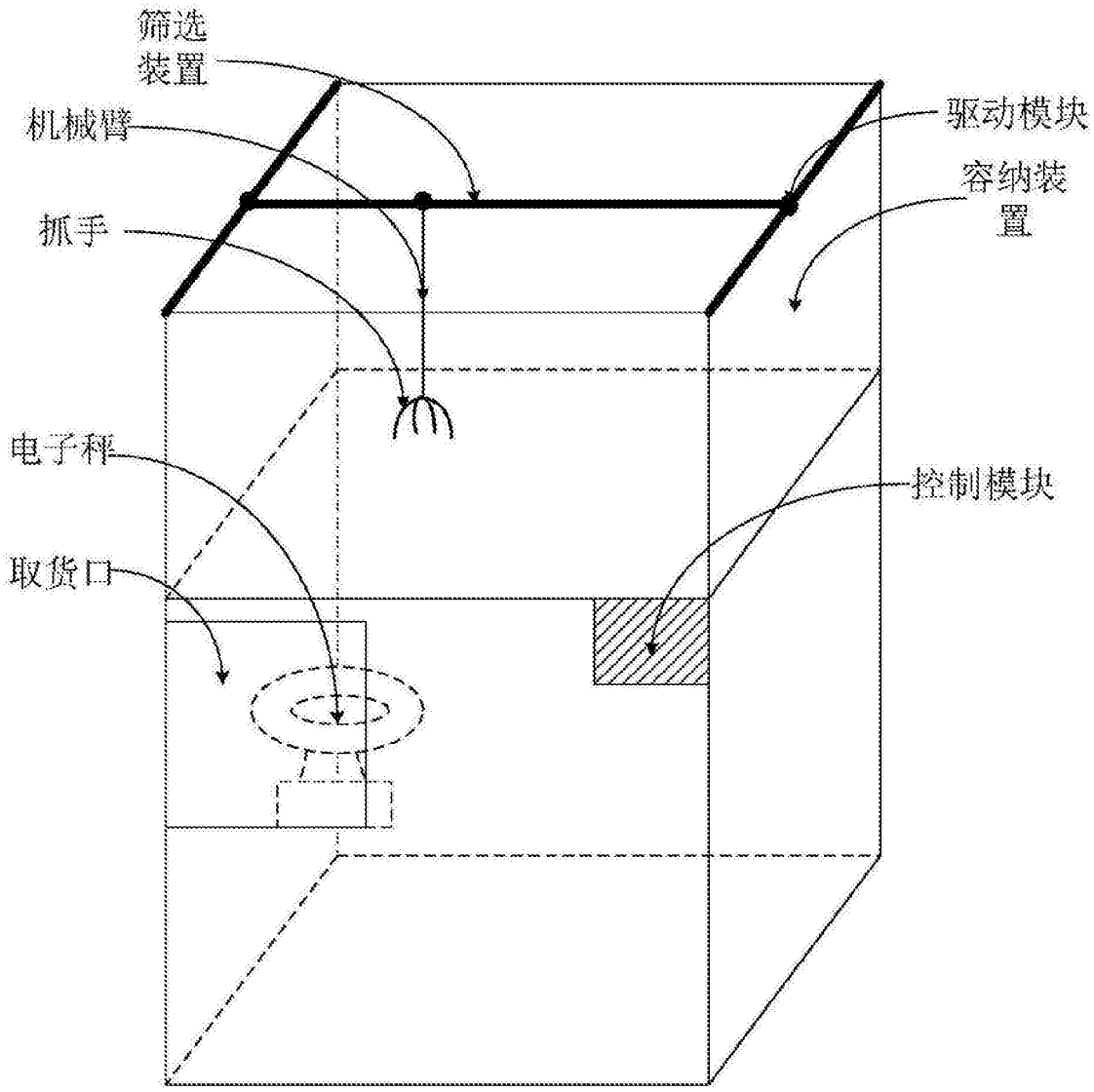


图1

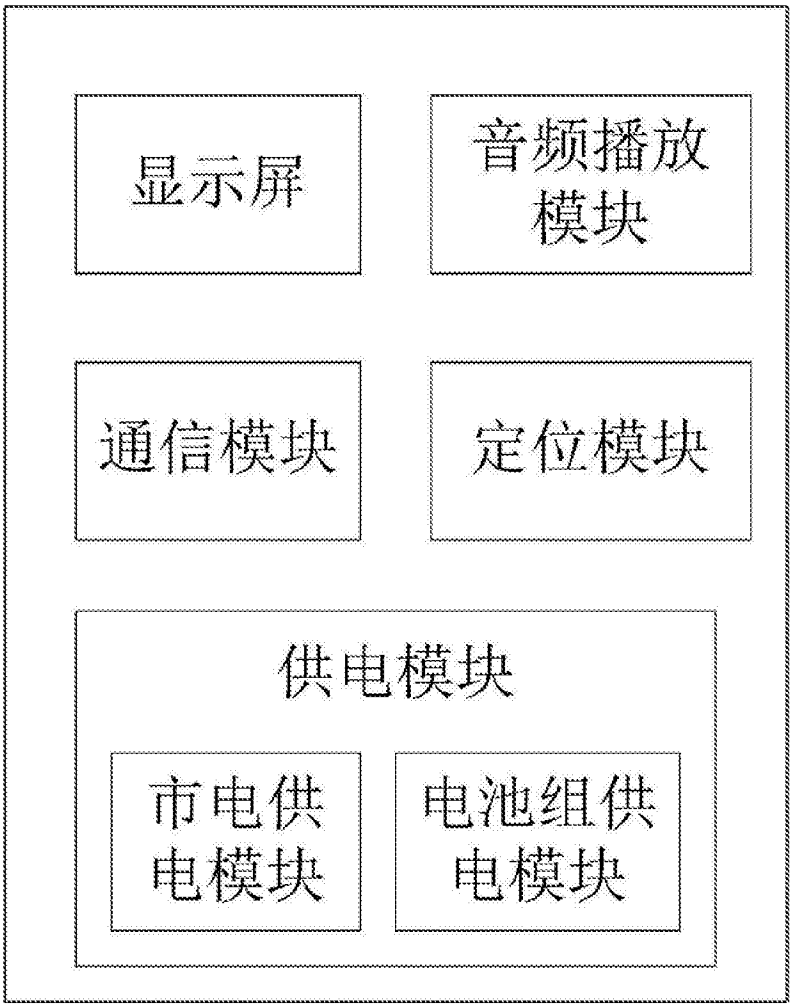


图2

图3

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/968,672	10/18/2022	Paresh K. Patel	104402-5066-US	8326

24341 7590 12/15/2023

Morgan, Lewis & Bockius LLP (PA)
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EXAMINER	
NIGH, JAMES D	

ART UNIT	PAPER NUMBER
3685	

NOTIFICATION DATE	DELIVERY MODE
12/15/2023	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

donald.mixon@morganlewis.com
padocketingdepartment@morganlewis.com

Office Action Summary	Application No. 17/968,672	Applicant(s) Patel et al.	
	Examiner JAMES D NIGH	Art Unit 3685	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on October 18, 2022.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☑ The drawing(s) filed on October 18, 2022 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date 01/03/23, 06/14/23.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Priority

Continuation

2. This application is a continuation application of U.S. application no. 16/748,727 filed January 21, 2020, now U.S. Patent 11,475,454 ("Parent Application") which is a continuation-in-part ("CIP") application of U.S. application no. 15/406,492 filed on January 13, 2017, now U.S. Patent 10,719,833 which is a continuation of U.S. Patent Application 14/335,762 filed on July 18, 2014, now U.S. Patent 9,547,859, which is a continuation of U.S. application no. 14/214,644 filed on March 14, 2014, now U.S. Patent 8,856,045. See MPEP §201.08. In accordance with MPEP §609.02 *A.* 2 and MPEP §2001.06(b) (last paragraph), the Examiner has reviewed and considered the prior art cited in the Parent Application. Also in accordance with MPEP §2001.06(b) (last paragraph), all documents cited or considered 'of record' in the Parent Application are now considered cited or 'of record' in this application. Additionally, Applicant(s) are reminded that a listing of the information cited or 'of record' in the Parent Application need not be resubmitted in this application unless Applicants desire the information to be printed on a patent issuing from this application. See MPEP §609.02 *A.* 2. Finally, Applicants are reminded that the prosecution history of the Parent Application is relevant in this application. See *e.g., Microsoft Corp. v. Multi-Tech Sys., Inc.*, 357 F.3d

1340, 1350, 69 USPQ2d 1815, 1823 (Fed. Cir. 2004) (holding that statements made in prosecution of one patent are relevant to the scope of all sibling patents).

3. Other applications to which the claim is entitled to priority are listed in the application data sheet and will not be repeated by the Examiner.

4. Applicant's claim for the benefit of U.S. provisional patent application 61/917,936 filed December 18, 2013 and U.S. provisional patent application 62/081,492 filed November 18, 2014 under 35 U.S.C. 119(e) is acknowledged.

5. As this application is applicable to the first inventor to file provisions of MPEP § 2152.01 (B) as the application is a child application filed under the provisions regarding continuation-in-part. MPEP 2152.01(B) state as follows:

> If the application is a continuation-in-part of an earlier U.S. application or international application, any claims in the new application not supported by the specification and claims of the parent application have an effective filing date equal to the actual filing date of the new application. Any claims which are fully supported under **35 U.S.C. 112** by the earlier parent application have the effective filing date of that earlier parent application

In order to establish the effective filing date of the instant application each claim must be analyzed in its entirety to establish whether or not any the claim encompasses subject matter not fairly taught or suggested by each parent application to which the instant application claims priority ("*To qualify for an earlier filing date, section 120 requires, inter alia, that the earlier-filed U.S. patent application contain a disclosure which complies with 35 U.S.C. § 112, ¶ 1 (1994) for each claim in the newly filed application. Thus, this benefit only applies to claims that recite subject matter adequately described in an earlier application, and does not extend to claims with subject matter outside the description in the earlier application*". See *Waldemar Link, GmbH & Co. v. Osteonics Corp.*, 32 F.3d 556, 558-59, 31 USPQ2d 1855", as cited in

Studiengesellschaft Kohle, m.b.H. v. Shell Oil Co., 112 F.3d 1561, 42 U.S.P.Q.2d 1674 (Fed. Cir. 1997)

Other applications as listed in the written description in paragraphs 0001-0005 form the priority chain for the instant application.

Examiner will now proceed with establishing the earliest priority date for each patent application recited in the chain.

1. A mobile device, comprising: a first transceiver (supported by U.S. Patent 8,856,045 at column 13, lines 23-34 with publication date of October 7, 2014 to which priority is claimed which was filed on March 14, 2014)

a second transceiver (also supported by U.S. Patent 8,856,045 at column 13, lines 19-22 with publication date of October 7, 2014 to which priority is claimed which was filed on March 14, 2014)

one or more processors (also supported by U.S. Patent 8,856,045 at Figure 57 and column 15 lines 52-61 with publication date of October 7, 2014 to which priority is claimed which was filed on March 14, 2014)

and memory storing one or more programs, including an application, that when executed by the one or more processors cause the one or more processors to perform intermediary communications operations between an offline retail machine with a short-range communication capability and a remote server (also supported by U.S. Patent 8,856,045 at column 12 lines 15 through 46, column 13 lines 19-34 with publication date of October 7, 2014 to which priority is claimed which was filed on March 14, 2014)

the intermediary communications operations including: receiving first information from the short-range communication capability of the offline retail machine via the first

transceiver; (also supported by U.S. Patent 8,856,045 at column 13, lines 23-34 with publication date of October 7, 2014 to which priority is claimed which was filed on March 14, 2014)

identifying the offline retail machine based on the received first information (apparently first published in U.S. Patent Publication 20150170131 et al. with publication date of June 18, 2015 with support at paragraphs 0134 and 0136-0137 as part of application 14/458,192 to which priority is claimed with filing date of August 21, 2014)

obtaining via the first transceiver a single-use request code from an information packet broadcast by the offline retail machine as part of the first information (also first published in U.S. Patent Publication 20150170131 et al. with publication date of June 18, 2015 with support at paragraphs 0134 and 0136-0137 as part of application 14/458,192 to which priority is claimed with filing date of August 21, 2014)

transmitting via the second transceiver the single-use request code to a remote server; (also first published in U.S. Patent Publication 20150170131 et al. with publication date of June 18, 2015 with support at paragraphs 0134 and 0136-0137 as part of application 14/458,192 to which priority is claimed with filing date of August 21, 2014)

obtaining via the second transceiver from the remote server a grant token including the single-use request code and an amount of authorized funds (also first published in U.S. Patent Publication 20150170131 et al. with publication date of June 18, 2015 with support at paragraphs 0073 and 0137-0138 as part of application 14/458,192 to which priority is claimed with filing date of August 21, 2014)

detecting a trigger condition for obtaining a product or service from the offline retail machine; and in response to detecting the trigger condition (also supported by U.S. Patent 8,856,045 at column 14 lines 14-52 and column 22 line 46 through column 23 line 16 with publication date of October 7, 2014 to which priority is claimed which was filed on March 14, 2014)

initiating provision of the product or service by transmitting the grant token to the offline retail machine via the first transceiver (also supported by U.S. Patent 8,856,045 at column 14 line 66 through column 15 line 46 and column 23 line 16 along with column 4 lines 33-41 with publication date of October 7, 2014 to which priority is claimed which was filed on March 14, 2014)

Based on the preceding analysis Examiner deems that the effective filing date for the claims is no later than the filing date of the application with the latest filing date which in this case is application 14/458,192. This would lead to an effective filing date of August 21, 2014 if provisional applications are not considered for these non-provisional applications. Both of these applications claim priority to a common provisional application 61/917,936 filed December 18, 2013. In reviewing both the specification and the drawings Examiner does not see where the provisional application fairly teaches or suggests the single-use request code that is being claimed. As such provisional application 61/917,936 fails to sufficiently support the claimed subject matter and the effective filing date is held to be the filing date of non-provisional application 14/458,192 i.e. August 21, 2014.

Information Disclosure Statement

6. The information disclosure statements (IDS) were submitted on January 3, 2023 and June 14, 2023. The submissions are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statements are being considered by the examiner.

Double Patenting

7. A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process... may obtain a patent therefor..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the claims that are directed to the same invention so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

8. Claim 1 is rejected under 35 U.S.C. 101 as claiming the same invention as that of claim 1 of prior U.S. Patent No. 11,475,454. This is a statutory double patenting rejection.

9. Examiner has reviewed both claim 1 of the instant application and claim 1 of U.S. Patent 11,475,454 and cannot find any wording changes and concludes that claim 1 of the instant application is claiming the exact same subject matter as that present in claim

1 of U.S. 11,475,454. Therefore claim 1 of the instant application is rejected under section 101 for claiming the same invention that was claimed in U.S. Patent 11,475,454.

Allowable Subject Matter

10. The following is a statement of reasons for the indication of allowable subject matter:

11. Examiner reviewed the prior art from parent applications and from the post grant review and still believes that Berger et al. (U.S. Patent Publication 2004/0117262, hereinafter referred to as Berger) is the closest prior art of record or at least in light of the art cited from the post-grant review is one of a collection of references that can be viewed as being the closest prior art. Unlike claims from the '492 application and the '762 application claims 1, 7 and 13 are not claiming a "pre-authorization" so this is not a factor in considering whether the claims are allowable over the prior art. What is different from the '492 application and the '762 application is the obtaining of a single-use request code broadcast by the offline retail machine by the first transceiver that is then transmitted via the second transceiver to a remote server. The written disclosure at paragraph 0140 disclose that the payment module 100 sends out a unique authorization code every X seconds and that these unique authorization codes are randomly or pseudo-randomly generated numbers". These codes are stored by the payment module until a received authorization grant token matches one of the stored authorization code. The disclosure goes on to state that codes may be stored for a predetermined amount of time after which an authorization code expires and is deleted. Examiner does not see where Berger can be held to fairly teach or suggest the single-use request code of the claim that is also part of the authorization grant token because

Berger only teaches that the request includes a POP device identification and amount (0014) and that the transmission to the certifying authority includes this information and a mobile device identification (0012, 0023) along with goods/services selected and the prices associated with the goods services. Therefore Berger does not fairly teach or suggest the single-use request code of the claim. Skowronek (U.S. Patent Publication 2009/0106160) discloses the fields used both in the transmission from the unattended retail device to the mobile device (Figures 3A and 3B, 0045) and none of these fields or those shown in Figure 3C can fairly be viewed as reading on a single-use request code being broadcast by the offline retail machine and therefore also cannot be viewed as reading on a grant token including the single-use request code. Behjat (U.S. Patent Publication 2013/0126607) describes the use of a QR code but the composition of this code appears to be "identical to the information presented in the magnetic strip of a conventional credit/debit card" (0234). Melone et al. (U.S. Patent Publication 2014/0074714, hereinafter referred to as Melone) does teach the use of a random identifier being included as part of a transaction identifier (0072) but does not apparently teach where Melone includes the transaction identifier including the random number within an authorization grant token that is sent to the vending machine and in Melone the vending machine is connected to a network (0027) and is described as being capable of sending the transaction information to the mobile payment server (0029, 0032). As none of the prior art considered by Examiner fairly teaches the obtaining of a single-use request code from the offline retail machine in combination with the obtaining of a grant token including the single-use request code that is subsequently transmitted

to the offline retail machine for provision of the product or service claims 1-18 are held as being allowable over the prior art.

12. The closest non-patent literature Examiner was able to find was Nurel "Recent Developments in Wireless Network Systems", Izmir Institute of Technology, September 2001, 280 pages which in section 9.12 describes that inventory management would be improved through the use of wireless networks in order to monitor stock. However Nurel describes nothing that can be viewed as either a single-use code or a combining of a near-field communication from a vending machine to a user's cellular phone to a server connected to the user's cellular phone via the cellular network. Therefore Nurel does not correct any of the deficiencies of the previously cited references.

Conclusion

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAMES D NIGH whose telephone number is (571)270-5486. The examiner can normally be reached 6:00 to 9:45 and 10:30 to 2:45.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Neha Patel can be reached on (571) 270-1492. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is

available to registered users. To file and manage patent submissions in Patent Center, visit: https://patentcenter.uspto.gov. Visit https://www.uspto.gov/patents/apply/patent-center for more information about Patent Center and https://www.uspto.gov/patents/docx for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JAMES D NIGH/
Senior Examiner, Art Unit 3685

Notice of References Cited	Application/Control No. 17/968,672	Applicant(s)/Patent Under Reexamination Patel et al.	
	Examiner JAMES D NIGH	Art Unit 3685	Page 1 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Name	CPC Classification	US Classification
*	A	US-20140025958-A1	2014-01-23	Calman; Matthew A.	G06F21/33	713/189
*	B	US-20130191789-A1	2013-07-25	CALMAN; MATTHEW A.	G06F3/017	715/863
*	C	US-20040117262-A1	2004-06-17	Berger, Jeffrey Keith	G06Q20/341	705/16
*	D	US-20130246171-A1	2013-09-19	Carapelli; Giovanni	G06Q20/325	705/14.51
*	E	US-20140074714-A1	2014-03-13	MELONE; Cristian	G06Q20/322	235/487
*	F	US-20140064116-A1	2014-03-06	Linde; Joakim	H04L67/06	370/252
*	G	US-8856045-B1	2014-10-07	Patel; Paresh K.	G06Q20/401	705/79
*	H	US-10977642-B2	2021-04-13	Khan; Ahmer A.	G06Q20/3263	1/1
*	I	US-10824828-B2	2020-11-03	Ostri; Ronen	G06Q20/3278	1/1
*	J	US-10423949-B2	2019-09-24	Lyons; Garry	G06Q20/40	1/1
*	K	US-8489140-B2	2013-07-16	Weiner; Avish Jacob	G06Q20/40	455/454
*	L	US-20190244205-A1	2019-08-08	Fieglein; Henry	H04L67/04	1/1
*	M	US-20140032413-A1	2014-01-30	Low; Gak Wee	G07F9/026	705/44

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	Nurel “Recent Developments in Wireless Network Systems”, Izmir Institute of Technology, September 2001, 280 pages (Year: 2001)
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in YYYY-MM-DD format are publication dates. Classifications may be US or foreign.

Notice of References Cited	Application/Control No. 17/968,672	Applicant(s)/Patent Under Reexamination Patel et al.	
	Examiner JAMES D NIGH	Art Unit 3685	Page 2 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Name	CPC Classification	US Classification
*	A	US-20180240096-A1	2018-08-23	Patel; Paresh K.	G06Q20/18	1/1
*	B	US-20140074723-A1	2014-03-13	Kamat; Shreyas	G06Q20/202	705/71
*	C	US-20130126607-A1	2013-05-23	Behjat; Abdolreza	G06Q20/326	235/375
*	D	US-8059101-B2	2011-11-15	Westerman; Wayne Carl	G06F3/04883	345/173
*	E	US-20090306819-A1	2009-12-10	Insolia; Gerard E.	G07F9/02	700/231
*	F	US-20090106160-A1	2009-04-23	Skowronek; Dan	G06Q20/327	705/75
*	G	US-6810234-B1	2004-10-26	Rasanen; Juhana	H04W88/02	455/414.1
*	H	US-20030236872-A1	2003-12-25	Atkinson, Paul	G06Q20/3278	709/223
*	I	US-20030158891-A1	2003-08-21	Lei, Jonathan L.	G06Q20/327	709/203
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in YYYY-MM-DD format are publication dates. Classifications may be US or foreign.

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Report Information from Dialog

November 29 2023 09:22

Table of contents

Mobile-phone payment option gains ground

Author: Bailey, Brandon

Publication info: McClatchy - Tribune News Service [Washington] 14 Apr 2010.

Abstract (summary): Obopay is a company that lets users open an account, with funds from a bank or credit card, then transfer money to another person's cell phone number by sending a text message.

Full text:

Meyer Malka walked up to the counter of a crowded Palo Alto, Calif., cafe last week and ordered a small coffee and a hot chocolate. The total was $5.74, which he paid by lightly tapping the back of his mobile phone against a small plastic box next to the cash register.

Within seconds, the screen on the box displayed a message telling the cashier the payment was approved, and Malka received a text message saying the amount had been deducted from his account at a local credit union.

For years, analysts have been saying that mobile payment systems -- which let consumers use their phones instead of debit or credit cards -- are the wave of the future. Widespread adoption has been elusive, but now some analysts say the idea is gaining traction.

Malka, co-founder of a company called Bling Nation, can use his phone for purchases at only a few shops near his office in downtown Palo Alto. But Bling Nation says it has partnered with banks in five regions around the country, including Colorado, Texas and upstate New York, where several thousand customers are using their phones to "Bling" their purchases at scores of local shops.

Bling Nation is close to announcing an expanded service in the Bay Area, Malka said. Meanwhile a host of other companies, from startups like MobiBucks and Obopay to big companies like PayPal and Starbucks, are promoting their own technologies and business models for mobile payments.

"The market is still very nascent," said Beth Robertson, a financial industry analyst at Javelin Strategy &Research. "But I think you're seeing some innovation occurring that shows the market is going to start to break out."

Big financial institutions and phone companies have been slow to embrace the concept, for a variety of reasons, explained Steve Klebe, a veteran e-commerce executive who writes a blog at www.paymenttalk.blogspot.com. Many banks make handsome profits from existing credit and debit card networks, while mobile carriers and cell phone manufacturers haven't been able to agree on technical standards.

But at least some consumers have taken to the idea.

"They're almost always on the phone when they walk in, anyway," said Doreen Kamen, owner of the Fortunate Cup cafe in Saratoga Springs, N.Y., which began accepting Bling Nation payments two months ago. "It's quick, and it's easy and painless."

"We don't get that many customers using it, but I like the concept," added Jean-Paul Coupa, owner of the Coupa Cafe in Palo Alto, where Malka bought his drinks. "If there's more competition for the credit card companies, maybe it will bring their rates down."

Rather than try to win over the biggest financial institutions first, Bling Nation has partnered with regional banks in communities where those banks serve a high percentage of merchants and consumers. Bling and the banks share a fee they charge merchants for processing each transaction, which Malka says is significantly lower than most credit card companies impose.

The banks offer their customers Bling Nation stickers -- which have an embedded radio frequency identification, or RFID, chip and antenna -- to put on the backs of their phones.

Merchants get a small plastic device that resembles a credit or debit card reader, except the Bling Nation device doesn't have a slot to swipe a card through. Instead, it has a receiver that can read the RFID signal when a customer taps the sticker against the device, which transmits a signal telling the bank to deduct the price of the purchase from the customer's account.

Customers get a text message confirming each transaction and reporting their remaining balance. The message may include other information about "rewards points" or other incentives offered by the bank or merchant. That's more information than customers get from a debit card, Malka said, and "people enjoy getting the feedback."

Another startup takes a different approach. Shoppers can open a MobiBucks account at the company's Web site and deposit funds from a credit or debit card. They can pay for purchases at participating shops and restaurants, deducting money from their MobiBucks account by typing their mobile phone number, plus a PIN, on a small keypad at the checkout counter.

Some experts believe these methods will be overtaken by systems for sending money by text message or a mobile Web browser. Obopay is a company that lets users open an account, with funds from a bank or credit card, then transfer money to another person's cell phone number by sending a text message. PayPal has a smart phone phone app for transferring funds to individuals or merchants with PayPal accounts.

But others say there's an appeal to using a phone without having to text or key in a lot of information.

Klebe likes an iPhone app that Starbucks has developed to work just like its popular prepaid coffee card. After downloading the app and linking it to their Starbucks card number, users can pass the iPhone screen in front of a small scanner that deducts the cost of their mochaccino from their account.

Still on the horizon is a future where all mobile phones come equipped with a chip or can download software that will pay the bill at any local gas station or coffeehouse.

Instead of trying to predict which technical format will triumph, Malka said his company is focused on developing a model that consumers and merchants can use -- and get used to -- today.

"We're not going to bet on the technology. We're betting on the gesture," he said, tapping his phone.

HOW IT WORKS:

Examples of mobile payment systems:

--Bling Nation uses an RFID sticker to send a signal when the user taps a small device at a retail outlet. That triggers a debit from the user's bank account.

--MobiBucks assigns the user's phone number to a prepaid account. Users type the number and a PIN on a retailer's keypad.

--Obopay lets users create an account, with funds from a bank or credit card, then transfer money to another person by going online or sending a text message with the recipient's cell phone number.

Credit: San Jose Mercury News

Subject: Cellular telephones;Credit cards;Financial institutions;Mobile commerce;Banks;Radio frequency identification

Location: Palo Alto California

Publication title: McClatchy - Tribune News Service

Publication year: 2010

Publication date: Apr 14, 2010

Publisher: Tribune Content Agency LLC

Place of publication: Washington

Country of publication: United States

Publication subject: General Interest Periodicals--United States

Source type: Wire Feeds

Language of publication: English

Document type: News

ProQuest document ID: 456395919

Document URL: https://dialog.proquest.com/professional/docview/456395919?accountid=131444

First available: 2010-07-01

Updates: 2016-03-27

Database: ProQuest Newsstand Professional

Bibliography

Citation style: APA 6th - American Psychological Association, 6th Edition

Bailey, B. (2010, Apr 14). Mobile-phone payment option gains ground. McClatchy - Tribune News Service Retrieved from https://dialog.proquest.com/professional/docview/456395919?accountid=131444

Electronically filed January 25, 2024

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of:	Paresh K. Patel	Confirmation No.:	9843
Serial No.:	18/197,071	Art Unit:	3698
Filed:	May 14, 2023	Examiner:	Frantzy POINVIL
For:	METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS	Attorney Docket No.:	104402-5075-US

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In accordance with the duty of disclosure provisions of 37 C.F.R. §1.56, there is hereby provided certain information which the Examiner may consider material to the examination of the subject U.S. patent application. It is requested that the Examiner make this information of record if it is deemed material to the examination of the application.

1. Enclosures accompanying this Information Disclosure Statement are:

1a. ☒ A list of all patents, publications, applications, or other information submitted for consideration by the office.

1b. A legible copy of:

☒ Each foreign patent;

☐ Each publication or that portion which caused it to be listed on the PTO-1449;

☐ For each cited pending U.S. application, the application specification including the claims, and any drawing of the application, or portion of the application which caused it to be listed on the PTO-1449 including any claims directed to that portion;

☒ all other information or portion which caused it to be listed on the PTO-1449.

1c. ☐ An English language copy of search report(s) from a counterpart foreign application or PCT International Search Report.

1d. ☐ Explanations of relevancy (ATTACHMENT 1(d), hereto) or English language abstracts of the non-English language publications.

2. ☐ This Information Disclosure Statement is filed under 37 C.F.R. §1.97(b):

☐ Within three months of the filing date of a national application other than a continued prosecution application under §1.53(d);

☐ Within three months of the date of entry of the national stage as set forth in §1.491 in an international application;

☐ Before the mailing of the first Office action on the merits;

☐ Before the mailing of a first Office action after the filing of a request for continued examination under §1.114.

3. ☒ This Information Disclosure Statement is filed under 37 C.F.R. §1.97(c) after the period specified in 37 C.F.R. §1.97(b), but before the mailing date of any of a final action under 37 C.F.R. §1.113, a notice of allowance under 37 C.F.R. §1.311 or an action that otherwise closes prosecution in the application.

(Check either Item 3a, 3b, 3c or 3d)

3a. ☒ The Certification Statement in Item 5 below is applicable. Accordingly, no fee is required.

3b. ☐ The $260 (large entity) fee set forth in 37 C.F.R. §1.17(p) in accordance with 37 C.F.R. §1.97(c) is to be charged to Morgan, Lewis & Bockius LLP Deposit Account No. 50-0310 (order no.).

3c. ☐ The $104 (small entity) fee set forth in 37 C.F.R. §1.17(p) in accordance with 37 C.F.R. §1.97(c) is to be charged to Morgan, Lewis & Bockius LLP Deposit Account No. 50-0310 (order no.).

3d. ☐ The $52 (micro entity) fee set forth in 37 C.F.R. §1.17(p) in accordance with 37 C.F.R. §1.97(c) is to be charged to Morgan, Lewis & Bockius LLP Deposit Account No. 50-0310 (order no.).

(Items 3b or 3c to be checked if any reference known for more than 3 months)

4. ☐ This Information Disclosure Statement is filed under 37 C.F.R. §1.97(d) after the period specified in 37 C.F.R. §1.97(c), but on or before the date of payment of the issue fee.

(Check Item 4a, and 4b, 4c or 4d)

4a. ☐ The Certification Statement in Item 5 below is applicable.

4b. ☐ The $260 (large entity) fee set forth in 37 C.F.R. §1.17(p) in accordance with 37 C.F.R. §1.97(c) is to be charged to Morgan, Lewis & Bockius LLP Deposit Account No. 50-0310 (order no.).

4c. ☐ The $104 (small entity) fee set forth in 37 C.F.R. §1.17(p) in accordance with 37 C.F.R. §1.97(c) is to be charged to Morgan, Lewis & Bockius LLP Deposit Account No. 50-0310 (order no.).

4d. ☐ The $52 (micro entity) fee set forth in 37 C.F.R. §1.17(p) in accordance with 37 C.F.R. §1.97(c) is to be charged to Morgan, Lewis & Bockius LLP Deposit Account No. 50-0310 (order no.).

5. ☒ Certification Statement (applicable if Item 3a or Item 4a is checked)

(Check either Item 5a, 5b, 5c or 5d)

5a. ☐ In accordance with 37 C.F.R. §1.97(e)(1), it is certified that each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this Information Disclosure Statement.

5b. ☒ In accordance with 37 C.F.R. §1.97(e)(2), it is certified that no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 C.F.R. §1.56(c) more than three months prior to the filing of this information disclosure statement.

5c. ☐ Each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and the communication was not **received** by any individual designated in 37 C.F.R. §1.56(c) more than thirty days prior to the filing of this information disclosure statement.

5d. ☐ Pursuant to 37 C.F.R. §1.704(d), each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and the communication was not **received** by any individual designated in 37 C.F.R. §1.56(c) more than thirty days prior to the filing of this information disclosure statement.

6. ☒ Copies of each cited U.S. patent and each U.S. patent application publication are not enclosed pursuant to the USPTO OG Notice dated 05 August 2003 waiving the requirement under 37 C.F.R. 1.98(a)(2)(i) for U.S. patent applications filed after June 30, 2003.

7. ☐ This application is a continuation application under 37 C.F.R. §1.53(b) or (d).

(Check appropriate Items 7a, 7b and/or 7c)

7a. ☐ A Petition to Withdraw from issue under 37 C.F.R. §1.313(b)(5) is concurrently filed herewith.

7b. ☐ Copies of publications listed on Form PTO-1449 from prior application Serial No. , filed on , of which this application claims priority under 35 U.S.C. §120, are not being submitted pursuant to 37 C.F.R. §1.98(d).

7c. ☐ Copies of the publications listed on the attached Form PTO-1449 that were not previously cited in prior application Serial No. , filed on , are provided herewith.

8. ☐ This is a Supplemental Information Disclosure Statement. (Check Item 8a)

8a. ☐ This Supplemental Information Disclosure Statement under 37 C.F.R. §1.97(f) supplements the Information Disclosure Statement filed on . A bona fide attempt was made to comply with 37 C.F.R. §1.98, but inadvertent omissions were made. These omissions have been corrected herein. Accordingly, additional time is requested so that this Supplemental Information Disclosure Statement can be considered as if properly filed on .

9. ☐ In accordance with 37 C.F.R. §1.98, a concise explanation of what is presently understood to be the relevance of each non-English language publication is:

(Check Item 9a, 9b, or 9c)

9a. ☐ satisfied because all non-English language publications were cited on the enclosed English language copy of the PCT International Search Report or the search report from a counterpart foreign application indicating the degree of relevance found by the foreign office.

9b. ☐ set forth in the application.

9c. ☐ enclosed as an attachment hereto.

10. ☒ The Commissioner is authorized to charge any additional fee required or credit any overpayment for this Information Disclosure Statement and/or Petition to Morgan, Lewis & Bockius LLP Deposit Account No. 50-0310 (order no. 104402-5075-US).

11. ☒ No admission is made that the information cited in this Statement is, or is considered to be, material to patentability nor a representation that a search has been made (other than a search report of a foreign counterpart application or PCT International Search Report if submitted herewith). 37 C.F.R. §§1.97(g) and (h).

Respectfully submitted,

Date: January 25, 2024

/Douglas J. Crisman/ 39,951
Douglas J. Crisman (Reg. No.)
MORGAN, LEWIS & BOCKIUS LLP
1400 Page Mill Road
Palo Alto, CA 94304
(650) 843-4000

Mobile payment heads to the U.S.

Publication Info: Mobile Internet 6.10: 1. Information Gatekeepers, Inc. (Oct 2004)

Abstract (English): Wireless Payments by SMS or micro-browsers have long been a mainstay in high mobile-penetration markets like Japan. The most famous example of this is probably Cmode--Coca Cola vending machines where thirsty users purchase soda using their phones. Following the recent announcement that KDDI would be joining DoCoMo's mobile payment effort by including FeliCa chips in future handsets, Coke is joining in too. New Cmode2 vending machines will support FeliCa chips, as well as current payment methods. However neither of these technologies are in widespread use in the U.S., and they are set to launch, or at least test-launch, nearly simultaneously.

Full text: Wireless Payments by SMS or micro-browsers have long been a mainstay in high mobile-penetration markets like Japan. The most famous example of this is probably Cmode--Coca Cola vending machines where thirsty users purchase soda using their phones. Following the recent announcement that KDDI would be joining DoCoMo's mobile payment effort by including FeliCa chips in future handsets, Coke is joining in too. New Cmode2 vending machines will support FeliCa chips, as well as current payment methods. However neither of these technologies are in widespread use in the U.S., and they are set to launch, or at least test-launch, nearly simultaneously.
AT&T Wireless announced a partnership with USA Technologies to bring e-Port, a wireless payment system, to stateside vending machines and other automated purchase devices. AT&T's part in this is minor, as it will simply provide the wireless access (over GPRS) for USA Technologies to send and process transactions. Vendors that choose to include e-Port in their machines or kiosks will only have to worry about electric supply and not a phone line, even if they want to enable credit card transactions on their machine. This is a more U.S.-centric version of Cmode-like payments, since the wireless aspect is part of the vending machine, not in a handset. Since mobile penetration has only recently crossed 50 percent in the U.S., and since different carriers have different capabilities and technologies, it is probably too difficult to rely on handsets for purchases yet.
E-Port may provide a stop-gap until efforts to deploy Near Field Communication (NFC) systems like FeliCa have gained momentum. To that end, Motorola announced that it would launch a few handsets that include MasterCard's PayPass, an NFC solution, in a few test markets. As on FeliCa handsets, PayPass-equipped phones will include a secure application space allowing subscribers to use them for ticketing, public transportation, and other situations in addition to payments. Nokia, Samsung, and Visa have previously announced that they would support this same protocol. Support from the top three manufacturers and two largest credit cards in the West should all but assure that this will be the standard to replace the ubiquitous magnetic stripe. Since it will be some time before NFC could dominate payment technology in the U.S., AT&T's e-Port partnership capitalizes on near-term demand for wireless payment. Like Cmode, this may even put AT&T and USA Technologies at an advantage when NFC takes off.

Subject: All company;All product and service information;Applications;Joint venture;Product introduction; Computer;Mobile communications;Telecom equipment;Telecom services;Telecommunications

Location: North America;United States

Company / organization: AT&T WIRELESS SERVICES INC (AT&T CORP); USA TECHNOLOGIES INC; AT&T CORP

Product classification: 357100: Computers;366301: Radio communications systems;366308: Cellular phones;481218: Cellular telephone services

Alternate title: Business

Publication title: Mobile Internet

Volume: 6

Issue: 10

Pagination: 1

Publication date: Oct 2004

Publisher: Information Gatekeepers, Inc.

Place of publication: United States

Journal code: MOBIINTE

Source type: Newsletter

Language of publication: English

Document type: Magazine/Journal

Source attribution: Gale Group Business And Industry, © Publisher specific

Accession number: 123850832

Document URL: https://dialog.proquest.com/professional/docview/1083884138?accountid=131444

Updates: 2012-10-05

First available: 2012-10-05

Database: Business &Industry (1994 - 2018)

Espacenet

Bibliographic data: CN107480975 (A) — 2017-12-15

UAV vending method

Inventor(s): WEN YUGUI ± (温玉桂)

Applicant(s): HUIZHOU YINIE TECH CO LTD ± (惠州市伊涅科技有限公司)

Classification: - **international:** *G06Q20/18; G06Q20/32; G07F11/00; G07F9/02*
- **cooperative:** G06Q20/18 (CN); G06Q20/322 (EP); G06Q20/3276 (CN); G06Q20/3278 (CN); G07F11/00 (CN); G07F9/023 (EP, CN); G07F9/026 (EP)

Application number: CN201710623807 20170727 Global Dossier

Priority number(s): CN201710623807 20170727

Abstract of CN107480975 (A)

The invention relates to a UAV vending method, which includes the steps of determining whether a user approaches, and if so, displaying goods; further determining whether a handheld terminal enters a state ready to pay, and if so, providing the goods on a shelf according to a choice of the user; further determining whether the provided goods are taken out from the shelf, and if so, completing the deduction according to the selling price of the goods; and determining whether the user moves far away, and if so, stopping displaying the goods. The above UAV vending method can be used to display the goods when the user approaches and stop displaying the goods when the user moves far away, does not require continuous illumination which causes the waste of energy, and avoids that the displayed goods are exposed to the sun for a long time and is easily oxidized, so that the shelf life of the goods is longer. In addition, the deduction is completed only when the user takes out the goods provided from the shelf, more freedom of choice is offered to the user, and the UAV vending method is especially for supporting associated works of the Belt and Road construction.

Notice

DESCRIPTION CN107480975A

10 Drone sales method

[0001]

14 Technical field

[0002]

18 The present invention relates to the field of unmanned vending, and in particular to an unmanned aerial vehicle vending method.

[0003]

23 Background technique

[0004]

27 Existing vending drones (also known as: unmanned vending machines, abbreviated as: drones) are commonly used in shopping malls, parks, scenic spots and amusement places, etc., and can save human resources.

[0005]

32 However, vending drones often need to be constantly illuminated, especially when no one is around for a long time. This causes a waste of energy, which is heartbreaking and is not conducive to building a green, energy-saving and sustainable new China that advances with the times. , and the goods displayed in the vending drone have been exposed to the sun for a long time and are easily oxidized.

[0006]

39 Contents of the invention

[0007]

43 Based on this, it is necessary to provide a drone vending machine to improve the problem of energy waste caused by constant lighting in vending drones and the fact that the goods displayed in vending drones are easily oxidized after being exposed to the sun for a long time. cargo method.

[0008]

49 A drone vending method includes the following steps: determine whether a user approaches, and if so, display the goods; further determine whether the handheld terminal enters a pre-payment state, and if so, provide goods on the shelf according to the user's choice; further determine whether If the provided goods are taken out from the shelf, the deduction will be completed based on the selling price of the provided goods; it will be judged whether the user has moved away, and if so, the display of the goods will be stopped.

[0009]

57 The above-mentioned drone sales method only displays the goods when the user approaches and stops displaying the goods when the user moves away. This eliminates the need for constant lighting, which causes energy waste, and avoids the displayed goods being easily oxidized by the sun for a long time, which shortens the shelf life of the goods. It is longer, and the payment is only completed when the user takes out the provided goods from the shelf, which provides users with more freedom of choice and is especially suitable for supporting projects related to the Belt and Road construction.

[0010]

66 In one of the embodiments, the handheld terminal scans the code to enter the preparatory payment state.

[0011]

70 In one embodiment, the handheld terminal scans the QR code or barcode to enter the payment preparation state.

[0012]

75 In one of the embodiments, the proximity sensing handheld terminal enters the payment preparation state.

[0013]

79 In one of the embodiments, NFC or RFID proximity sensing handheld terminal is used to enter the

preparatory payment state.

[0014]

84 In one embodiment, the products are displayed in the product area.

[0015]

88 In one embodiment, thermal induction is used to select items from the item area.

[0016]

92 In one embodiment, infrared sensing is used to select goods from the goods area.

[0017]

96 In one embodiment, a temperature sensing method is used to select items from the item area.

[0018]

100 In one embodiment, gravity sensing is used to select items from the item area.

[0019]

104 The above drone vending method can also sense or read the handheld terminal, and select goods from the goods area through a variety of methods. It is easy and flexible to use. While protecting the rights of users, it can also protect the rights of drone cargo owners. rights and interests, to achieve a win-win balance for both parties, and is especially suitable for supporting projects related to the Belt and Road construction.

[0020]

111 Description of the drawings

[0021]

115 Figure 1 is a schematic diagram of an embodiment of the present invention.

[0022]

119 Detailed ways

[0023]

123 In order to make the above objects, features and advantages of the present invention more obvious and easy to understand, the specific embodiments of the present invention will be described in detail below with reference to the accompanying drawings.

126 In the following description, numerous specific details are set forth in order to provide a thorough understanding of the invention.

128 However, the present invention can be implemented in many other ways different from those described here. Those skilled in the art can make similar improvements without departing from the connotation of the present invention. Therefore, the present invention is not limited to the specific embodiments disclosed below.

[0024]

135 It should be noted that when an element is referred to as being "mounted" or "disposed on" another element, it can be directly on the other element or intervening elements may also be present.

137 When an element is said to be "connected" to another element, it can be directly connected to the other element or there may also be intervening elements present.

139 The terms "vertical", "horizontal", "left", "right" and similar expressions used herein are for illustrative purposes only and do not represent the only implementation manner.

[0025]

144 Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the technical field to which the invention belongs.

146 The terminology used herein is for the purpose of describing specific embodiments only and is not intended to limit the invention.

148 As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items.

[0026]

153 As shown in Figure 1, one embodiment of the present invention is a drone vending method applied to an unmanned vending machine. The drone vending method includes the following steps: determine whether a user approaches, and if so Display the goods; further determine whether the handheld terminal enters the pre-payment state, and if so, provide the goods on the shelf according to the user's choice; further determine whether to take out the provided goods from the shelf, and if so, complete the deduction based on the selling price of the provided goods; determine whether If the user moves away, the display of goods will stop.

159 The above-mentioned drone sales method only displays the goods when the user approaches and stops displaying the goods when the user moves away. This eliminates the need for constant lighting, which causes energy waste, and avoids the displayed goods being easily oxidized by the sun for a long time, which shortens the shelf life of the goods. It is longer, and the payment is only completed when the user takes out the provided goods from the shelf, which provides users with more freedom of choice and is especially suitable

for supporting projects related to the Belt and Road construction.

[0027]

168 For example, in the drone sales method, it is judged whether the user is approaching, and if so, the goods are displayed. Otherwise, no operation is performed, that is, there is no need to display the goods; for example, in the drone sales method, it is further judged whether the handheld terminal has entered the preparatory payment mode. status, if the goods are provided on the shelf according to the user's choice, otherwise no operation is performed, that is, there is no need to provide goods on the shelf; for example, in the drone sales method, it is further determined whether to take out the provided goods from the shelf, then Deduction is completed based on the selling price of the goods provided, otherwise no operation is performed, that is, there is no need to perform a deduction operation; for example, in the drone sales method, it is judged whether the user is away, and if so, the display of the goods is stopped, otherwise the current interface is maintained, such as displaying products or providing products on the shelf according to the user's selection.

[0028]

181 In one of the embodiments, the handheld terminal scans the code to enter the preparatory payment state.

182 For example, a drone vending method includes the following steps: determine whether the user is approaching, and if so, display the goods; further determine whether the handheld terminal enters the pre-payment state by scanning the code, and if so, provide it on the shelf according to the user's choice goods; further determine whether to take out the provided goods from the shelf, and if so, complete the deduction based on the selling price of the provided goods; determine whether the user has moved away, and if so, stop displaying the goods.

188 For example, the user scans the QR code with his mobile phone to enter the payment preparation state.

189 In one embodiment, the handheld terminal scans the QR code or barcode to enter the payment preparation state.

191 In one of the embodiments, the proximity sensing handheld terminal enters the payment preparation state.

192 For example, a drone vending method includes the following steps: determine whether the user is approaching, and if so, display the goods; further determine whether the handheld terminal enters the payment preparation state through proximity sensing, and if so, display the goods on the shelf according to the user's choice Provide the goods; further determine whether to take out the provided goods from the shelf, and if so, complete the deduction based on the selling price of the provided goods; determine whether the user has moved away, and if so, stop displaying the goods.

198 For example, the user holds the mobile phone for proximity sensing and enters the ready payment state.

199 In one of the embodiments, NFC or RFID proximity sensing handheld terminal is used to enter the preparatory payment state.

201 In this way, you only need to hold the terminal to enter the preparatory payment state.

[0029]

205 One example is to associate the preparatory payment status with the user's identity information (such as ID

number). Since the user's identity information is often unique, the corresponding user is also unique. In this way, the payment can be better ensured. payment situation.

208 For example, after determining that the handheld terminal enters the preparatory payment state, and before providing goods on the shelf according to the user's selection, the method further includes the following steps: associating the preparatory payment state with the user's identity information, and determining the user's payment based on the user's historical transaction records. If the credit meets a certain credit threshold, follow-up steps will be performed; that is, based on the user's historical transaction records, it is determined that the payment credit meets a certain credit threshold, and then the goods are provided on the shelf according to the user's choice, or after it is determined to enter the preparatory payment state , the provision of goods on the shelf according to the user's selection specifically includes the following steps: the preliminary payment status is associated with the user's identity information, and when it is determined that the user's payment credit meets a certain credit threshold based on the user's historical transaction records, according to the user's selection Provide goods on the shelves; among them, the credit threshold can be flexibly set based on experience, bank credit and/or social credit information.

220 For example, after determining the user's choice (that is, the user selects goods) and before providing the goods on the shelf, the method further includes the step of querying the user's payment ability according to the preliminary payment status, and when the payment ability meets the selected goods, the subsequent steps are performed. step, that is, providing goods on the shelves when the user's paying ability meets his or her choice.

225 In this way, users can avoid intentional overdraft consumption, and can also avoid users' non-subjective malicious overdraft consumption, especially face-saving consumption that cannot be controlled by people with incomplete behavioral capabilities, etc., which is conducive to safeguarding the interests of users, correctly guiding users to reasonable consumption, and thus effectively Maintained normal social order.

[0030]

232 In one embodiment, static pictures are used to display goods, for example, multiple static pictures are used to display multiple goods, or multiple static pictures are used to display one product, or one static picture is used to display one product.

235 In one embodiment, after displaying the goods and before providing the goods on the shelf according to the user's selection, the step further includes: clicking on the static picture to select the goods.

237 For example, before or after further determining whether the handheld terminal enters the ready-to-pay state, click on the static picture to select goods, and then when or after the hand-held terminal enters the ready-to-pay state, provide goods on the shelf according to the user's selection.

240 For example, a drone vending method includes the following steps: determine whether a user is approaching, and if so, use a static picture to display the goods; click on the static picture to select the goods; further determine whether the handheld terminal enters a ready payment state, and if so, use a static picture to display the goods; Choose to provide goods on the shelf; further determine whether to take out the provided goods from the shelf, and if so, complete the deduction based on the selling price of the provided goods; determine whether the user has moved away, and if so, stop displaying the goods.

246 In one embodiment, click on a static image to select a product corresponding to the static image.

247 In one embodiment, a number of static pictures are clicked during a preset time period, and a number of

products corresponding to the several static pictures are selected.

249 For example, a drone vending method includes the following steps: determine whether a user approaches, and if so, use a static image to display the product; click on a static image to select a product corresponding to the static image; further determine whether the handheld terminal has entered In the ready payment state, the goods are provided on the shelf according to the user's choice; it is further judged whether to take out the provided goods from the shelf, and if so, the deduction is completed based on the selling price of the provided goods; it is judged whether the user is away, and if so, the display of the goods is stopped. .

255 For example, a drone vending method includes the following steps: determine whether a user is approaching, and if so, use static pictures to display the goods; click on a number of static pictures during a preset time period, and select a number of goods corresponding to the static pictures. ; Further determine whether the handheld terminal enters the pre-payment state, and if so, provide goods on the shelf according to the user's choice; further determine whether the provided goods are taken out from the shelf, and if so, complete the deduction based on the selling price of the provided goods; determine whether the user has Stay away and the product will stop displaying.

262 In this way, multiple products can be given for users to choose at one time, thereby improving sales efficiency. After selection, if the provided goods are not taken out from the shelf, the drone can take back some or all of the provided goods, thus making Users can refuse to accept defective or unsatisfactory goods, avoiding the problem of being forced to accept defective or unsatisfactory goods.

[0031]

269 In one embodiment, dynamic images are used to display the goods.

270 In one embodiment, click on the dynamic image to select the item.

271 In one of the embodiments, several dynamic images are clicked within a preset time period, and several products corresponding to the several dynamic images are selected.

273 For example, a drone vending method includes the following steps: determine whether a user approaches, and if so, use static pictures and/or dynamic images to display the goods; click on a static picture to select a product corresponding to the static picture or click Choose a product through a dynamic image or click on a certain dynamic image to select a product corresponding to the dynamic image or click on several dynamic images during a preset time period to select several products corresponding to the several dynamic images; further determine whether the handheld terminal enters the preparatory payment state, yes Then provide the goods on the shelf according to the user's choice; further determine whether to take out the provided goods from the shelf, and if so, complete the deduction based on the selling price of the provided goods; determine whether the user has moved away, and if so, stop displaying the goods.

282 In this way, more complete and clearer information can be provided, and targeted advertising effects can be achieved to a certain extent.

[0032]

287 In one embodiment, the goods are displayed in the goods area. For example, it is determined whether the user approaches, and if so, the goods are displayed in the goods area.

289 For example, use a certain area of the unmanned vending machine as the product area and display the

products in the product area. For another example, the products are displayed on a display screen of an unmanned vending machine, such as a liquid crystal display screen. In other words, the goods can be displayed in real form, or only virtual pictures or text can be given to display the goods. For example, a drone vending method includes the following steps: determine whether the user is approaching, and if so, display the goods in the goods area; further determine whether the handheld terminal enters the payment preparation state, and if so, provide the goods on the shelf according to the user's choice goods; further determine whether to take out the provided goods from the shelf, and if so, complete the deduction based on the selling price of the provided goods; determine whether the user has moved away, and if so, stop displaying the goods. For example, the deduction is completed based on the selling price of one item taken out from the shelf, or the deduction is completed based on the total selling price of multiple items taken out from the shelf.

[0033]

303 For example, after the goods are displayed in the goods area and before it is further determined whether the handheld terminal enters the payment preparation state, a step is also included: selecting goods from the goods area.

306 For example, a drone vending method includes the following steps: determine whether the user is approaching, and if so, display the goods in the goods area; select the goods from the goods area; further determine whether the handheld terminal enters the ready payment state, and if so, according to the user Choose to provide goods on the shelf; further determine whether to take out the provided goods from the shelf, and if so, complete the deduction based on the selling price of the provided goods; determine whether the user has moved away, and if so, stop displaying the goods. In one embodiment, thermal induction is used to select items from the item area. For example, users can select products from the product area by touching or approaching the product area with their fingers or palms. For example, a drone vending method includes the following steps: determine whether the user is approaching, and if so, display the goods in the goods area; use thermal induction to select goods from the goods area; further determine whether the handheld terminal enters the payment preparation state, If it is, the goods will be provided on the shelf according to the user's choice; if it is further judged whether to take out the provided goods from the shelf, if it is, the deduction will be completed based on the selling price of the provided goods; if it is judged whether the user has moved away, if so, the display of the goods will be stopped. In one embodiment, infrared sensing is used to select goods from the goods area. In one embodiment, a temperature sensing method is used to select items from the item area.

[0034]

325 In one embodiment, gravity sensing is used to select items from the item area.

326 For example, the user selects goods from the goods area by pressing or stepping. For example, a drone vending method includes the following steps: determine whether the user is approaching, and if so, display the goods in the goods area; use gravity sensing to select goods from the goods area; further determine whether the handheld terminal enters the payment preparation state, If it is, the goods will be provided on the shelf according to the user's choice; if it is further judged whether to take out the provided goods from the shelf, if it is, the deduction will be completed based on the selling price of the provided goods; if it is judged

whether the user has moved away, if so, the display of the goods will be stopped.

[0035]

336 The above drone vending method can also sense or read the handheld terminal, and select goods from the goods area through a variety of methods. It is easy and flexible to use. While protecting the rights of users, it can also protect the rights of drone cargo owners. rights and interests, to achieve a win-win balance for both parties, and is especially suitable for supporting projects related to the Belt and Road construction.

[0036]

343 One example is that the drone is provided with a waiting area and/or a sales area; for example, when in use, the user enters the sales area from the outside; for example, enters the sales area from the waiting area; another example is that the sales area is open , semi-open or closed setting; for example, determine whether the user approaches, specifically determine whether the user approaches the waiting area and/or sales area; for example, determine whether the user approaches the waiting area, and if so, display the goods; another example, Determine whether the user is close to the sales area, and if so, display the goods; for example, determine whether the handheld terminal enters the pre-payment state, and if so, allow the user to enter the sales area, and provide goods on the shelf according to the user's selection; for example, the goods area setting In the sales area; for example, after determining whether the handheld terminal enters the pre-payment state, and before providing goods on the shelf according to the user's selection, it also includes the steps of: sending a request to obtain the user's video permission; when the request to obtain the user's video permission is When passed, the user is allowed to enter the sales area; the video of the user in the sales area is obtained; after the user enters the sales area, goods are provided on the shelf according to the user's choice.

356 For example, a drone vending method includes the following steps: determine whether the user is approaching, and if so, display the goods; further determine whether the handheld terminal enters the payment preparation state, and if so, send a request to obtain the user's video permission; when obtaining the user When the video permission request is passed, the user is allowed to enter the sales area; the user's video in the sales area is obtained; goods are provided on the shelf according to the user's choice; further it is judged whether to take out the provided goods from the shelf, and if so, the goods are provided based on the user's choice. The sales price is deducted; it is determined whether the user is away, and if so, the display of the goods will be stopped.

364 For another example, completing the deduction based on the selling price of the provided goods specifically includes the following steps: when the user leaves the sales area, determine whether an abnormal operation occurs based on the video, otherwise, complete the deduction based on the selling price of the provided goods. In one embodiment, it is determined based on the video whether an abnormal operation occurs, and if so, an alarm signal is issued. For example, an alarm signal is sent to the monitoring room or management area to remind managers to handle it; another example is to send an alarm signal to the sales area to remind users to stop abnormal operations; another example is to send alarm information to managers or police officers . In one embodiment, the abnormal operation includes malicious damage or destruction behavior. In one of the embodiments, the method further includes the following steps: when the user is in the sales area, determine whether an abnormal operation occurs based on the video, and if so, send an alarm signal. In one

embodiment, the method further includes the following steps: when the user is in the sales area, determine whether an abnormality occurs based on the video, and if so, send a help signal. For example, when the user is unwell, it can be handled in time, such as rescuing the user in time. In this way, it reflects better humanistic care and improves the safety factor of drones.

[0037]

381 In one embodiment, a body-worn video device is used to obtain videos of users in the sales area.

382 For example, the user's mobile phone is used to wirelessly connect to the server to obtain the video of the user in the sales area. For another example, when the user is allowed to enter the sales area, the user is provided with a portable video device. The portable video device includes a wearable device and a number of cameras installed on the wearable device to obtain at least three views of the user in the sales area. Videos from various angles, including videos in front of the user, behind the user, and in front of the user including parts of the user. In one embodiment, a fixed video device installed in the sales area is used to obtain the user's video in the sales area. In one embodiment, when a user is allowed to enter the sales area, a positioning tag is set for the user; when a video of the user in the sales area is obtained, a video of the user in the sales area is obtained based on the positioning tag. For example, the positioning tag is a mobile phone that confirms the mobile phone identification code or its mobile phone identification code.

[0038]

395 In one embodiment, only one user is allowed into the vending area at a time.

396 In this case, the user is required to come out of the sales area within a certain time. The following embodiments optimize this design. In one of the embodiments, after the user is allowed to enter the sales area, the following steps are also performed simultaneously: starting a timer; and prompting the user to leave the sales area after a certain period of time. In this way, the time when users enter the store can be controlled. In one of the embodiments, it is determined whether any user among several users enters the prepayment state, and if so, all users are allowed to enter the sales area. In this way, local tyrants can bring their friends into the sales area, and parents can bring their children into the sales area. One person pays the bill and everyone benefits. For another example, when or after all users enter the sales area, steps are also executed simultaneously: start timing; and prompt users to leave the sales area after a certain period of time. In one embodiment, after allowing the user to enter the sales area, the step further includes: starting a timer; and prompting the user to leave the sales area after a certain period of time. For example, the certain time period is 1 minute, 5 minutes or 10 minutes, depending on the quantity of drone goods, and the cargo owner can also customize the certain time period, thus facilitating the cargo owner's time management and control.

[0039]

412 An example is that after completing the deduction based on the selling price of the goods provided, it also includes the step of sending information about the goods that were deducted, for example, to a preset terminal or server, so that the owner of the goods can clearly know the sales status of the goods.

415 Another example is sending information about deducted goods regularly; for example, sending it once an

hour, or once a day, and so on. For example, when sending information about deducted goods, the identity information of the drone where the goods are located is attached. For example, the identity information is the serial number or serial number of the drone; in this way, it is helpful for the cargo owner to manage multiple drones. .

[0040]

423 It should be noted that other embodiments of the present invention also include an implementable drone vending method formed by combining the technical features in the above embodiments.

[0041]

428 The technical features of the above-described embodiments can be combined in any way. To simplify the description, not all possible combinations of the technical features in the above-described embodiments are described. However, as long as there is no contradiction in the combination of these technical features, All should be considered to be within the scope of this manual.

[0042]

435 The above-mentioned embodiments only express several implementation modes of the present invention, and their descriptions are relatively specific and detailed, but they should not be construed as limiting the scope of the invention.

438 It should be noted that, for those of ordinary skill in the art, several modifications and improvements can be made without departing from the concept of the present invention, and these all belong to the protection scope of the present invention.

441 Therefore, the scope of protection of the patent of the present invention should be determined by the appended claims.

Notice

CLAIMS CN107480975A

1.

13 A drone vending method is characterized by including the following steps:

14 Determine whether the user is approaching, and if so, display the product;

15 It is further determined whether the handheld terminal has entered the payment preparation state, and if so, the goods will be provided on the shelf according to the user's choice;

17 Further determine whether to take out the provided goods from the shelf, and if so, complete the deduction based on the selling price of the provided goods;

19 Determine whether the user has moved away, and if so, stop displaying the goods.

2.

23 The drone vending method according to claim 1, characterized in that the handheld terminal scans the code to enter the preparatory payment state.

3.

28 The drone vending method according to claim 2, characterized in that the handheld terminal scans the QR code or barcode to enter the preparatory payment state.

4.

33 The drone vending method according to claim 1, characterized in that the proximity sensing handheld terminal enters a preparatory payment state.

5.

38 The drone vending method according to claim 4, characterized in that NFC or RFID short-range sensing handheld terminal is used to enter the preparatory payment state.

6.

43 The drone vending method according to claim 1, characterized in that the goods are displayed in the goods area.

7.

48 The drone vending method according to claim 6, characterized in that a thermal induction method is used to select goods from the goods area.

8.

53 The drone vending method according to claim 7, characterized in that infrared sensing is used to select goods from the goods area.

9.

58 The drone vending method according to claim 7, characterized in that a temperature sensing method is used to select goods from the goods area.

10.

63 The drone vending method according to claim 6, characterized in that a gravity sensing method is used to select goods from the goods area.

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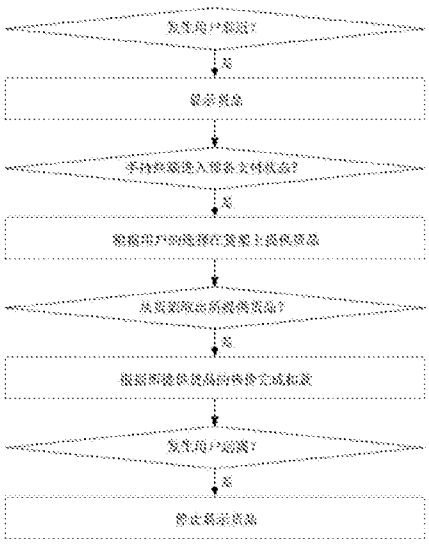
(54)发明名称

无人机售货方法

(57)摘要

本发明涉及一种无人机售货方法，其包括以下步骤：判断是否发生用户靠近，是则显示货品；进一步判断手持终端是否进入预备支付状态，是则根据用户的选择在货架上提供货品；进一步判断是否从货架取出所提供货品，是则根据所提供货品的售价完成扣款；判断是否发生用户远离，是则停止显示货品。上述无人机售货方法，当用户靠近时才显示货品，在用户远离后则停止显示货品，无需不断地照明造成能源浪费，并且避免了被展示货品长期被日晒容易被氧化，使得货品保质期更长，且仅当用户从货架取出所提供货品才完成扣款，给用户提供了更自由的选择权利，特别适合一带一路建设的相关工程配套使用。



CN 107480975 A

1.一种无人机售货方法，其特征在于，包括以下步骤：

判断是否发生用户靠近，是则显示货品；

进一步判断手持终端是否进入预备支付状态，是则根据用户的选择在货架上提供货品；

进一步判断是否从货架取出所提供货品，是则根据所提供货品的售价完成扣款；

判断是否发生用户远离，是则停止显示货品。

2.根据权利要求1所述无人机售货方法，其特征在于，手持终端扫码进入预备支付状态。

3.根据权利要求2所述无人机售货方法，其特征在于，手持终端扫二维码或条形码进入预备支付状态。

4.根据权利要求1所述无人机售货方法，其特征在于，近距感应手持终端进入预备支付状态。

5.根据权利要求4所述无人机售货方法，其特征在于，采用NFC或RFID近距感应手持终端进入预备支付状态。

6.根据权利要求1所述无人机售货方法，其特征在于，在货品区域显示货品。

7.根据权利要求6所述无人机售货方法，其特征在于，采用热感应方式从货品区域选择货品。

8.根据权利要求7所述无人机售货方法，其特征在于，采用红外感应方式从货品区域选择货品。

9.根据权利要求7所述无人机售货方法，其特征在于，采用温度感应方式从货品区域选择货品。

10.根据权利要求6所述无人机售货方法，其特征在于，采用重力感应方式从货品区域选择货品。

无人机售货方法

技术领域

[0001] 本发明涉及无人售货领域，特别是涉及无人机售货方法。

背景技术

[0002] 现有的自动售货无人机(亦称：无人自动售货机，简称：无人机)，常用于商场、公园、景区及游乐场所等，能够节约人力资源。

[0003] 但是，自动售货无人机往往需要不断地照明，尤其是长期无人时还要继续照明，造成能源浪费，看得人心痛，不利于与时俱进地建设绿色节能型的可持续发展新中国，并且，自动售货无人机中被展示的货品长期被日晒，容易被氧化。

发明内容

[0004] 基于此，有必要针对如何改进自动售货无人机往往需要不断地照明造成能源浪费以及自动售货无人机中被展示货品长期被日晒容易被氧化的问题，提供一种无人机售货方法。

[0005] 一种无人机售货方法，其包括以下步骤：判断是否发生用户靠近，是则显示货品；进一步判断手持终端是否进入预备支付状态，是则根据用户的选择在货架上提供货品；进一步判断是否从货架取出所提供货品，是则根据所提供货品的售价完成扣款；判断是否发生用户远离，是则停止显示货品。

[0006] 上述无人机售货方法，当用户靠近时才显示货品，在用户远离后则停止显示货品，无需不断地照明造成能源浪费，并且避免了被展示货品长期被日晒容易被氧化，使得货品保质期更长，且仅当用户从货架取出所提供货品才完成扣款，给用户提供了更自由的选择权利，特别适合一带一路建设的相关工程配套使用。

[0007] 在其中一个实施例中，手持终端扫码进入预备支付状态。

[0008] 在其中一个实施例中，手持终端扫二维码或条形码进入预备支付状态。

[0009] 在其中一个实施例中，近距感应手持终端进入预备支付状态。

[0010] 在其中一个实施例中，采用NFC或RFID近距感应手持终端进入预备支付状态。

[0011] 在其中一个实施例中，在货品区域显示货品。

[0012] 在其中一个实施例中，采用热感应方式从货品区域选择货品。

[0013] 在其中一个实施例中，采用红外感应方式从货品区域选择货品。

[0014] 在其中一个实施例中，采用温度感应方式从货品区域选择货品。

[0015] 在其中一个实施例中，采用重力感应方式从货品区域选择货品。

[0016] 上述无人机售货方法，还能够对手持终端进行感应或读取，以及通过多种方式从货品区域选择货品，使用方便、灵活，在保障用户权利的同时，也能够保障无人机货主的权益，达到双方共赢的平衡，特别适合一带一路建设的相关工程配套使用。

附图说明

[0017] 图1为本发明的一实施例的示意图。

具体实施方式

[0018] 为使本发明的上述目的、特征和优点能够更加明显易懂，下面结合附图对本发明的具体实施方式做详细的说明。在下面的描述中阐述了很多具体细节以便于充分理解本发明。但是本发明能够以很多不同于在此描述的其它方式来实施，本领域技术人员可以在不违背本发明内涵的情况下做类似改进，因此本发明不受下面公开的具体实施例的限制。

[0019] 需要说明的是，当元件被称为“固定于”或“设置于”另一个元件，它可以直接在另一个元件上或者也可以存在居中的元件。当一个元件被认为是“连接”另一个元件，它可以是直接连接到另一个元件或者可能同时存在居中元件。本文所使用的术语“垂直的”、“水平的”、“左”、“右”以及类似的表述只是为了说明的目的，并不表示是唯一的实施方式。

[0020] 除非另有定义，本文所使用的所有的技术和科学术语与属于本发明的技术领域的技术人员通常理解的含义相同。本文所使用的术语只是为了描述具体的实施方式的目的，不是旨在于限制本发明。本文所使用的术语“和/或”包括一个或多个相关的所列项目的任意的和所有的组合。

[0021] 如图1所示，本发明一个实施例是，一种无人机售货方法，应用于无人自动售货机，所述无人机售货方法包括以下步骤：判断是否发生用户靠近，是则显示货品；进一步判断手持终端是否进入预备支付状态，是则根据用户的选择在货架上提供货品；进一步判断是否从货架取出所提供货品，是则根据所提供货品的售价完成扣款；判断是否发生用户远离，是则停止显示货品。上述无人机售货方法，当用户靠近时才显示货品，在用户远离后则停止显示货品，无需不断地照明造成能源浪费，并且避免了被展示货品长期被日晒容易被氧化，使得货品保质期更长，且仅当用户从货架取出所提供货品才完成扣款，给用户提供了更自由的选择权利，特别适合一带一路建设的相关工程配套使用。

[0022] 例如，无人机售货方法中，判断是否发生用户靠近，是则显示货品，否则不执行任何操作，即无需显示货品；例如，无人机售货方法中，进一步判断手持终端是否进入预备支付状态，是则根据用户的选择在货架上提供货品，否则不执行任何操作，即无需在货架上提供货品；例如，无人机售货方法中，进一步判断是否从货架取出所提供货品，是则根据所提供货品的售价完成扣款，否则不执行任何操作，即无需执行扣款操作；例如，无人机售货方法中，判断是否发生用户远离，是则停止显示货品，否则保持当前界面，例如显示货品或者根据用户的选择在货架上提供货品等。

[0023] 在其中一个实施例中，手持终端扫码进入预备支付状态。例如，一种无人机售货方法，其包括以下步骤：判断是否发生用户靠近，是则显示货品；进一步判断手持终端是否通过扫码进入预备支付状态，是则根据用户的选择在货架上提供货品；进一步判断是否从货架取出所提供货品，是则根据所提供货品的售价完成扣款；判断是否发生用户远离，是则停止显示货品。例如，用户拿着手机扫码进入预备支付状态。在其中一个实施例中，手持终端扫二维码或条形码进入预备支付状态。在其中一个实施例中，近距感应手持终端进入预备支付状态。例如，一种无人机售货方法，其包括以下步骤：判断是否发生用户靠近，是则显示货品；进一步判断手持终端是否通过近距感应进入预备支付状态，是则根据用户的选择在货架上提供货品；进一步判断是否从货架取出所提供货品，是则根据所提供货品的售价完

成扣款；判断是否发生用户远离，是则停止显示货品。例如，用户拿着手机近距感应，进入预备支付状态。在其中一个实施例中，采用NFC或RFID近距感应手持终端进入预备支付状态。这样，只需手持终端即可进入预备支付状态。

[0024] 一个例子是，将所述预备支付状态与用户的身份信息(例如身份证号)相关联，由于用户的身份信息往往是唯一的，因此对应的用户也是唯一的，这样，可以更好地确保收款情况。例如，确定手持终端进入预备支付状态之后，根据用户的选择在货架上提供货品之前，还包括步骤：将所述预备支付状态与用户的身份信息相关联，根据用户的历史成交记录判断用户的支付信用是否满足一定信用阈值，是则执行后续步骤；即根据用户的历史成交记录确定其支付信用满足一定信用阈值时，然后再根据用户的选择在货架上提供货品，或者，确定进入预备支付状态之后，所述根据用户的选择在货架上提供货品具体包括以下步骤：所述预备支付状态与用户的身份信息相关联，根据用户的历史成交记录确定其支付信用满足一定信用阈值时，根据用户的选择在货架上提供货品；其中，信用阈值可根据经验、银行信用及/或社会征信等灵活设置。例如，在确定用户的选择(即用户选择货品)之后，在货架上提供货品之前，还包括步骤：根据所述预备支付状态查询用户的支付能力，在支付能力满足所选择货品时，则执行后续步骤，即在用户支付能力满足其选择时在货架上提供货品。这样，可以避免用户故意透支消费，也可以避免用户非主观恶意透支消费，特别是非完全行为能力人的无法自控的面子消费等，从而有利于维护用户利益，正确引导用户的合理消费，从而有力地维护了社会正常秩序。

[0025] 在其中一个实施例中，采用静态图片显示货品，例如采用多个静态图片显示多个货品或者采用多个静态图片显示一个货品或者采用一个静态图片显示一个货品。在其中一个实施例中，显示货品之后，根据用户的选择在货架上提供货品之前，还包括步骤：点击静态图片选择货品。例如，进一步判断手持终端是否进入预备支付状态之前或之后，点击静态图片选择货品，然后在手持终端进入预备支付状态时或之后，根据用户的选择在货架上提供货品。例如，一种无人机售货方法，其包括以下步骤：判断是否发生用户靠近，是则采用静态图片显示货品；点击静态图片选择货品；进一步判断手持终端是否进入预备支付状态，是则根据用户的选择在货架上提供货品；进一步判断是否从货架取出所提供货品，是则根据所提供货品的售价完成扣款；判断是否发生用户远离，是则停止显示货品。在其中一个实施例中，点击某一静态图片选择该静态图片对应的一货品。在其中一个实施例中，在预设时间段点击若干静态图片，选择该若干静态图片分别对应的若干货品。例如，一种无人机售货方法，其包括以下步骤：判断是否发生用户靠近，是则采用静态图片显示货品；点击某一静态图片选择该静态图片对应的一货品；进一步判断手持终端是否进入预备支付状态，是则根据用户的选择在货架上提供货品；进一步判断是否从货架取出所提供货品，是则根据所提供货品的售价完成扣款；判断是否发生用户远离，是则停止显示货品。例如，一种无人机售货方法，其包括以下步骤：判断是否发生用户靠近，是则采用静态图片显示货品；在预设时间段点击若干静态图片，选择该若干静态图片分别对应的若干货品；进一步判断手持终端是否进入预备支付状态，是则根据用户的选择在货架上提供货品；进一步判断是否从货架取出所提供货品，是则根据所提供货品的售价完成扣款；判断是否发生用户远离，是则停止显示货品。这样，可以一次给出多个货品以供用户选择，从而提高了销售效率，还在选择之后，如果没有从货架取出所提供货品，则无人机可以收回部分或全部所提供的货品，从而使

得用户可以拒绝接受瑕疵品或不满意货品，避免了被迫接受瑕疵品或不满意货品的问题。

[0026] 在其中一个实施例中，采用动态图像显示货品。在其中一个实施例中，点击动态图像选择货品。在其中一个实施例中，在预设时间段点击若干动态图像，选择该若干动态图像分别对应的若干货品。例如，一种无人机售货方法，其包括以下步骤：判断是否发生用户靠近，是则采用静态图片及/或动态图像显示货品；点击某一静态图片选择该静态图片对应的一货品或点击动态图像选择货品或点击某一动态图像选择该动态图像对应的一货品或在预设时间段点击若干动态图像选择该若干动态图像分别对应的若干货品；进一步判断手持终端是否进入预备支付状态，是则根据用户的选择在货架上提供货品；进一步判断是否从货架取出所提供货品，是则根据所提供货品的售价完成扣款；判断是否发生用户远离，是则停止显示货品。这样，可以提供更完善更清晰的信息，也可以在一定程度上实现定点广告效果。

[0027] 在其中一个实施例中，在货品区域显示货品，例如，判断是否发生用户靠近，是则在货品区域显示货品。例如，以无人售货机的某一区域作为货品区域，在货品区域显示货品。又如，在无人售货机的显示屏例如液晶显示屏显示货品。也就是说，可以真实给出货品来进行显示，也可以只给出虚拟的图片或者文字来显示货品。例如，一种无人机售货方法，其包括以下步骤：判断是否发生用户靠近，是则在货品区域显示货品；进一步判断手持终端是否进入预备支付状态，是则根据用户的选择在货架上提供货品；进一步判断是否从货架取出所提供货品，是则根据所提供货品的售价完成扣款；判断是否发生用户远离，是则停止显示货品。例如，根据从货架取出所提供的一个货品的售价完成扣款，或者，根据从货架取出所提供的多个货品的总售价完成扣款。

[0028] 例如，在货品区域显示货品之后，以及进一步判断手持终端是否进入预备支付状态之前，还包括步骤：从货品区域选择货品。例如，一种无人机售货方法，其包括以下步骤：判断是否发生用户靠近，是则在货品区域显示货品；从货品区域选择货品；进一步判断手持终端是否进入预备支付状态，是则根据用户的选择在货架上提供货品；进一步判断是否从货架取出所提供货品，是则根据所提供货品的售价完成扣款；判断是否发生用户远离，是则停止显示货品。在其中一个实施例中，采用热感应方式从货品区域选择货品。例如，用户用手指或手掌触碰或贴近货品区域，即可从货品区域选择货品。例如，一种无人机售货方法，其包括以下步骤：判断是否发生用户靠近，是则在货品区域显示货品；采用热感应方式从货品区域选择货品；进一步判断手持终端是否进入预备支付状态，是则根据用户的选择在货架上提供货品；进一步判断是否从货架取出所提供货品，是则根据所提供货品的售价完成扣款；判断是否发生用户远离，是则停止显示货品。在其中一个实施例中，采用红外感应方式从货品区域选择货品。在其中一个实施例中，采用温度感应方式从货品区域选择货品。

[0029] 在其中一个实施例中，采用重力感应方式从货品区域选择货品。例如，用户采用压触或者踩踏方式从货品区域选择货品。例如，一种无人机售货方法，其包括以下步骤：判断是否发生用户靠近，是则在货品区域显示货品；采用重力感应方式从货品区域选择货品；进一步判断手持终端是否进入预备支付状态，是则根据用户的选择在货架上提供货品；进一步判断是否从货架取出所提供货品，是则根据所提供货品的售价完成扣款；判断是否发生用户远离，是则停止显示货品。

[0030] 上述无人机售货方法，还能够对手持终端进行感应或读取，以及通过多种方式从

货品区域选择货品，使用方便、灵活，在保障用户权利的同时，也能够保障无人机货主的权益，达到双方共赢的平衡，特别适合一带一路建设的相关工程配套使用。

[0031] 一个例子是，所述无人机设置有等待区及/或售货区；例如，使用时，用户从外部进入售货区；例如，从等待区进入售货区；又如，售货区开放、半开放或者封闭式设置；例如，判断是否发生用户靠近，具体为判断是否发生用户靠近等待区及/或售货区；例如，判断是否发生用户靠近等待区，是则显示货品；又如，判断是否发生用户靠近售货区，是则显示货品；例如，判断手持终端是否进入预备支付状态，是则允许用户进入售货区，根据用户的选择在货架上提供货品；例如所述货品区域设置于所述售货区；例如，判断手持终端是否进入预备支付状态之后，根据用户的选择在货架上提供货品之前，还包括步骤：发送获取用户视频权限的请求；当获取用户视频权限的请求被通过时，允许用户进入售货区；获取用户在售货区的视频；在用户进入售货区之后，再根据用户的选择在货架上提供货品。例如，一种无人机售货方法，其包括以下步骤：判断是否发生用户靠近，是则显示货品；进一步判断手持终端是否进入预备支付状态，是则发送获取用户视频权限的请求；当获取用户视频权限的请求被通过时，允许用户进入售货区；获取用户在售货区的视频；根据用户的选择在货架上提供货品；进一步判断是否从货架取出所提供货品，是则根据所提供货品的售价完成扣款；判断是否发生用户远离，是则停止显示货品。又如，根据所提供货品的售价完成扣款，具体包括以下步骤：当用户离开售货区时，根据所述视频判断是否发生异常操作，否则根据所提供货品的售价完成扣款。在其中一个实施例中，根据所述视频判断是否发生异常操作，是则发出报警信号。例如，向监控室或者管理区发出报警信号，以提醒管理人员进行处理；又如，在售货区发出报警信号，以提醒用户停止异常操作；又如，向管理人员或者警务人员发送报警信息。在其中一个实施例中，所述异常操作包括恶意的损毁或破坏行为。在其中一个实施例中，还包括以下步骤：当用户处于售货区时，根据所述视频判断是否发生异常操作，是则发出报警信号。在其中一个实施例中，还包括以下步骤：当用户处于售货区时，根据所述视频判断是否发生异常状况，是则发出求助信号。例如，当用户身体不适时，能够及时处理，例如及时抢救用户。这样，体现了更好的人文关怀，提升了无人机的安全系数。

[0032] 在其中一个实施例中，采用随身视频设备获取用户在售货区的视频。例如，采用用户的手机无线连接服务器以获取用户在售货区的视频。又如，允许用户进入售货区时，为用户提供随身视频设备，所述随身视频设备包括可穿戴设备，以及安装于可穿戴设备上的若干摄像头，用于获取用户在售货区的至少三个角度的视频，包括用户前方、用户后方以及包含有用户部分的用户前方的视频。在其中一个实施例中，采用在售货区安装的固定视频设备获取用户在售货区的视频。在其中一个实施例中，允许用户进入售货区时，为用户设置定位标签；获取用户在售货区的视频时，根据所述定位标签获取用户在售货区的视频。例如，所述定位标签为确认手机识别码的手机或其手机识别码。

[0033] 在其中一个实施例中，每次仅允许一个用户进入售货区。这种情况下，要求用户在一定时间从售货区出来，下面的实施例对此进行了优化设计。在其中一个实施例中，允许用户进入售货区之后，还同步执行步骤：开始计时；并且在达到一定时长之后提示用户离开售货区。这样，可以控制用户进店时间。在其中一个实施例中，判断若干用户中是否任一用户进入预备支付状态，是则允许全部用户进入售货区。这样，土豪可以带着伙伴们一起进入售货区，家长可以带着孩子一起进入售货区，一人买单，全体受益。又如，全部用户进入售货区

时或之后，还同步执行步骤：开始计时；并且在达到一定时长之后提示用户离开售货区。在其中一个实施例中，允许用户进入售货区之后，还包括步骤：开始计时；并且在达到一定时长之后提示用户离开售货区。例如，所述一定时长为1分钟、5分钟或10分钟，根据无人机货品数量而定，货主也可以自定义该一定时长，从而方便了货主的时间管控。

[0034] 一个例子是，根据所提供货品的售价完成扣款之后，还包括步骤：发送被扣款的货品的信息，例如发送到预设终端或者服务器，这样，货主可以清楚地知道货品售卖情况。又如，定时发送被扣款的货品的信息：例如，每小时发送一次，或者每天发送一次，以此类推。例如，发送被扣款的货品的信息时，附加货品所在的无人机的身份信息，例如，所述身份信息是无人机的编号或者序列号；这样，有利于货主管理多个无人机。

[0035] 需要说明的是，本发明的其它实施例还包括，上述各实施例中的技术特征相互组合所形成的、能够实施的无人机售货方法。

[0036] 以上所述实施例的各技术特征可以进行任意的组合，为使描述简洁，未对上述实施例中的各个技术特征所有可能的组合都进行描述，然而，只要这些技术特征的组合不存在矛盾，都应当认为是本说明书记载的范围。

[0037] 以上所述实施例仅表达了本发明的几种实施方式，其描述较为具体和详细，但并不能因此而理解为对发明专利范围的限制。应当指出的是，对于本领域的普通技术人员来说，在不脱离本发明构思的前提下，还可以做出若干变形和改进，这些都属于本发明的保护范围。因此，本发明专利的保护范围应以所附权利要求为准。

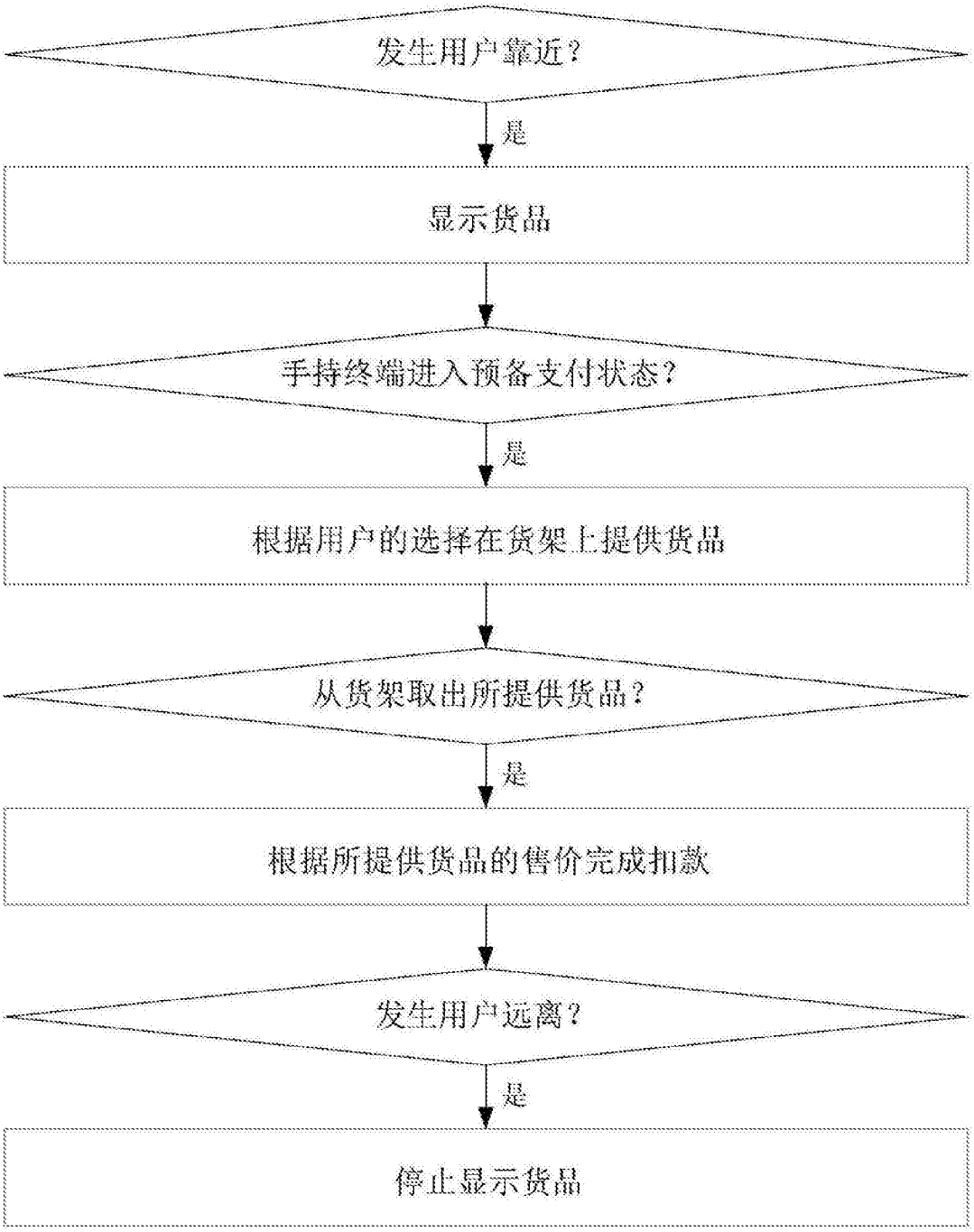


图1

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/973,505	10/25/2022	Paresh K. Patel	104402-5067-US	4236

24341 7590 12/15/2023

Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

EXAMINER
NIGH, JAMES D

ART UNIT	PAPER NUMBER
3685	

NOTIFICATION DATE	DELIVERY MODE
12/15/2023	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

donald.mixon@morganlewis.com
padocketingdepartment@morganlewis.com

Office Action Summary	Application No. 17/973,505	Applicant(s) Patel et al.	
	Examiner JAMES D NIGH	Art Unit 3685	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on October 25, 2022.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☑ The drawing(s) filed on October 25, 2022 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date 01/03/2023, 06/14/2023.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Priority

Continuation

2. This application is a continuation of U.S. application 16/750,477, filed January 23, 2020, now U.S. Patent 11,481,781 ("Parent Application") which is a continuation-in-part of U.S. Patent Application 15/406,492, filed January 13, 2017, which is a continuation of U.S. Patent Application 14/335,762, filed July 18, 2014, issued as U.S. Patent 9,547,859 on January 17, 2017, which is a continuation of U.S. Patent Application 14/214,644, filed March 14, 2014, issued as U.S. Patent 8,856,045 on October 7, 2014, which claims priority to U.S. Provisional Patent Application 61/917,936, filed December 18, 2013. U.S. Patent Application 14/214,644 is also a continuation-in-part of U.S. Design Patent Application 29/477,025, filed December 18, 2013, issued as U.S. Design Patent D755,183 on May 3, 2016.

3. U.S. application 16/750,477 is a continuation-in-part of U.S. Patent Application 16/029,483, filed July 6, 2018, which is a continuation of U.S. Patent Application 14/611,065, filed January 30, 2015, issued as U.S. Patent 10,019,724 on July 10, 2018.

4. U.S. application 16/750,477 is a continuation-in-part of U.S. Patent Application No. 15/956,741, filed April 18, 2018, which claims priority to U.S. Provisional Patent Application No. 62/486,951, filed April 18, 2017.

5. U.S. Patent Application No. 15/956,741 is also a continuation-in-part of U.S. Patent Application No. 15/893,514, filed February 9, 2018, which is a continuation of PCT Patent Application No. PCT/US2017/015676, filed January 30, 2017, which claims priority to U.S. Provisional Application No. 62/289,158, filed January 29, 2016. U.S. Patent Application No. 15/893,514 is also a continuation-in-part of U.S. Patent Application No. 14/641,236, filed March 6, 2015, which claims priority to U.S. Provisional Application No. 62/081,492, filed November 18, 2014. U.S. Patent Application No. 14/641,236 is also a continuation-in-part of U.S. Patent Application No. 14/320,534, filed June 30, 2014, which is a continuation-in-part of U.S. Patent Application No. 14/214,644, filed March 14, 2014 and issued on October 7, 2014 as U.S. Patent No. 8,856,045, which claims priority to U.S. Provisional Patent Application No. 61/917,936, filed December 18, 2013. U.S. Patent Application No. 14/214,644 is also a continuation-in-part of U.S. Design Patent Application No. 29/477,025, filed December 18, 2013 and issued on May 3, 2016 as U.S. Patent No. D755,183.

6. U.S. Patent Application No. 15/956,741 is also a continuation-in-part of U.S. Patent Application No. 15/435,228, filed February 16, 2017, which claims priority to U.S. Provisional Application No. 62/296,543, filed February 17, 2016 and is a continuation-in-part of U.S. Patent Application No. 14/458,192, filed August 12, 2014 and issued on January 23, 2018 as U.S. Patent No. 9,875,473, which is a continuation-in-part of U.S. Patent Application No. 14/456,683, filed August 11, 2014 and issued on February 9, 2016 as U.S. Patent No. 9,256,873, which is a continuation of U.S. Patent Application No. 14/335,762, filed July 18, 2014 and issued on January 17, 2017 as U.S. Patent No. 9,547,859, which is a continuation of U.S. Patent Application No. 14/214,644, filed

March 14, 2014 and issued on October 7, 2014 as U.S. Patent No. 8,856,045, which claims priority to U.S. Provisional Patent Application No. 61/917,936, filed December 18, 2013. U.S. Patent Application No. 14/214,644 is also a continuation-in-part of U.S. Design Patent Application No. 29/477,025, filed December 18, 2013 and issued on May 3, 2016 as U.S. Patent No. D755,183.

7. As this application is applicable to the first inventor to file provisions of MPEP § 2152.01 (B) as the application is a child application filed under the provisions regarding continuation-in-part. MPEP 2152.01(B) states as follows:

> If the application is a continuation-in-part of an earlier U.S. application or international application, any claims in the new application not supported by the specification and claims of the parent application have an effective filing date equal to the actual filing date of the new application. Any claims which are fully supported under **35 U.S.C. 112** by the earlier parent application have the effective filing date of that earlier parent application

In order to establish the effective filing date of the instant application each claim must be analyzed in its entirety to establish whether or not any the claim encompasses subject matter not fairly taught or suggested by each parent application to which the instant application claims priority ("*To qualify for an earlier filing date, section 120 requires, inter alia, that the earlier-filed U.S. patent application contain a disclosure which complies with 35 U.S.C. § 112, ¶ 1 (1994) for each claim in the newly filed application. Thus, this benefit only applies to claims that recite subject matter adequately described in an earlier application, and does not extend to claims with subject matter outside the description in the earlier application*". See *Waldemar Link, GmbH & Co. v. Osteonics Corp.*, 32 F.3d 556, 558-59, 31 USPQ2d 1855", as cited in *Studiengesellschaft Kohle, m.b.H. v. Shell Oil Co.*, 112 F.3d 1561, 42 U.S.P.Q.2d 1674 (Fed. Cir. 1997)

Other applications as listed in the written description in paragraphs 0001-0005 form the priority chain for the instant application.

Examiner will now proceed with establishing the earliest priority date for each patent application recited in the chain.

Claim 1. An offline retail machine comprising: a short-range transceiver (supported by U.S. Patent 8,856,045 at column 13, lines 23-34 with publication date of October 7, 2014 to which priority is claimed which was filed on March 14, 2014)

one or more processors (also supported by U.S. Patent 8,856,045 at Figure 57 and column 15 lines 52-61 with publication date of October 7, 2014 to which priority is claimed which was filed on March 14, 2014)

memory storing one or more programs that when executed by the one or more processors, cause the one or more processors to perform communications operations via one or more mobile devices, the communications operations comprising (also supported by U.S. Patent 8,856,045 at column 12 lines 15 through 46, column 13 lines 19-34 with publication date of October 7, 2014 to which priority is claimed which was filed on March 14, 2014)

establishing via the short-range transceiver a connection between the offline retail machine and a first mobile device proximate to the offline retail machine (also supported by U.S. Patent 8,856,045 at column 13, lines 23-34 with publication date of October 7, 2014 to which priority is claimed which was filed on March 14, 2014)

transmitting via the short-range transceiver to the first mobile device first information including a record of one or more products and/or services provided by the offline retail machine for a first user who is associated with the first mobile device

(supported by U.S. Patent Publication 2015/0170136 at paragraphs 0147 and 0246 with publication date of June 18, 2015 to which priority was claimed which was filed on June 30, 2014)

determining whether first acknowledgement information is received from the first mobile device within a predetermined time period, the first acknowledgement information acknowledging that a remote server received the first information; (supported by U.S. Patent Publication 2015/0170136 at paragraphs 0011, 0147 and 0230 with publication date of June 18, 2015 to which priority was claimed which was filed on June 30, 2014 as application no. 14/320,534)

in accordance with a determination that the first acknowledgement information is not received from the first mobile device within the predetermined time period:

maintaining the first information in the memory; (supported by U.S. Patent Publication 2015/0170136 at paragraphs 0181 and 0260 with publication date of June 18, 2015 to which priority was claimed which was filed on June 30, 2014 as application no. 14/320,534)

broadcasting an information packet via the short-range transceiver, wherein the information packet includes a status flag indicating unacknowledged information including the first information (supported by U.S. Patent Publication 2015/0170136 at paragraphs 0181 and 0260 with publication date of June 18, 2015 to which priority was claimed which was filed on June 30, 2014 as application no. 14/320,534).

Examiner notes that the application to which priority is claimed for application 14/320,534 is 14/214,644 which does not have the language regarding status flags and also does not have a clear recitation involving the maintaining of the first information in

the memory as applied to a record of one or more products and/or services. While there is a recitation regarding unacknowledged transactions (0262) and maintaining of transactions in memory (0260) these would appear to be user transactions and not records of one or more products and/or services provided by the offline retail machine. Therefore, priority does not extend to application 14/214,644. Similarly, the provisional application 61/917,936 filed on December 18, 2013 to which both applications 14/320,534 and 14/214,644 claim priority does not apparently teach or even suggest the language regarding status flags and also does not have a clear recitation involving the maintaining of the first information in the memory as applied to a record of one or more products and/or services. Therefore, for prior art purposes the effective filing date of the instant application will be deemed as coinciding with the filing date of application no. 14/320,524 i.e. June 30, 2014.

Information Disclosure Statement

8. The information disclosure statement (IDS) was submitted on January 3, 2023 and June 14, 2023. The submissions are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statements are being considered by the examiner.

Double Patenting

9. A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process... may obtain a patent therefor..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Vogel*,

422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the claims that are directed to the same invention so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

10. Claim 1 is rejected under 35 U.S.C. 101 as claiming the same invention as that of claim 1 of prior U.S. Patent No. 11,481,781. This is a statutory double patenting rejection.

11. Examiner has reviewed both claim 1 of the instant application and claim 1 of U.S. Patent 11,481,781 and cannot find any wording changes and concludes that claim 1 of the instant application is claiming the exact same subject matter as that present in claim 1 of U.S. 11,481,781. Therefore claim 1 of the instant application is rejected under section 101 for claiming the same invention that was claimed in U.S. Patent 11,481,781.

Allowable Subject Matter

12. The following is a statement of reasons for the indication of allowable subject matter:

13. Examiner reviewed the prior art from parent applications and from the post grant review and still believes that Berger et al. (U.S. Patent Publication 2004/0117262, hereinafter referred to as Berger) is the closest prior art of record or at least in light of the art cited from the post-grant review is one of a collection of references that can be viewed as being the closest prior art. Unlike claims from the '492 application and the '762 application claims 1, 7 and 13 are not claiming a "pre-authorization" so this is not a

factor in considering whether the claims are allowable over the prior art. What is different from the '492 application and the '762 application is the transmission of a record of one or more products and/or services provided by the offline retail machine. Prior art references such as Low et al. (U.S. Patent Publication 2014/0032413, hereinafter referred to as Low) teach a combination of an offline retail machine communicating through a network by transmission of a short-range wireless signal to a user device which can then transmit the information to a vendor server (0026, 0044). Kolls et al. (U.S. Patent 7,690,495, hereinafter referred to as Kolls) teaches a similar ability albeit through a PDA that is carried to the machine (22:9-26). Lei et al. (U.S. Patent Publication 2003/0158891, hereinafter referred to as Lee) teaches a similar operation. Examiner does not see where any of the cited prior art fairly teaches or suggests the operations of determining whether acknowledgement information is received in a predetermined time period and based on the information that the acknowledgement is not received maintaining the first information in memory and subsequently broadcasting an information packet including a status flag indicating unacknowledged information. Nurel "Recent Developments in Wireless Network Systems", Izmir Institute of Technology, September 2001, 280 pages) discloses in section 9.1.2 on pages 236 and 237 the benefits of including wireless networking capability in a vending machine but does not disclose either the combination of short range and long-range capability or the use of unique codes. As none of the prior art considered by Examiner fairly teaches this combination of features claim 1 is held as being allowable over the prior art.

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAMES D NIGH whose telephone number is (571)270-5486. The examiner can normally be reached 6:00 to 9:45 and 10:30 to 2:45.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Neha Patel can be reached on (571) 270-1492. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To file and manage patent submissions in Patent Center, visit: https://patentcenter.uspto.gov. Visit https://www.uspto.gov/patents/apply/patent-center for more information about Patent Center and https://www.uspto.gov/patents/docx for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JAMES D NIGH/
Senior Examiner, Art Unit 3685

Notice of References Cited	Application/Control No. 17/973,505	Applicant(s)/Patent Under Reexamination Patel et al.	
	Examiner JAMES D NIGH	Art Unit 3685	Page 1 of 3

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Name	CPC Classification	US Classification
*	A	US-10977642-B2	2021-04-13	Khan; Ahmer A.	G06Q20/3263	1/1
*	B	US-10824828-B2	2020-11-03	Ostri; Ronen	G06Q20/3278	1/1
*	C	US-10423949-B2	2019-09-24	Lyons; Garry	G06Q20/40	1/1
*	D	US-20190244205-A1	2019-08-08	Fieglein; Henry	H04L67/04	1/1
*	E	US-20180240096-A1	2018-08-23	Patel; Paresh K.	G06Q20/18	1/1
*	F	US-9875473-B2	2018-01-23	Patel; Paresh K.	G06Q20/327	1/1
*	G	US-9262771-B1	2016-02-16	Patel; Paresh K.	G06Q30/0248	1/1
*	H	US-20150170136-A1	2015-06-18	Patel; Paresh K.	G06F8/20	705/76
*	I	US-8856045-B1	2014-10-07	Patel; Paresh K.	G06Q20/401	705/79
*	J	US-20140074714-A1	2014-03-13	MELONE; Cristian	G06Q20/322	235/487
*	K	US-20140074723-A1	2014-03-13	Kamat; Shreyas	G06Q20/202	705/71
*	L	US-20140064116-A1	2014-03-06	Linde; Joakim	H04L67/06	370/252
*	M	US-20140032413-A1	2014-01-30	Low; Gak Wee	G07F9/026	705/44

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Country	Name	CPC Classification
	N	WO-2009070430-A2	2009-06-04	WO	SCHIBUK N	G06F21/32
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	Nurel “Recent Developments in Wireless Network Systems”, Izmir Institute of Technology, September 2001, 280 pages) (Year: 2001)
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in YYYY-MM-DD format are publication dates. Classifications may be US or foreign.

Notice of References Cited	Application/Control No. 17/973,505	Applicant(s)/Patent Under Reexamination Patel et al.	
	Examiner JAMES D NIGH	Art Unit 3685	Page 2 of 3

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Name	CPC Classification	US Classification
*	A	US-20140025958-A1	2014-01-23	Calman; Matthew A.	G06F21/33	713/189
*	B	US-20130246171-A1	2013-09-19	Carapelli; Giovanni	G06Q20/325	705/14.51
*	C	US-20130191789-A1	2013-07-25	CALMAN; MATTHEW A.	G06F3/017	715/863
*	D	US-8489140-B2	2013-07-16	Weiner; Avish Jacob	G06Q20/40	455/454
*	E	US-20130126607-A1	2013-05-23	Behjat; Abdolreza	G06Q20/326	235/375
*	F	US-8059101-B2	2011-11-15	Westerman; Wayne Carl	G06F3/04883	345/173
*	G	US-7690495-B1	2010-04-06	Kolls; H. Brock	G07F9/026	194/350
*	H	US-20090306819-A1	2009-12-10	Insolia; Gerard E.	G07F9/02	700/231
*	I	US-20090106160-A1	2009-04-23	Skowronek; Dan	G06Q20/327	705/75
*	J	US-20050043011-A1	2005-02-24	Murray, Tomas	H04W68/00	455/403
*	K	US-6810234-B1	2004-10-26	Rasanen; Juhana	H04W88/02	455/414.1
*	L	US-20040117262-A1	2004-06-17	Berger, Jeffrey Keith	G06Q20/341	705/16
*	M	US-20030236872-A1	2003-12-25	Atkinson, Paul	G06Q20/3278	709/223

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Country	Name	CPC Classification
	N					
	O					
	P					
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	T					

NON-PATENT DOCUMENTS

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	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in YYYY-MM-DD format are publication dates. Classifications may be US or foreign.

Notice of References Cited	Application/Control No. 17/973,505	Applicant(s)/Patent Under Reexamination Patel et al.	
	Examiner JAMES D NIGH	Art Unit 3685	Page 3 of 3

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Name	CPC Classification	US Classification
*	A	US-20030158891-A1	2003-08-21	Lei, Jonathan L.	G06Q20/327	709/203
*	B	US-10210501-B2	2019-02-19	Low; Gak Wee	G07F9/001	1/1
*	C	US-8958846-B2	2015-02-17	Freeny, Jr.; Charles C.	G06Q30/0284	455/411
*	D	US-7455223-B1	2008-11-25	Wilson; David N.	G06Q20/18	222/2
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

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	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in YYYY-MM-DD format are publication dates. Classifications may be US or foreign.

During the period 2005 to 2009, the total number of wireless data connections used for retail applications in Europe can be expected to rise from less than 1 million to around 3 million

Publication info: M2 Presswire 28 Feb 2006: NA.

Abstract (English): M2 PRESSWIRE-28 February 2006-Research and Markets: During the period 2005 to 2009, the total number of wireless data connections used for retail applications in Europe can be expected to rise from less than 1 million to around 3 million(C)1994-2006 M2 COMMUNICATIONS LTD
RDATE:02032006
Research and Markets (http://www.researchandmarkets.com/reports/c14771) has announced the addition of Wireless M2M Communication and Retail to their offering.
What is the status for wireless M2M communication in the European retail sector?

Full text: M2 PRESSWIRE-28 February 2006-Research and Markets: During the period 2005 to 2009, the total number of wireless data connections used for retail applications in Europe can be expected to rise from less than 1 million to around 3 million(C)1994-2006 M2 COMMUNICATIONS LTD
RDATE:02032006
Research and Markets (http://www.researchandmarkets.com/reports/c14771) has announced the addition of Wireless M2M Communication and Retail to their offering.
What is the status for wireless M2M communication in the European retail sector? POS terminals and on street parking solutions are two areas where the new technology is already widely adopted. Remote management solutions for vending machines are expected to take off on a large scale in 2005. Learn more about the opportunities associated with the transformation of the European vending industry and the implementation for the EMV standard for secure card payments in this new report.
The highlights of this report are as follow:
- Overview of the European card payment, vending, parking and transportation ticketing industries.
- Introduction to key applications for wireless M2M communication in the retail sector.
- Analysis and forecasts of adoption of mobile communication for retail.
- Case studies of the implementation of wireless M2M communication solutions by industry leaders such as Parkeon, Selecta and VeriFone.
- Profiles of 65 leading POS terminal vendors, vending machine manufacturers, vending operators and parking and ticketing solution vendors.
Key questions answered by the report:
- What is the potential market size for wireless M2M communication in the retail sector? - Which are the key applications that offer sizable business opportunities? - How can the mobile industry benefit from deployment of 13 million EMV compliant POS terminals? - At what rate are wireless M2M communication solutions being adopted in the vending industry? - What are the opportunities for the mobile industry in the areas of parking and ticketing solutions?
Retail is one of the first sectors in Europe that has seen some significant breakthroughs for wireless M2M communication technology in certain application areas. Wireless POS terminals are widely used to enable card payments in businesses where mobility is required and modern on street parking management solutions rely on information transferred over wireless networks. The vending industry is expected to become the next segment where remote management systems enabled by mobile data communication will be deployed on a large scale from 2005 and onwards.
During the period 2005 to 2009, the total number of wireless data connections used for retail applications in

Europe can be expected to rise from less than 1 million to around 3 million.
Growth could however be many times higher if the mobile industry is able to take advantage of the ongoing migration to EMV in the card payments industry. As European merchants prepare to replace well over 10 million POS terminals to meet the new security standard, the mobile industry has a unique opportunity to initiate a shift from landline to wireless connections as primary means of communication for card payment systems. Such a development will however require tailored solutions that combine inexpensive, reliable terminals with secure high performance communication services.
Topics covered in this report include:
- Vending Machines - Parking and Ticketing Machines - Market Opportunity for Mobile Industry Players - Case Studies
For more information visit http://www.researchandmarkets.com/reports/c14771
CONTACT: Laura Wood, Senior Manager, Research and MarketsFax: +353 1 4100 980e-mail: press@researchandmarkets.com

Identifier (keyword): Trade

Publication title: M2 Presswire

Pagination: NA

Publication date: Feb 28, 2006

Publisher: Normans Media Ltd.

Journal subject: Business, Business, international

Journal code: 0ENS

Source type: Newswire

Language of publication: English

Document type: Magazine/Journal

Source attribution: Gale Group Trade &Industry, © Publisher specific

Accession number: 142732955

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Date created: 2012-08-07

Updates: 2012-09-23

First available: 2012-09-23

Database: Gale Group Trade &Industry Database™ (1976 - current)

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

24341 7590 01/18/2024
Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

EXAMINER
POE, KEVIN T

ART UNIT	PAPER NUMBER
3692	

DATE MAILED: 01/18/2024

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/956,741	04/18/2018	Paresh K. Patel	104402-5033-US	9837

TITLE OF INVENTION: MOBILE PAYMENT MODULE WITH DUAL FUNCTION RADIO TRANSMITTER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	04/18/2024

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 40% the amount of undiscounted fees, and micro entity fees are 20% the amount of undiscounted fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via the USPTO patent electronic filing system.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of this issue fee in order not to jeopardize copendency.**

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

24341 7590 01/18/2024
Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via the USPTO patent electronic filing system or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/956,741	04/18/2018	Paresh K. Patel	104402-5033-US	9837

TITLE OF INVENTION: MOBILE PAYMENT MODULE WITH DUAL FUNCTION RADIO TRANSMITTER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	04/18/2024

EXAMINER	ART UNIT	CLASS-SUBCLASS
POE, KEVIN T	3692	705-044000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑ Issue Fee ❑ Publication Fee (if required)

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via the USPTO patent electronic filing system ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

❑ Applicant asserting small entity status. See 37 CFR 1.27

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

❑ Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/956,741	04/18/2018	Paresh K. Patel	104402-5033-US	9837

24341 7590 01/18/2024

Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

EXAMINER	
POE, KEVIN T	
ART UNIT	PAPER NUMBER
3692	

DATE MAILED: 01/18/2024

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. The United States Patent and Trademark Office (USPTO) collects the information in this record under authority of 35 U.S.C. 2. The USPTO's system of records is used to manage all applicant and owner information including name, citizenship, residence, post office address, and other information with respect to inventors and their legal representatives pertaining to the applicant's/owner's activities in connection with the invention for which a patent is sought or has been granted. The applicable Privacy Act System of Records Notice for the information collected in this form is COMMERCE/PAT-TM-7 Patent Application Files, available in the Federal Register at 78 FR 19243 (March 29, 2013).
https://www.govinfo.gov/content/pkg/FR-2013-03-29/pdf/2013-07341.pdf

Routine uses of the information in this record may include disclosure to:

1) law enforcement, in the event that the system of records indicates a violation or potential violation of law;
2) a federal, state, local, or international agency, in response to its request;
3) a contractor of the USPTO having need for the information in order to perform a contract;
4) the Department of Justice for determination of whether the Freedom of Information Act (FOIA) requires disclosure of the record;
5) a Member of Congress submitting a request involving an individual to whom the record pertains, when the individual has requested the Member's assistance with respect to the subject matter of the record;
6) a court, magistrate, or administrative tribunal, in the course of presenting evidence, including disclosures to opposing counsel in the course of settlement negotiations;
7) the Administrator, General Services Administration (GSA), or their designee, during an inspection of records conducted by GSA under authority of 44 U.S.C. 2904 and 2906, in accordance with the GSA regulations and any other relevant (i.e., GSA or Commerce) directive, where such disclosure shall not be used to make determinations about individuals;
8) another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c));
9) the Office of Personnel Management (OPM) for personnel research purposes; and
10) the Office of Management and Budget (OMB) for legislative coordination and clearance.

If you do not furnish the information requested on this form, the USPTO may not be able to process and/or examine your submission, which may result in termination of proceedings, abandonment of the application, and/or expiration of the patent.

Notice of Allowability	Application No. 15/956,741	Applicant(s) Patel, Paresh K.	
	Examiner KEVIN T POE	Art Unit 3692	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to 5/28/2023.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 1-4 and 6-20 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information , please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some* c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☑ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☑ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☑ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA. This office action is in response to applicant's communication of May 28, 2023. The rejections are stated below.

Claims 1-4 and 16-20 are pending and have been examined.

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Benjamin Pezzner on October 17, 2023.

The application has been amended as follows:

In the Claims

1. (Currently Amended) An electronic communication module comprising:

a transceiver,

one or more processors, and

memory storing one or more programs ~~to be executed by the one or more processors~~, the one or more programs comprising instructions that, when executed by

the one or more processors, cause the ~~electronic communication module~~ one or more processors to perform operations comprising:

broadcasting ~~from~~ via the transceiver a first stream of alternating packets, the first stream comprising packets alternating between a plurality of first packets and a plurality of second packets;

wherein each of the first packets is associated with a first service and includes a header with information identifying a first device as its source of transmission, the first device being associated with the first service;

wherein each of the second packets is associated with a second service distinct from the first service and includes a header with information identifying a second device as its source of transmission, the second device being associated with the second service;

receiving ~~at~~ via the transceiver from a first mobile device a first request for the first device to perform an operation associated with the first service; and

concurrently:

(i) in response to the first request, establishing via the transceiver a first connection between the transceiver and the first mobile device, and transmitting wirelessly ~~from~~ via the transceiver to the first mobile device first packets associated with a response to the first request; and

(ii) broadcasting wirelessly, via the transceiver, the second packets;

wherein the first and second packets are transmitted and broadcasted, respectively, in an alternating pattern.

2. (Currently Amended) The electronic communication module of claim 1, further comprising instructions that, when executed by the one or more processors, ~~causing~~ cause the ~~electronic communication module~~ one or more processors to perform operations comprising:

while broadcasting packets associated with the first service to the first mobile device, continuing to broadcast via the transceiver, first packets indicating presence of the first device.

3. (Currently Amended) The electronic communication module of claim 2, further comprising instructions that, when executed by the one or more processors, ~~causing~~ cause the ~~electronic communication module~~ one or more processors to perform operations comprising:

while broadcasting packets associated with the first service to the first mobile device:

receiving ~~at~~ via the transceiver, from a second mobile device a second request for the second device to perform an operation associated with the second service; and

in response to the second request, establishing via the transceiver a second connection between the transceiver and the second mobile device, and transmitting wirelessly from the transceiver to the second mobile device second packets associated with a response to the second request.

4. (Currently Amended) The electronic communication module of claim 1, further comprising instructions that, when executed by the one or more processors, ~~causing~~ cause the ~~electronic communication module~~ one or more processors to perform operations comprising:

including in the header for each of the first packets a first device identifier identifying the first device; and

including in the header for each of the second packets a second device identifier identifying the second device.

5. (Canceled)

6. (Currently Amended) The electronic communication module of claim 1, wherein broadcasting the first stream of alternating packets comprises alternatively broadcasting (i) groups of the first packets during respective first broadcast intervals, and (ii) groups of the second packets during respective second broadcast intervals.

7. (Original) The electronic communication module of claim 1, wherein:

the first service is one of a payment service, a data transfer service, and a configuration service; and

the second service is another of the payment service, the data transfer service, and the configuration service.

8. (Currently Amended) The electronic communication module of claim 7, wherein:

~~the electronic communication module is configured for coupling to a vending machine;~~

the payment service is ~~configured to facilitate cashless transactions with the vending machine~~ a cashless payment application;

the data transfer service is ~~configured to~~ an application that communicates status information of ~~the vending machine~~ a payment accepting unit; and

the configuration service is ~~configured to~~ an application that receives configuration data for ~~the vending machine~~ a payment accepting unit.

9. (Previously Presented) A method of broadcasting information associated with different services, the method comprising:

at an electronic communication module including a short-range transceiver, one or more processors, and memory:

broadcasting, by the one or more processors, and from the transceiver, a first stream of alternating packets, the first stream comprising packets alternating between a plurality of first packets and a plurality of second packets;

wherein each of the first packets is associated with a first service and includes a header with information identifying a first device as its source of transmission, the first device being associated with the first service;

wherein each of the second packets is associated with a second service distinct from the first service and includes a header with information identifying a second device as its source of transmission, the second device being associated with the second service;

receiving at the transceiver from a first mobile device a first request for the first device to perform an operation associated with the first service; and

concurrently:

(i) in response to the first request, establishing, by the one or more processors, and via the transceiver, a first connection between the transceiver and the

first mobile device, and transmitting wirelessly from the transceiver to the first mobile device first packets associated with a response to the first request; and

(ii) broadcasting wirelessly, by the one or more processors and via the transceiver, the second packets indicating presence of the second device;

wherein the first and second packets are transmitted in an alternating pattern.

10. (Previously Presented) The method of claim 9, further comprising:

while broadcasting packets associated with the first service to the first mobile device, continuing to broadcast via the transceiver first packets indicating presence of the first device.

11. (Previously Presented) The method of claim 10, further comprising:

while broadcasting packets associated with the first service to the first mobile device:

receiving at the transceiver from a second mobile device a second request for the second device to perform an operation associated with the second service; and

in response to the second request, establishing via the transceiver a second connection between the transceiver and the second mobile device, and transmitting wirelessly from the transceiver to the second mobile device second packets associated with a response to the second request.

12. (Original) The method of claim 9, further comprising:

including in the header for each of the first packets a first device identifier identifying the first device; and

including in the header for each of the second packets a second device identifier identifying the second device.

13. (Original) The method of claim 9, wherein:

the first service is one of a payment service, a data transfer service, and a configuration service; and

the second service is another of the payment service, the data transfer service, and the configuration service.

14. (Currently Amended) The method of claim 13, wherein:

~~the electronic communication module is configured for coupling to a vending machine;~~

the payment service is ~~configured to facilitate cashless transactions with the vending machine~~ a cashless payment application;

the data transfer service is ~~configured to~~ an application that communicates status information of ~~the vending machine~~ a payment accepting unit; and

the configuration service is ~~configured to~~ an application that receives configuration data for ~~the vending machine~~ the payment accepting unit.

15. (Original) A non-transitory computer readable storage medium storing one or more programs, the one or more programs comprising instructions, which, when executed by one or more processors of an electronic communication module comprising a short range transceiver, causes the one or more processors to perform operations comprising:

broadcasting from the transceiver a first stream of alternating packets, the first stream comprising packets alternating between a plurality of first packets and a plurality of second packets;

wherein each of the first packets is associated with a first service and includes a header with information identifying a first device as its source of transmission, the first device being associated with the first service;

wherein each of the second packets is associated with a second service distinct from the first service and includes a header with information identifying a second device as its source of transmission, the second device being associated with the second service;

receiving at the transceiver from a first mobile device a first request for the first device to perform an operation associated with the first service; and

concurrently:

(i) in response to the first request, establishing via the transceiver a first connection between the transceiver and the first mobile device, and transmitting wirelessly from the transceiver to the first mobile device first packets associated with a response to the first request; and

(ii) broadcasting wirelessly via the transceiver the second packets;

wherein the first and second packets are transmitted and broadcasted, respectively, in an alternating pattern.

16. (Currently Amended) The non-transitory computer readable storage medium of claim 15, further comprising instructions that, when executed by the one or more processors, ~~causing~~ cause the ~~electronic communication module~~ one or more processors to perform operations comprising:

while broadcasting packets associated with the first service to the first mobile device, continuing to broadcast via the transceiver first packets indicating presence of the first device.

17. (Currently Amended) The non-transitory computer readable storage medium of claim 16, further comprising instructions that, when executed by the one or more processors, ~~causing~~ cause the ~~electronic communication module~~ one or more processors to perform operations comprising:

while broadcasting packets associated with the first service to the first mobile device:

receiving ~~at~~ via the transceiver from a second mobile device a second request for the second device to perform an operation associated with the second service; and

in response to the second request, establishing via the transceiver a second connection between the transceiver and the second mobile device, and transmitting wirelessly from the transceiver to the second mobile device second packets associated with a response to the second request.

18. (Currently Amended) The non-transitory computer readable storage medium of claim 15, further comprising instructions that, when executed by the one or more processors, ~~causing~~ cause the ~~electronic communication module~~ one or more processors to perform operations comprising:

including in the header for each of the first packets a first device identifier identifying the first device; and

including in the header for each of the second packets a second device identifier identifying the second device.

19. (Original) The non-transitory computer readable storage medium of claim 15, wherein:

the first service is one of a payment service, a data transfer service, and a configuration service; and

the second service is another of the payment service, the data transfer service, and the configuration service.

20. (Currently Amended) The non-transitory computer readable storage medium of claim 19, wherein:

~~the communication module is coupled to a vending machine;~~

the payment service is ~~configured to facilitate cashless transactions with the vending machine~~ a cashless payment application;

the data transfer service is ~~configured to~~ an application that communicates status information of ~~the vending machine~~ a payment accepting unit; and

the configuration service is ~~configured to~~ an application that receives configuration data for ~~the vending machine~~ a payment accepting unit.

Allowable Subject Matter

2. Claims 1-4 and 16-20 are allowed.

3. The following is an examiner's statement of reasons for allowance for the Claims.

The claimed invention pertains to relates to the field of providing network connections at unattended machines, and in particular, to providing network connections to facilitate mobile payment processing at unattended machines.

The closest prior art of record is US Pub No. 2013/0117490 A1 to Harriman, US Pub No. 2016/0292469 A1 to Ianni et al., and US Pub No. 2004/0029569 A1 to Khan et al.

4. Harriman pertains to the field of high speed point-to-point interconnections and communications architectures.

5. Ianni relates generally to devices and methods for coordinating digital transmission signals in wireless data communication networks, and more particularly to wireless data communications networks wherein a master node with a limited bandwidth needs to receive, distinguish and process data transmissions generated and broadcasted by a large number of other nodes in the network.

6. Khan discloses methods and apparatuses which allow for a micropayment to be made utilizing electronic media in a convenient and economically viable and secure fashion.

11. The instant application is distinguished from the prior art that is cited. The cited prior art fails to disclose, suggest or render obvious in combination the steps of

"***broadcasting via the transceiver a first stream of alternating packets, the first stream comprising packets alternating between a plurality of first packets and a plurality of second packets;***

wherein each of the first packets is associated with a first service and includes a header with information identifying a first device as its source of transmission, the first device being associated with the first service;

wherein each of the second packets is associated with a second service distinct from the first service and includes a header with information

identifying a second device as its source of transmission, the second device being associated with the second service;

receiving via the transceiver from a first mobile device a first request for the first device to perform an operation associated with the first service; and

concurrently:

(i) in response to the first request, establishing via the transceiver a first connection between the transceiver and the first mobile device, and transmitting wirelessly from via the transceiver to the first mobile device first packets associated with a response to the first request; and

(ii) broadcasting wirelessly, via the transceiver, the second packets;

wherein the first and second packets are transmitted and broadcasted, respectively, in an alternating pattern",

as recited in independent claim 1 and analogously in claim 9. Dependent claims are allowed for the same reasons as respective independent claims.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEVIN T POE whose telephone number is (571)272-9789. The examiner can normally be reached on **Monday-Friday 9:30am through 6pm EST**.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Calvin Hewitt** can be reached on 571-272-6709. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see https://ppair-my.uspto.gov/pair/PrivatePair. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K.T.P/
Examiner, Art Unit 3692
/KEVIN T POE/

/CALVIN L HEWITT II/
Supervisory Patent Examiner, Art Unit 3692

Applicant-Initiated Interview Summary	**Application No.** 15/956,741	**Applicant(s)** Patel, Paresh K.		
	Examiner KEVIN T POE	**Art Unit** 3692	**AIA (First Inventor to File) Status** Yes	**Page** 1 of 1

All Participants (applicant, applicants representative, PTO personnel)	**Title**	**Type**
KEVIN T POE	Examiner	Telephonic
BENJAMIN PEZZNER	Attorney of Record	

Date of Interview: 17 October 2023

Issues Discussed:

Proposed Amendment(s)

Discussed proposed amendment to place application in condition for allowance. Applicant agreed to cancel claim 5.

☑ Attachment

/KEVIN T POE/ Examiner, Art Unit 3692	

Applicant is reminded that a complete written statement as to the substance of the interview must be made of record in the application file. It is the applicants responsibility to provide the written statement, unless the interview was initiated by the Examiner and the Examiner has indicated that a written summary will be provided. See MPEP 713.04
Please further see:
MPEP 713.04
Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews, paragraph (b)
37 CFR § 1.2 Business to be transacted in writing

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

Notice of References Cited	Application/Control No. 15/956,741	Applicant(s)/Patent Under Reexamination Patel, Paresh K.	
	Examiner KEVIN T POE	Art Unit 3692	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Name	CPC Classification	US Classification
*	A	US-20150278811-A1	10-2015	Lalchandani; Nikesh Anand	G06Q20/202	705/42
*	B	US-20120253852-A1	10-2012	Pourfallah; Stacy S.	G06Q20/36	705/41
*	C	US-20140279008-A1	09-2014	Calman; Matthew A.	G06Q30/0215	705/14.58
*	D	US-20140278989-A1	09-2014	Calman; Matthew A.	G06Q30/0215	705/14.58
*	E	US-20120066096-A1	03-2012	Penide; Philippe	G06Q20/12	705/26.1
*	F	US-9424603-B2	08-2016	Hammad; Ayman	G06Q20/3224	1/1
*	G	US-8606702-B2	12-2013	Ruckart; John	G06Q20/3223	705/37
*	H	US-8020763-B1	09-2011	Kowalchyk; Eric F.	G06Q30/06	705/40
*	I	US-8881975-B1	11-2014	Matthews; Michele	G06Q20/20	235/379
*	J	US-20070255653-A1	11-2007	Tumminaro; John	G06Q20/3255	705/39
*	K	US-20100280956-A1	11-2010	Chutorash; Richard J.	G07F13/025	705/64
*	L	US-20130275305-A1	10-2013	Duplan; Lucas Andrew	G06Q20/223	705/44
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	"IEEE Standard for Telecommunications and Information Exchange Between Systems - LAN/MAN Specific Requirements - Part 15: Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for Low Rate Wireless Personal Area Networks (WPAN)," (Year: 2003)
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in YYYY-MM-DD format are publication dates. Classifications may be US or foreign.

UNITED STATES PATENT AND TRADEMARK OFFICE

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NOTICE OF ALLOWANCE AND FEE(S) DUE

24341 7590 12/12/2023

Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

EXAMINER
HAMILTON, MATTHEW L

ART UNIT	PAPER NUMBER
3682	

DATE MAILED: 12/12/2023

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/963,170	10/10/2022	Paresh K. Patel	104402-5071-US	9471

TITLE OF INVENTION: METHOD AND SYSTEM FOR PROVIDING OFFERS FOR AUTOMATED RETAIL MACHINES VIA MOBILE DEVICES

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	03/12/2024

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 40% the amount of undiscounted fees, and micro entity fees are 20% the amount of undiscounted fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via the USPTO patent electronic filing system.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of this issue fee in order not to jeopardize copendency.**

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

24341 7590 12/12/2023
Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via the USPTO patent electronic filing system or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/963,170	10/10/2022	Paresh K. Patel	104402-5071-US	9471

TITLE OF INVENTION: METHOD AND SYSTEM FOR PROVIDING OFFERS FOR AUTOMATED RETAIL MACHINES VIA MOBILE DEVICES

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	03/12/2024

EXAMINER	ART UNIT	CLASS-SUBCLASS
HAMILTON, MATTHEW L	3682	705-014370

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑Issue Fee ❑Publication Fee (if required)

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via the USPTO patent electronic filing system ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

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UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/963,170	10/10/2022	Paresh K. Patel	104402-5071-US	9471

24341 7590 12/12/2023

Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

EXAMINER	
HAMILTON, MATTHEW L	
ART UNIT	PAPER NUMBER
3682	

DATE MAILED: 12/12/2023

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. The United States Patent and Trademark Office (USPTO) collects the information in this record under authority of 35 U.S.C. 2. The USPTO's system of records is used to manage all applicant and owner information including name, citizenship, residence, post office address, and other information with respect to inventors and their legal representatives pertaining to the applicant's/ owner's activities in connection with the invention for which a patent is sought or has been granted. The applicable Privacy Act System of Records Notice for the information collected in this form is COMMERCE/PAT-TM-7 Patent Application Files, available in the Federal Register at 78 FR 19243 (March 29, 2013).
https://www.govinfo.gov/content/pkg/FR-2013-03-29/pdf/2013-07341.pdf

Routine uses of the information in this record may include disclosure to:

1) law enforcement, in the event that the system of records indicates a violation or potential violation of law;
2) a federal, state, local, or international agency, in response to its request;
3) a contractor of the USPTO having need for the information in order to perform a contract;
4) the Department of Justice for determination of whether the Freedom of Information Act (FOIA) requires disclosure of the record;
5) a Member of Congress submitting a request involving an individual to whom the record pertains, when the individual has requested the Member's assistance with respect to the subject matter of the record;
6) a court, magistrate, or administrative tribunal, in the course of presenting evidence, including disclosures to opposing counsel in the course of settlement negotiations;
7) the Administrator, General Services Administration (GSA), or their designee, during an inspection of records conducted by GSA under authority of 44 U.S.C. 2904 and 2906, in accordance with the GSA regulations and any other relevant (i.e., GSA or Commerce) directive, where such disclosure shall not be used to make determinations about individuals;
8) another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c));
9) the Office of Personnel Management (OPM) for personnel research purposes; and
10) the Office of Management and Budget (OMB) for legislative coordination and clearance.

If you do not furnish the information requested on this form, the USPTO may not be able to process and/or examine your submission, which may result in termination of proceedings, abandonment of the application, and/or expiration of the patent.

Notice of Allowability	Application No. 17/963,170	Applicant(s) Patel, Paresh K.	
	Examiner MATTHEW L HAMILTON	Art Unit 3682	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to November 5, 2023.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 2-21 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some* c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☑ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 11/05/2023.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/MATTHEW L HAMILTON/
Primary Examiner, Art Unit 3682

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under *Ex Parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on November 5, 2023 has been entered.

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Information Disclosure Statement

The Information Disclosure Statement filed on November 5, 2023 has been considered. An initialed copy of the Form 1449 is enclosed herewith.

Allowable Subject Matter

Claims 2-21 are allowed.

The applicant's invention discloses a mobile device with a display, processor(s), and memory: identifies a retail machine configured for wireless communications based on broadcasted information transmitted by the retail machine and including an identifier corresponding to the retail machine; transmits the identifier to a server and receives from the server an electronic communication including a promotional offer for products or services offered by the retail machine; displays the promotional offer; detects selection of a promotional offer; receives a notification from the retail machine that a product or service was provided by the retail machine for a user of the mobile device; transmits confirmation information associated with the notification to the server, receives promotion validation information from the server indicating validation of the promotional offer; and based on the promotion validation information, displays information confirming application of the promotional offer.

Claim 2 is allowed no prior art alone or in combination fails to teach or suggest or otherwise make obvious, all the limitations comprising:

in response to receiving the notification information:

capturing, with a camera or scanner of the mobile device, an image or scan associated with the product provided by the retail machine, the image or scan including a code; and

transmitting to the server via the communications unit of the mobile device the code and the notification information; and

in response to transmitting the code and the notification information to the server:

receiving, via the communications unit, promotion validation information from the server indicating the respective promotional offer has been applied; and

displaying on the display a confirmation that the respective promotional offer has been applied.

Independent claims 20-21 are allowable based on a similar rationale. Dependent claims 3-19 are allowable based on the same rationale as the claims they depend.

The Examiner notes the applicant's invention is directed to patent eligible subject matter under 35 U.S.C. 101. The additional limitations that when considered as an ordered combination demonstrates a technologically rooted solution to a network-centric problem and amounts to 'significantly more' than an abstract idea. Additionally, the claims do not recite the performance of some business practice known from the pre-Internet world with the requirement to perform in on the Internet. The applicant has incorporated the features of a communications unit, mobile device, retail machine, server, processors, scanner, and camera demonstrate the invention is rooted in computer technology. Furthermore, the applicant's specification discloses the following advantages of the invention: "The payment processing system 100 harnesses the connectivity of the mobile device 104 to communicate with the payment module 124, which has neither a dedicated communication connection nor a long-range communication transceiver. As such, the mobile device 124 acts as a relay between the payment module 124 and the server system 108. Furthermore, leveraging the connectivity of the mobile device 104 helps to keep costs down from the point of view of the operator of the automatic retail machine 122." (paragraph 0035) and "After obtaining the product code, the mobile device transmits (1226) the product code to the server. In response to transmitting the product code, the mobile device: receives promotion validation information from the server; and displays the promotion validation information on the display, where the promotion validation information indicates whether the respective promotion offer was validated. In some implementations, the mobile device 104 or a component thereof (e.g., the product code processing module 242, Figure 2) either validates the obtained product code or sends the obtained product code to the server 108 for validation. In some implementations, the mobile device 104 or a component thereof (e.g., the information relaying module

244, Figure 2) sends the transaction completion notification or a portion thereof to the server 108 regardless of whether the user follows the prompt and the mobile device 104 ultimately obtains the product code. In some implementations, the server 108 determines whether conditions for the respective promotional offer have been based on the transaction and the product code. For example, the server 108 determines whether the proper product code was obtained for the respective promotional offer, whether the respective promotional offer has expired, whether the user has fulfilled a buy N items get one free condition, whether the user has fulfilled cross-promotion condition, and/or the like. In some implementations, the offer is validated and applied by the server 108 to the user's account." (paragraph 0136).

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Slick Self-Service Options: As Staffing Remains Lean Grocers are using Advanced Self-Service Checkouts and Kiosk to Augment Customer Service, Grocery Headquarters, 2010

The article is about using self-service checkouts and kiosk to enhance the customer experience.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW L HAMILTON whose telephone number is (571)270-1837. The examiner can normally be reached Monday-Thursday 9:30-5:30 pm EST.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Waseem Ashraf can be reached on (571)270-3948. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To file and manage patent submissions in Patent Center, visit: https://patentcenter.uspto.gov. Visit https://www.uspto.gov/patents/apply/patent-center for more information about Patent Center and https://www.uspto.gov/patents/docx for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/MATTHEW L HAMILTON/
Primary Examiner, Art Unit 3682

Notice of References Cited	Application/Control No. 17/963,170	Applicant(s)/Patent Under Reexamination Patel, Paresh K.	
	Examiner MATTHEW L HAMILTON	Art Unit 3682	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Name	CPC Classification	US Classification
	A					
	B					
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	Slick Self-Service Options: As Staffing Remains Lean Grocers are using Advanced Self-Service Checkouts and Kiosk to Augment Customer Service, Grocery Headquarters, 2010 (Year: 2010)
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in YYYY-MM-DD format are publication dates. Classifications may be US or foreign.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

24341 7590 12/20/2023

Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

EXAMINER	
POINVIL, FRANTZY	
ART UNIT	PAPER NUMBER
3698	

DATE MAILED: 12/20/2023

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/197,070	05/14/2023	Paresh K. Patel	104402-5074-US	5568

TITLE OF INVENTION: METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	03/20/2024

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 40% the amount of undiscounted fees, and micro entity fees are 20% the amount of undiscounted fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via the USPTO patent electronic filing system.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of this issue fee in order not to jeopardize copendency.**

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

24341 7590 12/20/2023
Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via the USPTO patent electronic filing system or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/197,070	05/14/2023	Paresh K. Patel	104402-5074-US	5568

TITLE OF INVENTION: METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	03/20/2024

EXAMINER	ART UNIT	CLASS-SUBCLASS
POINVIL, FRANTZY	3698	705-044000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑Issue Fee ❑Publication Fee (if required)

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via the USPTO patent electronic filing system ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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https://www.govinfo.gov/content/pkg/FR-2013-03-29/pdf/2013-07341.pdf

Routine uses of the information in this record may include disclosure to:

1) law enforcement, in the event that the system of records indicates a violation or potential violation of law;
2) a federal, state, local, or international agency, in response to its request;
3) a contractor of the USPTO having need for the information in order to perform a contract;
4) the Department of Justice for determination of whether the Freedom of Information Act (FOIA) requires disclosure of the record;
5) a Member of Congress submitting a request involving an individual to whom the record pertains, when the individual has requested the Member's assistance with respect to the subject matter of the record;
6) a court, magistrate, or administrative tribunal, in the course of presenting evidence, including disclosures to opposing counsel in the course of settlement negotiations;
7) the Administrator, General Services Administration (GSA), or their designee, during an inspection of records conducted by GSA under authority of 44 U.S.C. 2904 and 2906, in accordance with the GSA regulations and any other relevant (i.e., GSA or Commerce) directive, where such disclosure shall not be used to make determinations about individuals;
8) another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c));
9) the Office of Personnel Management (OPM) for personnel research purposes; and
10) the Office of Management and Budget (OMB) for legislative coordination and clearance.

If you do not furnish the information requested on this form, the USPTO may not be able to process and/or examine your submission, which may result in termination of proceedings, abandonment of the application, and/or expiration of the patent.

Notice of Allowability	Application No. 18/197,070	Applicant(s) Patel, Paresh K.	
	Examiner FRANTZY POINVIL	Art Unit 3698	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to the remarks filed 11/15/2023.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 1-20 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some* c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☑ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/FRANTZY POINVIL/
Primary Examiner, Art Unit 3698

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Allowable Subject Matter

2. The following is an examiner's statement of reasons for allowance:

Claims 1-20 are allowable over the art of record.

Particularly, the prior art taken alone or in combination failed to teach or suggest :

"identifying one or more payment accepting units in proximity to the mobile device that are available to accept payment from a mobile payment application executing or mobile device, the identifying based at least in part on an identifier corresponding to the one more payment accepting units, wherein the one or more payment accepting units are payment operated machines that accept payment for dispensing of products and/or services, displaying a user interface of the mobile payment application on the display mobile device, the user interface being configured to display a visual indication of the one or more payment accepting units and accept user input selecting an available payment accepting unit of the one or more payment accepting units, and after exchanging the information, displaying, on the display, an updated user interface of the mobile payment application to the user of the mobile device", as recited in independent claims 1, 13 and 15.

The above recited limitations provide meaningful limitations that transforms the abstract idea into patent eligible. The claims as a whole effect an improvement to another technology or

technical field. These limitations in combination provide meaningful limitations beyond generally linking the use of the abstract idea to a practical application.

3. The following prior art is deemed relevant but failed to teach or suggest the above noted limitations.

Maeng (US Patent No. 11010759 B1) discloses a system, computer-readable storage medium and method provide a secure transaction by receiving, from a mobile wallet a request to assign a vendor specific payment account identifier (VSPAI) to a payment account identifier (PAI) associated with a user of the mobile wallet. Identifying information is verified of: (i) an issuer of the PAI, (ii) a specific vendor; and (iii) the user of the mobile wallet. In response to verifying, a unique VSPAI is created that is associated with the PAI of the user and the specific vendor. Then, when a payment request is received including the unique VSPAI for a transaction with a particular vendor, the particular vendor is verified as the specific vendor associated with the unique VSPAI. In response to verifying that the particular vendor, payment of the transaction by the issuer using the PAI associated with the unique VSPAI is facilitated.

Giordano (US Pub. No. 20020152123 A1) discloses a method and apparatus for processing retail non-cash transaction at a kiosk or other similar self-service station. A terminal located at the kiosk is similar to online consumer computer 710 except that a product database similar to that found in online merchant computer 734 is stored in the mass storage device. In operation, the customer in merchant store 12 approaches a kiosk in the store, indicates a food, merchandise or service selection, and provides a customer/transmitter ID using input device 920, customer transceiver 50 or a combination of the two. In doing so, the customer has placed an

order for the desired article of food, merchandise or service and simultaneously initiated payment processing. Once the transaction is authorized, a receipt is printed on printer 990 and the purchase is delivered to the customer, either at the kiosk or at another predetermined location.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to FRANTZY POINVIL whose telephone number is (571)272-6797. The examiner can normally be reached on M-Th 7:00AM to 5:30PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Anderson can be reached on 571-270-0508. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/FP/

/FRANTZY POINVIL/
Primary Examiner, Art Unit 3698

November 23, 2023

Notice of References Cited	Application/Control No. 18/197,070	Applicant(s)/Patent Under Reexamination Patel, Paresh K.	
	Examiner FRANTZY POINVIL	Art Unit 3698	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Name	CPC Classification	US Classification
*	A	US-11010759-B1	05-2021	Maeng; Joon	G06Q20/401	1/1
*	B	US-20140279537-A1	09-2014	Cicoretti; Dean L.	G06Q20/40	705/44
*	C	US-20120158528-A1	06-2012	Hsu; Wesley	G06Q20/322	705/16
*	D	US-20020152123-A1	10-2002	Giordano, Joseph	G06Q20/04	705/14.36
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	Mobile payments head to the United States, Mobile Internet 6.10: 1. Information Gatekeepers, Inc., Dialog Accession No. 123850832, October . (Year: 2004).
	V	"During the period 2--5 to 2009, the total number of wireless data connections used for retail applications in Europe can be expected to rise from less than 1 million to around 3 million", M2 PressWire 28 February. (Year: 2006).
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in YYYY-MM-DD format are publication dates. Classifications may be US or foreign.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

24341 7590 11/08/2023

Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

EXAMINER	
OUSSIR, EL MEHDI	
ART UNIT	**PAPER NUMBER**
3685	

DATE MAILED: 11/08/2023

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/893,514	02/09/2018	Paresh K. Patel	104402-5026-US	4668

TITLE OF INVENTION: REFUND CENTERS FOR PROCESSING AND DISPENSING VENDING MACHINE REFUNDS VIA AN MDB ROUTER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	02/08/2024

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 40% the amount of undiscounted fees, and micro entity fees are 20% the amount of undiscounted fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of this issue fee in order not to jeopardize copendency.**

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

24341 7590 11/08/2023
Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/893,514	02/09/2018	Paresh K. Patel	104402-5026-US	4668

TITLE OF INVENTION: REFUND CENTERS FOR PROCESSING AND DISPENSING VENDING MACHINE REFUNDS VIA AN MDB ROUTER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	02/08/2024

EXAMINER	ART UNIT	CLASS-SUBCLASS
OUSSIR, EL MEHDI	3685	705-050000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑ Issue Fee ❑ Publication Fee (if required)

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via Patent Center or EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

❑ Applicant asserting small entity status. See 37 CFR 1.27

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

❑ Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/893,514	02/09/2018	Paresh K. Patel	104402-5026-US	4668

24341 7590 11/08/2023

Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

EXAMINER	
OUSSIR, EL MEHDI	
ART UNIT	PAPER NUMBER
3685	

DATE MAILED: 11/08/2023

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 15/893,514	Applicant(s) Patel et al.	
	Examiner EL MEHDI OUSSIR	Art Unit 3685	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to 10/02/2023.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are See Continuation Sheet . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some* c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☑ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/EL MEHDI OUSSIR/
Primary Examiner, Art Unit 3685

Continuation of 3. The allowed claim(s) is/are: 11,16,18-19 and 21-28

Detailed Action

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

This communication is in response to Applicant's response filed on October 2, 2023 requesting continued examination in response to Examiner's Notice of Allowance filed on July 12, 2023.

The information disclosure statement filed on October 02, 2023 has been considered.

Claims 11, 16, 18-19, and 21-28 are pending. All other claims are cancelled.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114.

Reasons for allowance

Claims 11, 16, 18-19, and 21-28 are allowed.

Applicant's submission an IDS on October 2, 2023 following the notice of allowance filed on July 12, 2023 has been considered. All references do not teach the claim limitations individually or as a whole.

All previous rejections and response to arguments are incorporated entirely herewith.

The claims overcome all objections and rejections.

The claims are novel over prior art because the claims are not obvious in light of the prior art. Although the claims capture different limitations that can be found in various references individually; the limitations as a whole would not be deemed obvious.

Some of the closest art related to the claims include U.S. Patent Application Publication 2015/0235202 to Zabala, U.S. Patent Application Publication 2015/0154579 to Teicher, U.S. Patent 9547859 to Patel et a., and U.S. Patent Application Publication 2016/0086145 to Tsutsui.

Zabala teaches a device in communication with a vending machine to perform cashless payments. A user can utilize a mobile device to establish a connection with the vending machine and purchase a product from the phone and have the vending machine dispense it.

Zabala teaches receiving a request for a cash payment; transmitting the request to an authorizing server distinct from the mobile device; receiving from the authorizing server an authorization message authorizing the cash payment; in response to receiving the authorization message, receiving a user selection of a payment accepting machine distinct from the mobile device; transmitting from the mobile device to the payment accepting machine an electronic command including one or more… payment accepting machine- dependent conditions, wherein a first of the one or more… payment accepting machine-dependent conditions comprises a… button or control at the payment accepting machine must be engaged; Abstract, at least Paragraphs 0004, 0042 and Figures 1, 8, 11, and 16.

Zabala does not explicitly disclose time dependent condition for the transaction; however, a transaction that is completed is understood that it is completed within a predetermined time otherwise the transaction is not processed. Zabala does not specifically disclose that the button must be activated within a predetermined time; however, because Zabala teaches a button is pressed in order to allow for the item to be dispensed, it is understood that said pressing is done within a predetermined time.

U.S. Patent 9,547,859 to Patel el al. is directed to a device with one or more processors, memory, and two or more communication capabilities obtains, from a payment module, an authorization request via a first communication capability (e.g., Bluetooth). The device sends, to a server, the authorization request via a second communication capability distinct from the first communication capability (e.g., cellular or WiFi technology). In response to sending the authorization request, the device obtains, from the server, authorization information via the second communication capability. After obtaining the authorization information, the device detects a trigger condition to perform a transaction with a payment accepting unit associated with the payment module. In response to detecting the trigger condition, the device sends, to the payment module, at least a portion of the authorization information via the first communication capability.

Patel does not teach transmitting from the mobile device to the payment accepting machine an electronic command including one or more time-dependent and payment accepting machine- dependent conditions, wherein a first of the one or more time-dependent and payment accepting machine-dependent conditions comprises a predefined time or time period by which a button or control at the payment accepting machine must be engaged; displaying the one or more

time-dependent and payment accepting machine- dependent conditions on a display of the mobile device; at the payment accepting machine: receiving the electronic command and the one or more time-dependent and payment accepting machine-dependent conditions from the mobile device.

U.S. Patent Application Publication 2016/0086145 to Tsutsui teaches a voucher ticket system and method of use employing a bill validator installed into any suitable automated machine, including an Automated Teller Machine (ATM), a gaming machine, etc. The bill validator is integrated with a bill reader, a voucher ticket reader, a reader for acquisition of electronic voucher ticket information from a portable computing device, a printer, and other supporting peripheral devices. The voucher ticket system includes a secured communication link with a host account manager serving a plurality of electronic money accounts. The method includes steps of receiving a value of electronic money or identification information associated with the electronic voucher ticket with account information associated with the electronic money account and sending the received value of the electronic money or the identification information of the voucher ticket to an upper control section of the one of the gaming machine and the ATM for completion of a financial transaction.

Further searches including non-patent literature and foreign references have been carried out. However, the references found and those cited fail to disclose the claim limitations of claim 11 as a whole. The combination of references to teach the claimed limitations would not have been obvious to one of ordinary skill in the art before the effective filing date of the Application.

The references relied upon throughout prosecution, cited, and the newly cited references fail to disclose:

A method, comprising: at a mobile device:

receiving a request for a cash payment; transmitting the request to an authorizing server distinct from the mobile device;

receiving from the authorizing server an authorization message authorizing the cash payment;

in response to receiving the authorization message, receiving a user selection of a payment accepting machine distinct from the mobile device;

transmitting from the mobile device to the payment accepting machine an electronic command including one or more time-dependent and payment accepting machine- dependent conditions, wherein a first of the one or more time-dependent and payment accepting machine-dependent conditions comprises a predefined time or time period by which a button or control at the payment accepting machine must be engaged;

displaying the one or more time-dependent and payment accepting machine- dependent conditions on a display of the mobile device;

at the payment accepting machine: receiving the electronic command and the one or more time-dependent and payment accepting machine-dependent conditions from the mobile device;

determining that the one or more time-dependent and payment accepting machine-dependent conditions are met, including determining that the button or control at the payment accepting machine has been engaged within the predefined time or time period; and

in response to the determination that the one or more time-dependent and payment accepting machine-dependent conditions are met, issuing the cash payment.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to EL MEHDI OUSSIR whose telephone number is (571)270-0191. The examiner can normally be reached on M-F 9AM - 5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Neha W. Patel can be reached on 571-270-1492. The fax phone number for the organization where this application or proceeding is assigned is 571-270-1191.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Sincerely,

/EL MEHDI OUSSIR/
Primary Examiner, Art Unit 3685
11/03/2023

Notice of References Cited	Application/Control No. 15/893,514	Applicant(s)/Patent Under Reexamination Patel et al.	
	Examiner EL MEHDI OUSSIR	Art Unit 3685	Page 1 of 1

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*	B	US-20100105454-A1	04-2010	Weber; Reid M.	G07F17/32	463/1
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	U	Kevin Werbach. Contracts Ex Machina. https://repository.law.umich.edu/cgi/viewcontent.cgi?article=2936&context=articles (Year: 2017)
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	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT Substitute for Form 1449-PTO				Electronically filed January 25, 2024	
				Application Number	18/197,071
				Filing Date	May 14, 2023
				First Named Inventor	Paresh K. Patel
				Art Unit	3698
				Examiner Name	Frantzy POINVIL
Sheet	1	of	2	Attorney Docket Number	104402-5075-US

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Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published			
		Patel et al., Notice of Allowance, US15/893,514, 08NOV2023, 13 pgs.			
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Examiner Signature		Date Considered	

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				Filing Date	May 14, 2023
				First Named Inventor	Paresh K. Patel
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Examiner Signature		Date Considered	

2017

Contracts *Ex Machina*

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CONTRACTS *EX MACHINA*

KEVIN WERBACH† & NICOLAS CORNELL††

ABSTRACT

Smart contracts are self-executing digital transactions using decentralized cryptographic mechanisms for enforcement. They were theorized more than twenty years ago, but the recent development of Bitcoin and blockchain technologies has rekindled excitement about their potential among technologists and industry. Startup companies and major enterprises alike are now developing smart contract solutions for an array of markets, purporting to offer a digital bypass around traditional contract law. For legal scholars, smart contracts pose a significant question: Do smart contracts offer a superior solution to the problems that contract law addresses? In this article, we aim to understand both the potential and the limitations of smart contracts. We conclude that smart contracts offer novel possibilities, may significantly alter the commercial world, and will demand new legal responses. But smart contracts will not displace contract law. Understanding why not brings into focus the essential role of contract law as a remedial institution. In this way, smart contracts actually illuminate the role of contract law more than they obviate it.

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INTRODUCTION

Technological advancements hold the potential to alter our very conception of the law. It is already common to suggest that technologies can operate as a kind of law, regulating the behavior of users.[1] But, thus far, traditional legal enforcement has generally remained available as a backstop. Is it possible for emerging technologies to displace the law even for enforcement, law's historically essential province? In this Article, we examine a significant contemporary example, digitally enforced "smart contracts"[2] based on the distributed cryptocurrency technology of Bitcoin[3] and the

1. *See generally* LAWRENCE LESSIG, CODE AND OTHER LAWS OF CYBERSPACE (1999) (arguing that "code is law"). This recognition in the legal academy of the constitutive role of technology follows a broader understanding within science and technology studies. *See generally* JULIE E. COHEN, CONFIGURING THE NETWORKED SELF: LAW, CODE, AND THE PLAY OF EVERYDAY PRACTICE (2012) (arguing that legal and technical rules governing flows of information are out of balance); Bruno Latour, *On Technical Mediation–Philosophy, Sociology, Genealogy*, 3 COMMON KNOWLEDGE 29 (1994) (analyzing the role of technological artifacts in modern day culture).

2. A smart contract is an agreement in digital form that is self-executing and self-enforcing. *See infra* note 24 and accompanying text. The term was coined by cryptographer Nick Szabo in the 1990s. *See* Nick Szabo, *Formalizing and Securing Relationships on Public Networks*, FIRST MONDAY (Sept. 1, 1997), http://ojphi.org/ojs/index.php/fm/article/view/548/469 [https://perma.cc/53HK-9D6W].

3. Bitcoin is a digital currency not issued by any bank or sovereign state. Bitcoin first appeared in a paper published online in 2008 by "Satoshi Nakamoto." *See* Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System (2008) (unpublished manuscript), https://

blockchain that facilitates it.[4] Enthusiasts of various stripes believe that smart contracts offer the potential to displace the legal system's core function of enforcing agreements.[5]

It has traditionally been assumed that enforceable agreements—the lifeblood of the modern economic and social world—require the backing of a legal system. Nearly four centuries ago, Thomas Hobbes described the impossibility of binding agreements without the law:

> If a covenant be made, wherein neither of the parties perform presently, but trust one another; in the condition of mere nature (which is a condition of war of every man against every man,) upon any reasonable suspicion, it is void: but if there be a common power set over them both, with right and force sufficient to compel performance, it is not void. For he that performeth first, has no assurance the other will perform after, because the bonds of words are too weak to bridle men's ambition, avarice, anger, and other passions, without the fear of some coercive power . . . .
>
> But in a civil estate, where there a power set up to constrain those that would otherwise violate their faith . . . he which by the covenant is to perform first, is obliged so to do.[6]

Hobbes's basic idea—that binding agreements require a system to ensure that counterparties can trust one another to perform—is an

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bitcoin.org/bitcoin.pdf [https://perma.cc/B777-M9F5]. Cryptocurrency is the more general term for currency-like tokens, like Bitcoin, that are secured through cryptography rather than traditional means.

4. A blockchain is a distributed ledger of transactions like the one created for Bitcoin. *See id.* ("We define an electronic coin as a chain of digital signatures."). Every node in a blockchain network verifiably sees the same transaction record, even though there is no master copy. Bitcoin uses this platform for a currency, with the ledger guaranteeing that the same coin cannot be spent twice. Smart contracts use blockchains to generalize the approach to any digitally expressible transaction.

5. *See* Matt Byrne, *Do Lawyers Have a Future?*, LAW. (Sept. 20, 2016), https://www.thelawyer.com/issues/online-september-2016/do-lawyers-have-a-future-2 [https://perma.cc/H2P4-BC94] ("Numerous futurists predict that smart contracts, using the developing technologies of blockchain and less strict coding languages, will result in contracts being written as immutable code on private blockchains, humming along harmoniously and self-executing and self-regulating."); Alan Cunningham, *Decentralisation, Distrust & Fear of the Body–The Worrying Rise of Crypto-Law*, SCRIPTED 237 (Dec. 2016), https://script-ed.org/wp-content/uploads/ 2016/12/13-3-cunningham.pdf [https://perma.cc/PAP2-VWVA] ("It is suggested that that the use of a blockchain . . . will guarantee the enforceability element of such transactions, without any need for . . . trust in the law as a reliable social praxis.").

6. THOMAS HOBBES, LEVIATHAN 91 (Oxford Univ. Press 1996) (1651). *See generally* Anthony T. Kronman, *Contract Law and the State of Nature*, 1 J.L. ECON. & ORG. 5 (1985) (examining the possibilities for assurance without state-imposed enforcement).

intuitive and powerful argument for the essential role of the law.[7]

Yet recent technological advances have led to speculation that smart contracts might largely, or entirely, displace the apparatus of contract law.[8] As one commentator succinctly puts this radical claim, "[s]mart contracts don't [need] a legal system to exist: they may operate without any overarching legal framework. De facto, they represent a technological alternative to the whole legal system."[9] Mainstream legal trade journals wonder whether "innovations offered by the Bitcoin 2.0 generation of technology may create a world where . . . technology renders some contract causes of action obsolete."[10] Even world leaders have taken notice, like Russian Prime Minister Dmitry Medvedev, who declared that "[s]mart [c]ontracts represent [a] new challenge to legal regulation. Systems creating such contracts live by their own rules, beyond the boundaries of law."[11] In short, smart contracts may offer the hope—or possibly the threat—of circumventing Hobbes's age-old essential role for the law.

The reaction to these new possibilities runs the gamut, from gleeful triumph to killjoy skepticism. Supporters claim smart contracts

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7. *Cf.* Arthur Ripstein, *Private Order and Public Justice: Kant and Rawls*, 92 VA. L. REV. 1391, 1418 (2006) ("Private enforcement is not merely inconvenient: it is inconsistent with justice because it is ultimately the rule of the stronger.").

8. *See* DON TAPSCOTT & ALEX TAPSCOTT, BLOCKCHAIN REVOLUTION: HOW THE TECHNOLOGY BEHIND BITCOIN IS CHANGING MONEY, BUSINESS, AND THE WORLD 47 (2016) ("Smart contracts are unprecedented methods of ensuring contractual compliance, including social contracts."); Byrne, *supra* note 5; Cunningham, *supra* note 5, at 254; Rob Marvin, *Blockchain in 2017: The Year of Smart Contracts*, PCMAG (Dec. 12, 2016), http://www.pcmag.com/article/350088/blockchain-in-2017-the-year-of-smart-contracts [https://perma.cc/2K96-PVVR] (quoting Jeff Garzik, Linux Board member, as saying that smart contracts will offer "adjudication-as-a-service," which will be "a hyper real-time version of the court system").

9. Alexander Savelyev, *Contract Law 2.0: «Smart» Contracts as the Beginning of the End of Classic Contract Law* 21 (Nat'l Research Univ. Higher Sch. of Econ., Working Paper No. BRP 71/LAW/2016, 2016), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2885241 [https://perma.cc/HS7F-PF3W].

10. Andrew Hinkes, *Blockchains, Smart Contracts, and the Death of Specific Performance*, INSIDE COUNSEL (July 29, 2014), http://www.insidecounsel.com/2014/07/29/blockchains-smart-contracts-and-the-death-of-speci [https://perma.cc/6FSQ-TT47]; *see also* Byrne, *supra* note 5 ("Numerous futurist predict that smart contracts, using the developing technologies of blockchain and less strict coding languages will result in contracts being written as immutable code on private blockchains, humming along harmoniously and self-executing and self-regulating. All of a sudden, the disruption we have seen in other sectors is knocking at our own doors. But, we need not panic. At least, not yet.").

11. Savelyev, *supra* note 9, at 15 (citing Dmitry Medvedev, Vystupleniye Dmitriya Medvedeva na plenarnom zasedanii [Speech of Dmitry Medvedev on Plenary Session], Saint Petersburg International Legal Forum (May 18, 2016)).

will obviate the need for contract law, revolutionize business arrangements, and restructure property ownership.[12] Skeptics see the blockchain foundation as little more than a Ponzi scheme.[13] Some technologists argue that, despite their name, smart contracts have nothing to do with contracts.[14] One group conspicuously absent from the debate over smart contracts is contract law scholars.

Upon inspection, the story is complex. Smart contracts may or may not transform the world, but they provide real benefits and seem likely to enjoy significant adoption over time. They represent the mature end of the evolution of electronic agreements over several decades.[15] Firms can achieve significant cost savings and efficiency gains when using computers to automate contracting.[16] Smart contracts

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12. *See, e.g.*, ARVIND NARAYANAN ET AL., BITCOIN AND CRYPTOCURRENCY TECHNOLOGIES 2 (2016) ("Optimists claim that Bitcoin will fundamentally alter payments, economics, and even politics around the world."); NORTON ROSE FULBRIGHT LLP, CAN SMART CONTRACTS BE LEGALLY BINDING CONTRACTS? 2 (2016), http://www.nortonrosefulbright.com/knowledge/publications/ 144559/can-smart-contracts-be-legally-binding-contracts [https://perma.cc/SKV7-Z8P8] (quoting R3 consortium CEO David Rutter stating that "smart contracts . . . will set the scene for the next twenty years of finance"); *Not-So-Clever Contracts*, ECONOMIST (July 30, 2016), https://www.economist.com/news/business/21702758-time-being-least-human-judgment-still-better-bet-cold-hearted [https://perma.cc/E6WR-TKLH] ("Such 'smart contracts' are all the rage among futurist backers of the blockchain, the technology that underpins bitcoin, a digital currency.").

13. A Ponzi scheme is a form of investment fraud in which earlier investors are paid returns out of funds contributed by new investors, rather than from actual profits. *See Fast Answers: Ponzi Schemes*, U.S. SEC. & EXCHANGE COMMISSION (Oct. 9, 2013), https://www.sec.gov/fast-answers/answersponzihtm.html [https://perma.cc/BFB6-4T8C]. Critics argue that the value of Bitcoin depends on a steady stream of new purchasers willing to buy the digital currency at higher prices, even though earlier purchasers (seeking investment returns) do not actually use it to buy anything, eventually causing a collapse. *See* Matt O'Brien, *Bitcoin Isn't the Future of Money—It's Either a Ponzi Scheme or a Pyramid Scheme*, WASH. POST: WONKBLOG (June 8, 2015), http://www.washingtonpost.com/blogs/wonkblog/wp/2015/06/08/bitcoin-isnt-the-future-of-money-its-either-a-ponzi-scheme-or-a-pyramid-scheme/ [https://perma.cc/7BRH-Y7VE]; Eric Posner, *Fool's Gold*, SLATE (Apr. 11, 2013, 11:11 AM) http://www.slate.com/articles/news_and_politics/view_from_chicago/2013/04/bitcoin_is_a_ponzi_scheme_the_internet_currency_will_collapse.html [https://perma.cc/NQ8R-77ZB]; *see also* Ferdinando Ametrano, *Why 2017 Will Prove 'Blockchain' Was a Bad Idea,* COINDESK (Jan. 4, 2017), http://www.coindesk.com/2017-will-prove-blockchain-bad-idea [https://perma.cc/4HCX-PGX9] ("Probably some smart contract hype will clutter the debate, thanks to the smartest ones among the fools trying to outsmart even the smart contract inventor.").

14. *See, e.g.*, *Explainer: Smart Contracts*, MONAX, https://monax.io/explainers/smart_contracts [https://perma.cc/45AT-KUEF] ("To begin with, smart contracts are neither particularly smart nor are they, strictly speaking, contracts.").

15. *See generally* Harry Surden, *Computable Contracts*, 46 U.C. DAVIS L. REV. 629 (2012) (describing the development of data-oriented and computable digital contracts).

16. *See, e.g.*, JAMES SCHNEIDER ET AL., GOLDMAN SACHS, BLOCKCHAIN: PUTTING THEORY INTO PRACTICE (2016), https://www.scribd.com/doc/313839001/Profiles-in-Innovation-

could greatly extend those benefits, by taking advantage of Bitcoin and the blockchain as open platforms for secure exchange of value without mutual trust.[17] As they are adopted, or used in lieu of traditional contracting, smart contracts will force courts, legislatures, and other legal actors to confront difficult questions about the application of basic contract doctrines.

They will not, however, replace contract law. While smart contracts can meet the doctrinal requirements of contract law,[18] they serve a fundamentally different purpose. Contract law is a remedial institution. Its aim is not to ensure performance ex ante, but to adjudicate the grievances that may arise ex post.[19] Smart contracts bring this core function of contract law into sharper relief, as they eliminate the act of remediation by admitting no possibility of breach.[20] But, the needs that gave rise to contract law do not disappear. If the parties do not or cannot represent all possible outcomes of the smart contract arrangement ex ante, the results may diverge from their mutual intent. The parties' expression may also not produce legally sanctioned outcomes, as in the case of duress, unconscionability, or illegality. Promise-oriented disputes and grievances will not disappear, but their complexions will shift. In such scenarios, either the parties or the state will seek to reintroduce the machinery of contractual adjudication. Once one properly appreciates what is—and what is not—the function of contract law, it becomes evident that the reports of its death are "greatly exaggerated."[21]

May-24-2016-1https://www.scribd.com/doc/313839001/Profiles-in-Innovation-May-24-2016-1 [https://perma.cc/WP5P-JPZF] (identifying several ways to use blockchain-based smart contracts which could save billions of dollars per year).

17. *See generally* Kevin Werbach, *Trust, But Verify: Why the Blockchain Needs the Law*, 32 BERKELEY TECH. L.J. (forthcoming 2018) (conceptualizing the blockchain as a new architecture for trust).

18. *See infra* Part II.A.

19. *Cf.* RESTATEMENT (SECOND) OF CONTRACTS ch. 16, intro. note (AM. LAW INST. 1981) ("The traditional goal of the law of contract remedies has not been compulsion of the promisor to perform his promise but compensation of the promisee for the loss resulting from breach."); Nicolas Cornell, *A Complainant-Oriented Approach to Unconscionability and Contract Law*, 164 U. PA. L. REV. 1131, 1164 (2016) ("[C]ontract law provides a legal remedy to those who have complaints arising out of broken agreements. It is purely retrospective; it concerns the relations that occur once something impermissible is done.").

20. *See* Hinkes, *supra* note 10.

21. Though now part of popular culture, the familiar turn of phrase attributed to Mark Twain appears to be a slight misquotation. Twain's original comment was "the report of my death was an exaggeration." SHELLEY FISHER FISHKIN, LIGHTING OUT FOR THE TERRITORY: REFLECTIONS ON MARK TWAIN AND AMERICAN CULTURE 134 (1996).

The remainder of this Article unfolds as follows. In Part I, we describe the history and operation of smart contracts. In Part II, we evaluate smart contracts, which have been undertheorized so far, by asking how existing legal categories might apply to smart contracts. In Part III, we consider whether smart contracts can serve as a substitute for contract law. We answer this question in the negative, by analyzing the larger question of what contract law is for. In Part IV, we consider likely responses to the practical and doctrinal questions we raise. Surprisingly for the libertarian proponents of smart contracts, they may force the expansion of public law into the private law preserve of contracts.[22] The only way to prevent serious negative outcomes from smart contracts may be for governments to regulate them.

I. CONTRACTS GET SMART

The cryptographer Nick Szabo defined a smart contract as "a set of promises, specified in digital form, including protocols within which the parties perform on these promises."[23] By using "a set of promises," Szabo left open whether a smart contract was enforceable as a legal contract.[24] We consider this question below.[25] Szabo's reference to "protocols within which" parties perform is similarly coy. Smart contracts do not just specify these protocols; they actually implement them. Szabo's definition has not been universally adopted, and subsequent authors offer subtly varied descriptions of the term. For

22. *See, e.g.*, Aaron Wright & Primavera de Filippi, Decentralized Blockchain Technology and the Rise of *Lex Cryptographia* 4 (Mar. 12, 2015) (unpublished manuscript), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2580664 [https://perma.cc/RQR3-VJCZ] (suggesting that "[i]f blockchain technology becomes more widely adopted, centralized authorities, such as governmental agencies and large multinational corporations, may lose the ability to control and shape the activities of disparate people through existing means").

23. Nick Szabo, *Smart Contracts: Building Blocks for Digital Markets*, U. AMSTERDAM (1996), http://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart_contracts_2.html [https://perma.cc/YC35-2MXQ]. Max Raskin uses a simpler definition: "agreements wherein execution is automated, usually by computers." Max Raskin, *The Law and Legality of Smart Contracts*, 1 GEO. L. TECH. REV. 305, 306 (2017); *see also* Josh Stark, *Making Sense of Blockchain Smart Contracts*, COINDESK (June 4, 2016, 6:39 PM), http://www.coindesk.com/making-sense-smart-contracts [https://perma.cc/533S-JUAJ] ("Many debates about the nature of smart contracts are really just contests between competing terminology.").

24. Other authors on the topic include the word "contract" in their definitions. For example, Wright and de Filippi define smart contracts as "digital, computable contracts where the performance and enforcement of contractual conditions occur automatically, without the need for human intervention." *See* Wright & de Filippi, *supra* note 22, at 10–11.

25. *See infra* Part II.A.

purposes of this Article, we define a smart contract as an agreement in digital form that is self-executing and self-enforcing.[26]

In this Part, we examine the history and workings of smart contracts. Smart contracts represent the fusion of two lines of technological development: electronic contracting and cryptography. Smart contracts were first theorized and named two decades ago, but significant interest in, and implementation of, smart contracts has occurred only recently. Smart contracts could represent merely the latest step the evolution of electronic agreements, or, smart contracts' use of blockchain technology could distinguish them from any of their antecedents.

A. The Evolution of Digital Agreements

Thanks to their speed and power, computers have taken over many forms of human interaction over the past half century. Email and instant messages substitute for letters and phone calls, accountants use spreadsheets and enterprise resource planning software rather than paper ledgers, and travelers use online ticketing systems rather than going to a travel agent—to give just a handful of examples. This automation has had major impacts on employment, the conduct of business, and social interactions. In many cases, it has raised significant legal and policy questions. The realm of contracting has not been immune.

Contractual agreements embodied in software code, and even their automatic performance, are nothing new.[27] For several decades, larger corporations have used electronic data interchange (EDI) formats to communicate digitally across supply chains.[28] The internet brought electronic commerce (e-commerce) to ordinary consumers, who accede to a digital contract every time they begin a relationship with an online service provider by clicking a button.[29] Despite its digital

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26. In addition to execution and enforcement, smart contract–related technologies could support the full range of contractual activity, including precontractual negotiation, contract formation, and postcontractual modification. *See, e.g.*, OPENLAW, http://openlaw.io [https://perma.cc/D8EZ-D5PW] (offering tools to "[c]reate, store, and execute legal agreements that interact with blockchain-based smart contracts."). We explain the centrality of enforcement to smart contracts below at Part I.C.

27. *See* Surden, *supra* note 15, at 634.

28. EDI, which has been around since the 1970s, refers generally to automated digital communications between or within firms, much of which goes beyond the bounds of contracting language. *See* JANE K. WINN & BENJAMIN WRIGHT, LAW OF ELECTRONIC COMMERCE § 5-09 (4th ed. 2001) (describing EDI); Surden, *supra* note 15, at 639 n.30.

29. *See* Brett Frischmann & Evan Selinger, *Engineering Humans with Contracts* 8 (Benjamin

costume, this sort of electronic contract is still a written agreement—while it is electronic in *form*, its substance and execution are still dependent on humans. A user who clicks the hyperlink to read the terms of service for Facebook or Amazon.com would then see a document that spells out the contractual terms. Courts apply contract law to such agreements in the same way as to a paper document. The major doctrinal question raised here is acceptance, because most consumers barely realize the existence of, let alone read, the contractual text; that said, courts have little difficulty disposing of this objection.[30]

The step beyond an electronic contract is what Professor Harry Surden labels a "data-oriented" contract. In these contracts, "the parties have expressed one or more terms or conditions of their agreement in a manner designed to be processable by a computer system."[31] The distinction here is that the primary audience for the contract is a machine rather than a human.[32] For example, a financial option contract may grant the right to purchase a stock at a given price, and expire on a certain date. A data-oriented contract would represent that arrangement in computer code. A brokerage house could then, if the conditions are met, direct its computer system to transfer the security to the buyer's account and debit the correct sum.

The next stage in Surden's typology is a "computable" contract.[33] It gives the computer systems that implement data-oriented contracts the power "to make automated, *prima-facie* assessments about compliance or performance."[34] In the option contract example above,

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N. Cardozo Sch. of Law, Faculty Research Paper No. 493, 2016), https://papers.ssrn.com/sol3/papers2.cfm?abstract_id=2834011 [https://perma.cc/VEE3-BU99].

30. *See* Hill v. Gateway 2000, Inc., 105 F.3d 1147, 1149 (7th Cir. 1997); ProCD, Inc. v. Zeidenberg, 86 F.3d 1447, 1452–53 (7th Cir. 1996). Courts have been willing to find the requisite evidence of acceptance lacking based on particular facts. *See, e.g.*, Specht v. Netscape Commc'ns Corp., 306 F.3d 17, 35 (2d Cir. 2002).

31. Surden, *supra* note 15, at 639.

32. In fact, the term is even more limited. *See id.* at 640 ("The data-oriented label simply suggests that the parties have decided that *some* subset of key terms or conditions would benefit from being represented as computer processable data." (emphasis in original)).

33. Professor Lauren Henry Scholz applies a different typology of "algorithmic" contracts, defined as those "that contain terms that were determined by algorithm rather than a person." Lauren Henry Scholz, *Algorithmic Contracts*, 20 STAN. TECH. L. REV. (forthcoming 2017) (manuscript at 12), https://ssrn.com/abstract=2747701 [https://perma.cc/64Z5-NNRD]. Scholz's focus is on formation. We believe the degree to which execution and enforcement are automated is the critical variable for thinking about smart contracts, with algorithmic formation raising its own set of issues.

34. *See* Surden, *supra* note 15, at 636.

the brokerage house computer system itself could evaluate whether the price and timing of a proposed purchase met the terms of the option. The requirements for a computable contract are that the semantics—the meaning of the contractual terms—can be expressed through a set of instructions or logic that a computer can process, and that any data necessary for that computation are available in digital form.[35] Giving machines the ability to determine whether a contract has been performed can dramatically reduce transaction costs.[36] Although there are significant challenges in accurately representing and interpreting contractual semantics in computer form, finance and similar fields employ computable contracts widely.[37]

The evolution from electronic, to data-oriented, to computable contracts embodies a trend toward greater machine autonomy. As computers can increasingly replace humans in negotiating, forming, performing, and enforcing contracts, contracts can increasingly operate with the speed and consistency of machines. Further, computable contracts can enable machines to contract automatically with one another, although such autonomous operation is still relatively limited.[38]

The limitation of computable contracts is that the computers involved can only make prima facie determinations about performance.[39] The legal system and other traditional mechanisms remain available to the parties if they are unsatisfied with the results of automated systems.[40] The contract is designed to be computable, but if the computation diverges from the parties' intent, as conventionally understood in contract law, they may disregard the computerized

35. *See id.* at 664.

36. *See id.* at 689–95.

37. *See id.* at 634.

38. *See id.* at 695.

39. *See id.* at 637 n.25.

40. Surden's article, which appeared in 2012, makes no reference to smart contracts or the blockchain. More recently, Flood and Goodenough show formally that financial contracts can be represented as finite-state machines, which are subject to computational interpretation. *See* Mark D. Flood & Oliver R. Goodenough, *Contract as Automaton: The Computational Representation of Financial Agreements passim* (Office of Fin. Research, Working Paper No. 15-04, 2015), http://ssrn.com/abstract=2538224 [https://perma.cc/9ZJF-9AT9]. However, Flood and Goodenough similarly fail to discuss the implications of implementing these formalized agreements as smart contracts. *Id.*; *see also* Cristian Prisacariu & Gerardo Schneider, *A Formal Language for Electronic Contracts*, *in* FORMAL METHODS FOR OPEN OBJECT-BASED DISTRIBUTED SYSTEMS 174–89 (Marcello M. Bonsangue & Einar Broch Johnsen eds., 2007) (proposing a formal language for writing electronic contracts).

result.[41]

In 1996, Szabo began to publish a series of articles and blog posts outlining the functions and technical requirements for what he labeled "smart contracts."[42] Szabo's starting point was that "protocols, running on public networks such as the Internet, both challenge and enable us to formalize and secure new kinds of relationships in this new environment, just as contract law, business forms, and accounting controls have long formalized and secured business relationships in the paper-based world."[43] He suggested that "[t]he contractual phases of search, negotiation, commitment, performance, and adjudication . . . can be embedded in [] hardware and software."[44] Many of those functions were already being implemented electronically at the time, or would be soon with the rise of e-commerce.[45] The visionary aspect of Szabo's concept was that hardware and software *alone* would handle the full lifecycle of contractual activity. Human action could be completely replaced in various parts of contractual exchange.

Szabo's smart contracts did not require fancy technology. His primary example was the humble vending machine.[46] The simple electronic mechanism of a vending machine performs two critical functions. First, it directly effectuates performance by taking in money and dispending products. Second, it incorporates enough security to make the cost of breach (breaking into the machine) exceed the potential rewards.[47] For all practical purposes, the vending machine is

41. In some circumstances, those harmed by failures of computerized agreements may ultimately be held responsible for their mistake. *See, e.g.*, David Z. Morris, *Computer Error Costs T. Rowe Price $190 Million in Dell Buyout Settlement*, FORTUNE (June 4, 2016), http://fortune.com/2016/06/04/computer-error-t-rowe-price-dell/ [https://perma.cc/H3UZ-ZBSQ] (noting that T. Rowe Price was not entitled to settlement proceeds because a computerized system mistakenly voted its shares in favor of an acquisition that the firm publicly opposed). In such situations, however, the aggrieved party is still entitled to its day in court.

42. *See* Szabo, *supra* note 2; Szabo, *supra* note 23; Nick Szabo, *The Idea of Smart Contracts* (1997), http://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOT winterschool2006/szabo.best.vwh.net/smart_contracts_idea.html [https://perma.cc/XF47-62RC]; Nicholas J. Szabo, Presentation for Keynote Address at the IEEE International Workshop on Electronic Contracting: Smart Contracts (July 6, 2004), http://w-uh.com/download/ WECSmart Contracts.pdf [https://perma.cc/6HQU-EYR5]. The exact introduction date of the concept is uncertain; Szabo stated that he had been refining the idea of smart contracts since "the early 1990s." Szabo, *supra* note 2, at n.1.

43. Szabo, *supra* note 2.

44. *Id.*

45. *See* WINN & WRIGHT, *supra* note 28 (discussing EDI systems that firms have used since the 1970s to automate contractual transactions and other communications).

46. *See* Szabo, *supra* note 2.

47. *See id.*

the entire contractual environment for its transactions. It is not limited to the prima facie decisions of Surden's computable contracts, because its performance of the contract is effectively final.[48]

Szabo's vision, the full automation of forming and performing contracts, was ahead of its time. His work, and similar ideas by others, were recognized within the community of "cypherpunks" who design technical mechanisms to ensure security and privacy without reliance on governments.[49] However, these ideas remained largely isolated from the e-commerce world.[50]

B. Bitcoin and the Blockchain

The development that made Szabo's vision of smart contracts more than a mere curiosity was Bitcoin, a digital currency not reliant on governments, banks, or other intermediary institutions.[51] Since it appeared in a mysterious 2008 post by the pseudonymous Satoshi Nakamoto,[52] Bitcoin has provoked intense interest. Less than a decade after publication of Nakamoto's paper, Bitcoin has spawned an entire ecosystem of developers, entrepreneurs, investors, traders, and analysts, working toward a vision of technologically enabled economic and social transformation.[53] Over one hundred thousand firms, including major companies such as Microsoft, Dell Computer, Dish Network, Time Inc., and Overstock.com, accept Bitcoin-denominated transactions,[54] and the nominal value of Bitcoins in circulation

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48. If the vending machine fails to perform the contract, such as when the product becomes stuck and is not dispensed to the customer, a remedy outside the machine may be available.

49. *See* Nathaniel Popper, *Decoding the Enigma of Satoshi Nakamoto and the Birth of Bitcoin*, N.Y. TIMES (May 15, 2015), http://www.nytimes.com/2015/05/17/business/decoding-the-enigma-of-satoshi-nakamoto-and-the-birth-of-bitcoin.html [https://perma.cc/G4UE-QU4L]; Benjamin Wallace, *The Rise and Fall of Bitcoin*, WIRED (Nov. 23, 2011, 2:52 PM), https://www.wired.com/2011/11/mf_bitcoin/ [https://perma.cc/7XAK-A8GY].

50. *See* Wright & de Filippi, *supra* note 22, at 10 ("[Blockchain] technology has breathed life into a theoretical concept [of smart contracts that Szabo] first formulated in 1997.").

51. As described below in this Section, Bitcoin is technically a specific implementation of blockchain-based cryptocurrencies, or more precisely, the currency token associated with that implementation. Smart contracts, the focus of this Article, may be implemented on the Bitcoin blockchain or other blockchains.

52. *See* Nakamoto, *supra* note 3. The identity of the person or persons who authored the paper remains unknown. *See* Popper, *supra* note 49.

53. *See generally* NATHANIEL POPPER, DIGITAL GOLD: BITCOIN AND THE INSIDE STORY OF THE MISFITS AND MILLIONAIRES TRYING TO REINVENT MONEY (2015) (surveying the burgeoning Bitcoin community).

54. *See State of Bitcoin 2015: Ecosystem Grows Despite Price Decline*, COINDESK (Jan. 7, 2015), http://www.coindesk.com/state-bitcoin-2015-ecosystem-grows-despite-price-decline [https://perma.cc/KYV3-7S8J].

exceeded $110 billion in early November 2017.[55] Venture capitalists have funded scores of Bitcoin-based startups, investing over $1 billion so far.[56] Most of the world's largest financial services firms are exploring or implementing related technologies. Legal scholars are beginning to take notice as well.[57]

The core attribute of Bitcoin is that it allows unrelated individuals and organizations to have confidence in transactions without trusting intermediaries or a legal system.[58] A currency requires trust because buyers and sellers must believe that the tokens they exchange for assets of value will themselves have value. A one hundred dollar bill without the "full faith and credit" of the United States of America is just a piece of paper featuring a green portrait of Benjamin Franklin. Bitcoin supplies a mechanism of trust that does not require the backing of any trusted institution or government. And that same mechanism can be employed for other kinds of transactions.

To supply this mechanism, Bitcoin uses a technology called "distributed ledgers."[59] A distributed ledger allows any number of computers to keep an identical record of information, without reference to a central master copy—indeed, no master copy exists.[60] This allows Bitcoin users to be confident that the same user cannot spend the same digital coin multiple times, but that turns out to be just one of many ways to use distributed ledgers. Developers and

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55. *See Market Capitalization*, BLOCKCHAIN (2017), https://blockchain.info/charts/market-cap [https://perma.cc/63GA-DENX].

56. *See* Garrick Hileman, *State of Blockchain Q1 2016: Blockchain Funding Overtakes Bitcoin*, COINDESK (May 11, 2016), http://www.coindesk.com/state-of-blockchain-q1-2016/ [https://perma.cc/6K7J-D5S8].

57. *See generally* Joshua A.T. Fairfield, *BitProperty*, 88 S. CAL. L. REV. 805 (2015) (discussing "smart property" built on the foundation of smart contracts); Raskin, *supra* note 23 (evaluating smart contracts as a form of contractual self-help); Wright & de Filippi, *supra* note 22 (considering the implications of the blockchain and smart contracts as a new kind of law).

58. Pete Rizzo, *VC Fred Wilson: Block Chain Could Be Bigger Opportunity than Bitcoin,* COINDESK (May 5, 2014), http://www.coindesk.com/vc-fred-wilson-block-chain-bigger-opportunity-bitcoin [https://perma.cc/AW62-C74H]; Rob Wile, *Satoshi's Revolution: How the Creator of Bitcoin May Have Stumbled onto Something Much, Much Bigger*, BUS. INSIDER (Apr. 22, 2014), http://www.businessinsider.com/the-future-of-the-blockchain-2014-4 [https://perma.cc/9KFD-4XP2].

59. Strictly speaking, not all distributed ledgers aggregate transactions into chains of blocks. However, "the blockchain" is commonly used to describe all similar systems.

60. *See* Hal Hodson, *Bitcoin Moves Beyond Mere Money*, NEW SCIENTIST (Nov. 20, 2013), http://www.newscientist.com/article/dn24620-bitcoin-moves-beyond-mere-money.html#.VZmDmqa-uf4 [https://perma.cc/MUX8-S7M2]; *Blockchain: The Next Big Thing–Or Is It?*, ECONOMIST (May 9, 2015), http://www.economist.com/news/special-report/21650295-or-it-next-big-thing [https://perma.cc/JZ29-CTF5].

entrepreneurs are actively working on applying this technology to cloud file storage;[61] ridesharing;[62] name registration (as for the internet's Domain Name System);[63] crowdfunding;[64] device management for the Internet of Things;[65] online voting;[66] verification of ownership and time-stamping for digital documents;[67] prediction markets;[68] and even establishing the provenance of wine.[69]

There are three primary elements to the Bitcoin architecture: the ledger, the network, and consensus. These three elements combine to create a mechanism for ensuring trustworthiness without requiring trust in any particular institution or agent.[70] That means users can have confidence that a transaction on the network is legitimate, accurate, and not duplicated.

The first element, the distributed ledger of transactions, is commonly called the blockchain.[71] This database grows as it steadily incorporates new approved transactions. A Bitcoin transaction is a cryptographically signed[72] statement on the blockchain transferring

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61. *See, e.g.*, MAIDSAFE, http://maidsafe.net [https://perma.cc/VYK3-GZ6L]; STORJ, http://storj.io/ [https://perma.cc/AT8D-68UM].

62. *See* Amanda Johnson, *La'Zooz: The Decentralized Proof-of-Movement "Uber" Unveiled*, COINTELEGRAPH (Oct. 19, 2014), http://cointelegraph.com/news/112758/lazooz-the-decentralized-proof-of-movement-uber-unveiled [https://perma.cc/8HRX-DUYP].

63. *See, e.g.*, NAMECOIN, https://namecoin.info [https://perma.cc/SE6M-AEAX].

64. *See, e.g.*, BLOCKTRUST, https://blocktrust.org [https://perma.cc/5NGX-HMWS].

65. *See* Paul Brody & Veena Pureswaran, *Device Democracy: Saving the Future of the Internet of Things*, IBM *passim* (2015), http://public.dhe.ibm.com/common/ssi/ecm/gb/en/gbe03620usen/GBE03620USEN.PDF [https://perma.cc/XC4G-3ZFF].

66. *See* Danny Bradbury, *How Block Chain Technology Could Usher in Digital Democracy*, COINDESK (June 16, 2014, 11:05 PM), http://www.coindesk.com/block-chain-technology-digital-democracy [https://perma.cc/X4RL-CTJM].

67. *What is Proof of Existence?*, PROOF OF EXISTENCE, http://www.proofofexistence.com/about [https://perma.cc/ZF9Q-TWUZ].

68. Jack Peterson & Joseph Krug, Augur: A Decentralized, Open-Source Platform for Prediction Markets *passim* (2015) (unpublished manuscript), https://bravenewcoin.com/assets/Whitepapers/Augur-A-Decentralized-Open-Source-Platform-for-Prediction-Markets.pdf [https://perma.cc/XV6G-GM3W].

69. *The Future of Wine Provenance Is Bitcoin*, VINFOLIO BLOG (Oct. 6, 2014), http://blog.vinfolio.com/2014/10/06/the-future-of-wine-provenance-is-bitcoin [https://perma.cc/W4BX-82P7].

70. *See generally* Werbach, *supra* note 17 (describing the "trustless trust" architecture).

71. *See* Fairfield, *supra* note 57, at 808.

72. A cryptographic signature is a secure means of verifying authenticity. It verifies that the transaction was authorized by the possessor of a private key, without actually distributing the key. With this approach, Bitcoin transactions can be quasi-anonymous. They are associated with a particular account, so it is often possible to correlate multiple transactions with the same account holder, but no identifying information about the account holder needs to be provided on the

Bitcoin tokens between two or more cryptographic private keys. These transactions are grouped together into blocks, with a new block appended approximately every ten minutes.[73] Every block contains an abbreviated reference, called a cryptographic hash, to the block before it, which keeps the blocks in the proper order. Anyone can view a Bitcoin's blockchain, and trace back transactions all the way to the original "genesis block" created by Nakamoto.[74] In theory, no one can alter an existing transaction, because every block is linked in an immutable sequence.[75]

The second element is the network. The blockchain is not stored in one central location.[76] Instead, computer nodes running the Bitcoin software connect in a peer-to-peer (P2P) network, where each maintains a complete copy of the blockchain. Every transaction is broadcast across the network to all nodes, which then add valid blocks to the blockchain on a regular basis.[77] Individual consumers do not need to operate a full node; they can use third-party wallet services to host their Bitcoins and connect to a service provider on the Bitcoin network.[78]

The final element, consensus, is perhaps the least intuitive aspect of Bitcoin,[79] but perhaps its most significant innovation. Decentralized trust systems are difficult because participants to a transaction may be untrustworthy, and without the involvement of a trusted central institution like a bank, parties face increased risk that the other will not comply with the agreement. Especially when there is a financial incentive to cheat or lie, some actors can be expected to do so. If there

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blockchain. And therefore, unlike traditional financial transactions where the parties may not know identities but some intermediaries, like banks, do, the actual identity of those transacting may be effectively impossible to determine.

73. J. DAX HANSEN, JACOB FARBER & PATRICK MURCK, PERKINS COIE LLP, BITCOIN: A PRIMER 2–4, https://www.perkinscoie.com/images/content/1/4/v2/14394/Bitcoin-Primer.pdf [https://perma.cc/6AWT-Z6T2]. Some distributed ledger systems use data structures other than blockchains, but the basic approach is similar.

74. Making the ledger public enhances trust because no one can hide or lie about the status of any transaction. Permissioned blockchains, which are limited to identified users, do not necessarily offer the global visibility of Bitcoin. *See infra* notes 269–71 and accompanying text.

75. The technical meaning of immutability for a blockchain is actually somewhat complex. *See* Angela Walch, *The Path of the Blockchain Lexicon (and the Law)*, 36 REV. BANKING & FIN. L. 713, 734–45 (2017).

76. *See* NARAYANAN ET AL., *supra* note 12, at 8.

77. *See id.*, at 53; Nakamoto, *supra* note 3, at 3–4.

78. Individuals wanting complete independence from any intermediary can, however, still operate their own full node on the network.

79. *See* NARAYANAN ET AL., *supra* note 12, at 52–61.

is a realistic possibility that malicious actors on the Bitcoin network could steal currency, or spend the same Bitcoins multiple times,[80] legitimate users and firms would be reluctant to use Bitcoin.

The great innovation in Bitcoin is to flip the incentive structure, by giving network nodes a reason to follow the legitimate consensus rather than behave dishonestly.[81] Bitcoin's approach to consensus is known as mining.[82] Bitcoin nodes repeatedly attempt to solve cryptographic hashing puzzles based on the transactions in a proposed new block on the blockchain. These puzzles are on a sliding level of difficulty so that, roughly every ten minutes, a random node finds a solution.[83] The new block based on that solution is broadcast across the network.[84] Other nodes, after checking for validity, add the new block to the blockchain.[85] In the event of conflicts, they follow the longest chain, which is the one the majority of the network supports. The node that successfully proposes the new block receives a financial reward.

These rewards for mining make Bitcoin resistant to attacks. Miners have incentives to apply as much computing power as possible to confirm valid blocks, because that increases their chance of winning the block reward.[86] Malicious actors are effectively competing against the total computing power in the network. Their blocks will only be adopted if they can solve the hashing puzzle before someone else. And

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80. This is known as a double-spend transaction, and is effectively printing money.

81. *See* NARAYANAN ET AL., *supra* note 12, at 61–68; Nakamoto, *supra* note 3, at 4.

82. The more technical term for the mining process is Proof of Work. *See* Nakamoto, *supra* note 3, at 3.

83. *See* Adam Back, *A Partial Hash Collision Based Postage Scheme*, HASHCASH (Mar. 28, 1997), http://www.hashcash.org/papers/announce.txt [https://perma.cc/DBV8-PR87] (describing a proof of work system to combat email spam). Because nodes must essentially use brute force to solve the puzzles, their probability of success is proportional to their computing power. However, which node finds a valid solution first is essentially random.

84. *See* NARAYANAN ET AL., *supra* note 12, at 53.

85. The network includes additional mechanisms to deal with situations where more than one valid block is proposed, whether due to an attack or network latency. Every block in the blockchain is cryptographically linked to the block before. Under the Bitcoin protocol, when given the choice, nodes add a block to the longest possible blockchain. Every new block added thus increases the confidence level that prior blocks represent the consensus. The common heuristic in Bitcoin is that after six subsequent blocks (approximately one hour), nodes can be sufficiently confident that a block will not be replaced. In Bitcoin, however, trust is probabilistic, not absolute. Applications requiring greater security might wait longer before accepting transactions from a block, but the trade-off is increased delay before they transfer the Bitcoins or associated assets.

86. *Cf.* Kevin Werbach, *Bitcoin Is Gamification*, MEDIUM (Aug. 5, 2014), https://medium.com/@kwerb/bitcoin-is-gamification-e85c6a6eea22 [https://perma.cc/Q4Q8-4YGG] (explaining the significance of the motivational system to Bitcoin).

because every block is linked to the previous one, as the chain gets longer, it becomes more and more difficult to replace an earlier set of transactions.

An elegant aspect of Bitcoin's mining system is that those financial rewards take the form of Bitcoins themselves.[87] Because Bitcoin is accepted as a currency, and can also be exchanged for traditional currencies, miners find the rewards desirable. Yet, the only reason Bitcoin has those properties is the trust generated by mining. Mining is, in fact, the only way that new Bitcoins are created. The mining reward is halved approximately every four years, meaning there will ultimately be no more than approximately 21 million Bitcoins ever created.[88] As an alternative compensation mechanism, Bitcoin allows parties to specify transaction rewards, which are deducted from the value of a validated transaction.[89] The expectation is that, as the available mining rewards decrease, voluntary transaction rewards will become the predominant incentive for Bitcoin miners.[90]

The combination of the ledger, the network, and consensus replaces authorities like financial or central banks, which traditionally serve to reinforce trust between transacting parties. If, for example, Abby commits to paying Bob one Bitcoin every year as a dividend for each share of stock Bob holds in Abby's company, every distributed ledger in the network will correctly reflect that information, because it will be encoded into a block of transactions that is immutably linked into a sequence. At no point in the future can anyone manipulate the

87. *See* NARAYANAN ET AL., *supra* note 12, at 62; Nakamoto, *supra* note 3, at 4. The block reward as of mid-2017 is 12.5 Bitcoins, which equates to roughly $25,000 at contemporary exchange rates.

88. *See id.*, at 63. This enforced scarcity is necessary to support Bitcoin's value as a currency. If the number of Bitcoins could keep growing indefinitely, the currency would be subject to massive devaluation due to inflation. The Bitcoin protocol allows Bitcoins to be subdivided down to eight decimal places, with the smallest unit being designated as one Satoshi. So, even though the exchange rate of a Bitcoin is, as of mid-2017, over $2,000, transactions can involve tiny amounts of money, far smaller than the equivalent of one cent.

89. Nakamoto called these "transaction fees." *See* Nakamoto, *supra* note 3, at 4. We use "transaction rewards" to clarify that the sum is offered by the transacting party, and only paid to the node that successfully validates a block through the mining process. It is not a fee specified by nodes in order to process a block.

90. *See id.* In practice, transaction rewards have grown rapidly because the Bitcoin system has struggled to keep up with growth. Users need to attach significant rewards to incentivize miners to process their transactions quickly. *See* Joseph Young, *As Recommended Fees Go Past $2, Bitcoin Direly Needs a Scaling Solution*, CRYPTOCOINS NEWS (May 31, 2017), https://www.cryptocoinsnews.com/urgent-necessity-of-a-scaling-solution-recommended-bitcoin-fees-go-past-2/ [https://perma.cc/BSR9-BXX6].

ledger to change or delete the transaction. Abby and Bob both know this and do not need a bank to provide reassurance that the Bitcoin transaction is legitimate. As the recipient of the dividend payment, Bob can confidently spend that Bitcoin without concerns about its legitimacy.

C. Blockchain-Based Smart Contracts

As thus described, the blockchain is a general-purpose technology for trusted transactions. One important class of trusted transactions is contracts. A legally enforceable contract enables parties to coordinate their actions and trust that their commitments to each other will be fulfilled.[91] An inherent constraint on traditional contracting is that the parties must trust the state, and a variety of private intermediaries that facilitate efficient operation of the system. Legal enforcement of contracts can be cumbersome and prone to error. Just as there are reasons to use a decentralized digital currency system even though traditional currencies are successful, there are reasons to use decentralized digital contracts to solve problems that the conventional contract system cannot. The basic challenge for decentralized contracts is the same as for currencies: reliably ensuring that participants will follow the rules and accept their outputs.[92]

Szabo's original conception of smart contracts envisioned that cryptography would secure agreements, but had no mechanism to guarantee enforcement or transfer of value. Everything changed with the development of Bitcoin.[93] Bitcoin's success in decentralizing trusted financial transactions gives hope to those who advocate similar

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91. *See, e.g.*, Anthony J. Bellia Jr., *Promises, Trust, and Contract Law*, 47 AM. J. JURIS. 25, 26 (2002) ("The incentive to rely on a promise exists only to the degree that a promise is trustworthy."). As Stewart Macauley famously showed, enforceable contracts enable coordination by structuring the relationship between contracting parties, even where threats of legal action are rare. *See* Stewart Macaulay, *Non-Contractual Relations in Business: A Preliminary Study*, 28 AM. SOC. REV. 55, 57 (1963); *cf.* Carolina Camén, Patrik Gottfridsson & Bo Rundh, *To Trust or Not To Trust?: Formal Contracts and the Building of Long-Term Relationships*, 49 MGMT. DECISION 365, 365 (2011) (studying empirically the role that formal contracts can play in cultivating trust). The theory behind smart contracts is built on this idea. *See* Szabo, *supra* note 2.

92. *See* FRANÇOIS R. VELDE, THE FED. RESERVE BANK OF CHI., BITCOIN: A PRIMER 1, 2–3 (2013) (stating that currencies "derive their value in exchange either from government fiat or from the belief that they may be accepted by someone else").

93. Jay Cassano, *What Are Smart Contracts? Cryptocurrency's Killer App*, FAST COMPANY (Sept. 17, 2014), http://www.fastcolabs.com/3035723/app-economy/smart-contracts-could-be-cryptocurrencys-killer-app [https://perma.cc/P7LX-9UFZ]; David Z. Morris, *Bitcoin Is Not Just Digital Currency. It's Napster for Finance*, FORTUNE (Jan. 21, 2014), http://fortune.com/ 2014/ 01/21/bitcoin-is-not-just-digital-currency-its-napster-for-finance [https://perma.cc/UV8E-U3X6].

decentralization of trusted contractual agreements.[94] Smart contracts may actually be a bigger idea than Bitcoin as a currency.[95] They take the static ledger and turn it into a dynamic system capable of executing the business logic of a contractual agreement.

Consider a simple insurance contract under which Abby promises farmer Bob, in return for a monthly payment, a lump sum in the event the temperature exceeds 100 degrees for more than five straight days during the term of the agreement. In a traditional contracting arrangement, the parties would likely reduce that agreement to a writing, signed to memorialize mutual intent. If the temperature exceeded the threshold for six straight days and Abby failed to pay, Bob could file suit for breach and present the contract as evidence. To implement a smart contract with the same terms, Abby and Bob would translate the provisions into software code. Each would make available sufficient funds to fulfill his or her side of the agreement. An agreed mechanism would be specified to determine performance, such as the daily high temperature for the area, as published on Weather.com. Abby and Bob would then each digitally sign the agreement with their private cryptographic key. One of them would send it as a transaction onto a blockchain, where it would be validated through the consensus process and recorded on the distributed ledger. Bob's payments would automatically be deducted each month and credited to Abby's account. Meanwhile, the smart contract would check the high temperature on Weather.com each day and store a record as needed on the blockchain. If the temperature exceeded 100 degrees for six days, the lump sum payment would be transferred from Abby's account to Bob's, and the smart contract would terminate.

The critical distinction between smart contracts and other forms of electronic agreements is enforcement. Once the computers determine that the requisite state has been achieved, they automatically perform data-oriented or computable contracts.

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94. Nick Szabo, *Foreword* to CHAMBER OF DIG. COMMERCE, SMART CONTRACTS: 12 USE CASES FOR BUSINESS & BEYOND 3 (2016), http://www.the-blockchain.com/docs/ Smart%20 Contracts%20%2012%20Use%20Cases%20for%20Business%20and%20Beyond%20%20Cha mber%20of%20Digital%20Commerce.pdf [https://perma.cc/9ZZT-9NX8] ("Blockchain technology appears very much to be the jet fuel necessary for smart contracts to become commonplace in business transactions and beyond.").

95. *See* Cassano, *supra* note 93. The currency aspect of Bitcoin is necessary, regardless of the application, because it provides the incentive structure for mining, at least in the ramp-up stage before transaction fees become dominant. Conceivably, Bitcoin could fail to have a significant impact on the financial system but still be the basis for the massive adoption of smart contracts.

Humans can interrupt that execution at any point.[96] But with a smart contract, complete execution of the agreement, including any transfer of value, occurs without any such opportunity to interrupt.[97] Accordingly, juridical forums are powerless to stop the execution of smart contracts—there is no room to bring an action for breach when breach is impossible. The computers in the blockchain network ensure performance, rather than any appendage of the state.[98] And, because blockchains run on a distributed network of independent nodes, with no central control point,[99] a litigant seeking to enjoin performance of a smart contract has no one to sue.[100]

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96. If a contract is executed on a traditional centralized computer system, the organization in control of that system can always stop execution. On a blockchain, no single entity controls the execution process. Furthermore, the output of a data-oriented or computable contract is at best only of provisional legal value. *See* Surden, *supra* note 15, at 637 n.25 ("[A]utomated assessments will often be 'first cut' approximations of an ultimate, legally authoritative determination as to compliance.").

97. *See infra* Part II.B.3. The only exception to immutable execution of a smart contract is a fork which splits the entire blockchain into incompatible tracks. If enough network nodes follow the track without the smart contract, it effectively no longer exists. However, such a move is so technically and politically costly that it rarely if ever occurs on functioning blockchains. *See infra* note 177 and accompanying text.

98. *See* Karen E.C. Levy, *Book-Smart, Not Street-Smart: Blockchain-Based Smart Contracts and the Social Workings of Law,* 3 ENGAGING SCI., TECH. & SOC'Y. 1, 2 (2017) ("Because they are based on code, smart contracts can be *immediately and automatically* effectuated, without . . . the intervention of institutions like courts."). The power of the smart contract is, however, limited to those assets which can be incorporated or controlled by a blockchain. A smart contract for construction of a house could not force the builder to perform, for example, nor could a smart contract to purchase a painting physically move it to the buyer's home. With techniques such as "smart property," however, more assets will be susceptible to blockchain control. *See* Fairfield, *supra* note 57, at 825–28.

99. The organizations developing the blockchain's software have no power over the network nodes that validate transactions. Even if a court ordered the software developers to issue an update that halted a particular smart contract, the miners would not have to adopt it. And because anyone around the world can set up a mining node on a public blockchain such as Bitcoin or Ethereum, there would be no way for that court to enforce compliance by the miners.

Exactly how powerless a court would be depends on the system. It is possible to use the basic technical approach of a blockchain to execute smart contracts on a "permissioned" network in which nodes must be authenticated and approved. *See* Tim Swanson, *Consensus-as-a-Service: A Brief Report on the Emergence of Permissioned, Distributed Ledger Systems*, GREAT WALL OF NUMBERS (Apr. 6, 2015), http://www.ofnumbers.com/wp-content/uploads/2015/04/Permissioned-distributed-ledgers.pdf [https://perma.cc/V36W-EFPA]. Those nodes could be contractually bound to follow duly issued judicial decisions. Even in that scenario, the practicalities of judicial oversight of the contract could be quite challenging. Further, it is unclear why a permissioned blockchain network would deliberately compromise the automation and certainty upon which the efficiency gains of smart contracts are premised.

100. Operators of sites connected to a blockchain, such as the infamous Silk Road online marketplace for illegal transactions using Bitcoin, may be brought to the bar. Silk Road operator Ross Ulbricht was eventually caught by U.S. law enforcement authorities and sentenced to life in

The blockchain's distributed trust facilitates smart contracts between unknown or untrusted counterparties.[101] This radical decentralization is what potentially makes smart contracting a substitute for the state-based legal system, rather than an additional step before reaching that system. For example, a financial trading program that automatically buys certain stocks when prices match a predefined algorithm, could be described as a smart contract. If a dispute arises, however, the parties to that self-executing transaction will still turn to the courts, which will apply traditional legal doctrines to evaluate the agreement, ascertain breach, and impose a remedy if appropriate. With smart contracts, the transaction is irreversibly encoded on a distributed blockchain. A judicial decision holding a smart contract unenforceable cannot undo the results of its fully executed agreement.

Smart contracts are possible with Bitcoin because its protocols include a scripting language that can incorporate limited programmable logic into transactions.[102] The vast majority of transactions on the Bitcoin blockchain are simple transfers of Bitcoins between accounts.[103] Additionally, when computers on the Bitcoin network process those transfers, they can perform other functions.[104] This allows for more complicated arrangements, like delaying payment until a specified number of parties provide confirmation.

Bitcoin's native scripting language is limited. Companies are developing more powerful systems that execute the contractual logic on application servers outside the blockchain, or through alternate blockchains supporting more sophisticated scripts. The most heralded is Ethereum, a general-purpose computing platform on a blockchain foundation.[105] Ethereum is a competing system to Bitcoin. It uses the

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prison. Kevin McCoy, *Silk Road Mastermind Ross Ulbricht Loses Legal Appeal*, USA TODAY (May 31, 2017, 11:30 AM), https://www.usatoday.com/story/money/2017/05/31/silk-road-mastermind-ross-ulbricht-loses-legal-appeal/102343062 [https://perma.cc/V56Q-SKGS]. The blockchains themselves are another story.

101. *See generally* Werbach, *supra* note 17 (describing the blockchain's "trustless trust" architecture).

102. *See* NARAYANAN ET AL., *supra* note 12, at 79–84.

103. *See id.* at 82–83 (observing that 99.9 percent of Bitcoin transactions at the time were straight transfers of coins).

104. *See id.* at 84.

105. *See* Tina Amirtha, *Meet Ether, the Bitcoin-Like Cryptocurrency That Could Power the Internet of Things*, FAST COMPANY (May 21, 2015), http://www.fastcompany.com/3046385/meet-ether-the-bitcoin-like-cryptocurrency-that-could-power-the-internet-of-things [https://perma.cc/77R6-ZE3F]; *A Next-Generation Smart Contract and Decentralized Application Platform*,

same basic approach of a distributed ledger, a network of validation nodes, and consensus through mining. However, the virtual currency in the system, called Ether, is designed for purchasing computing power on the Ethereum network, rather than as an alternative to traditional currencies. Ethereum's scripting language is significantly more powerful than Bitcoin's. It is Turing complete, which means it can in theory execute any function that can be processed by a computer.[106]

The promise of Ethereum is almost comically broad: one article suggested it might "transform law, finance, and civil society."[107] While such enthusiasm may be excessive, Ethereum has gained a substantial and passionate following among developers and cryptocurrency enthusiasts. Roughly a year after Ethereum launched, there were already over three hundred distributed apps built on the platform.[108] In one of the largest crowdfunding campaigns to that point, Ethereum raised over $18 million worth of Bitcoin in the initial sale of Ether.[109] A number of more specialized blockchain-based platforms employing smart contracts launched after Ethereum.

The scripting language on a blockchain platform like Bitcoin or Ethereum can be used to determine whether the conditions for performance of a smart contract have been met, and then execute the contractual transaction without human interference.[110] In the simplest case, parties place Bitcoins or other digital currency into a suspended state on the blockchain, and once certain terms are met, those Bitcoins are transferred to the appropriate account.[111] The Bitcoins may

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GITHUB, https://github.com/ethereum/wiki/wiki/White-Paper [https://perma.cc/4DLU-SJD3]; Jim Epstein, *Here Comes Ethereum, an Information Technology Dreamed Up by a Wunderkind 19-Year-Old That Could One Day Transform Law, Finance, and Civil Society*, REASON.COM (Mar. 19, 2015), http://reason.com/blog/2015/03/19/here-comes-ethereum-an-information-techn [https://perma.cc/X6QU-SK83]; D.J. Pangburn, *The Humans Who Dream of Companies That Won't Need Us*, FAST COMPANY (June 19, 2015), http://www.fastcompany.com/ 3047462/the-humans-who-dream-of-companies-that-wont-need-them [https://perma.cc/MW9R-CURA].

106. *See A Next-Generation Smart Contract and Decentralized Application Platform*, *supra* note 105.

107. Epstein, *supra* note 105.

108. *See* STATE OF THE DAPPS, http://dapps.ethercasts.com [https://perma.cc/4T99-URGE].

109. Nathan Schneider, *After the Bitcoin Gold Rush*, NEW REPUBLIC (Feb. 24, 2015), http://www.newrepublic.com/article/121089/how-small-bitcoin-miners-lose-crypto-currency-boom-bust-cycle [https://perma.cc/Z7UQ-ZCUZ]. Even though Ether is not intended as a replacement for cash, it can be exchanged for other currencies at a floating rate. Demand for Ether, based on the utility of the Ethereum smart contract platform, makes the tokens more valuable.

110. *See* NARAYANAN, *supra* note 12, at 286–88.

111. *See* Cassano, *supra* note 93. Not all smart contracts require funds to be placed in this escrow state. First, many contracts do not involve direct transfers of funds. Second,

represent payment directly, or they may be used as tokens, associated with digital rights in assets.

This algorithmic enforcement allows contracts to be executed as quickly and cheaply as other computer code. Cost savings occur at every stage, from negotiation to enforcement, especially in replacing judicial enforcement with automated mechanisms.[112] If smart contracts are substantially cheaper and more efficient, more situations can benefit from the use of contractual agreements; for example, dynamic transactions around physical objects (smart property)[113] or offerings for those unable to afford traditional legal services.[114] Another broad attraction of smart contracts is their fundamentally decentralized nature. Those who wish to avoid trust in centralized private or governmental actors, for political reasons or otherwise, can do so and still benefit from the advantages of contract.

Even though blockchain transactions are irrevocable, there are ways to build in more flexibility. There is no technical means, short of undermining the integrity of the entire system, to unwind a transfer.[115] It is, however, possible to incorporate logic into a smart contract that permits exceptions or conditions.[116] Enforcement could theoretically be structured to permit arbitration.[117] Such flexibility, however, must be coded into the smart contract at the outset, which takes away from the decentralization and efficiency that make smart contracts attractive

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cryptocurrency can be used as a token to designate other assets or rights, such as title to real property. Smart contract system developers are now working through the issues involved to apply smart contracts to more complex instruments such as financial derivatives, where counterparties typically do not prefund all transactions so as to maximize liquidity. *See* Luke Clancy, *Barclays Taps Blockchain for Equity Swaps, Options, Swaptions*, RISK.NET (May 16, 2016), http:// www.risk.net/derivatives/2457777/barclays-taps-blockchain-equity-swaps-options-swaptions [https://perma.cc/VX56-JGYK].

112. Of course, there is a trade-off for the certainty of algorithmic enforcement, as will be discussed in *infra* Part IV.

113. *See* Fairfield, *supra* note 57, at 825–28; Cassano, *supra* note 93.

114. *See* Cassano, *supra* note 93.

115. *See* Paul Vigna, *Ethereum Gets Its Hard Fork, and the 'Truth' Gets Tested*, WALL. ST. J.: MONEYBEAT BLOG (July 20, 2016 10:56 AM), http://blogs.wsj.com/moneybeat/2016/07/20/ethereum-gets-its-hard-fork-and-the-truth-gets-tested/ [https://perma.cc/8PXE-RBRG] (describing such a "hard fork" needed to unwind a fraudulent transaction on the Ethereum network).

116. These are simply additional terms of the contract conveyed through the scripting language of the blockchain system.

117. Pamela Morgan, *At Bitcoin South: Innovating Legal Systems Through Blockchain Technology*, BRAVE NEW COIN (Dec. 17, 2014), http://bravenewcoin.com/news/pamela-morgan-at-bitcoin-south-innovating-legal-systems-through-blockchain-technology [https://perma.cc/8446-WHPN].

to begin with.

Sometimes a smart contract refers to facts in the world, for example, when a contract pays out if a stock exceeds a certain price on a certain date. The Bitcoin blockchain knows nothing about stock prices; it must collect that information through an external data feed. In the language of smart contracts, systems that interpret such external feeds and verify contractual performance are called "oracles."[118] Unlike the blockchain itself, oracles are not fully decentralized. The contracting parties must, to some degree, trust the operator of the oracle and the authenticity of its data feed.[119]

Using these capabilities, a wide variety of industries could employ smart contracts. Beyond simple financial arrangements, smart contracts could facilitate complex instruments like wills[120] or crowdfunding systems, both of which disburse funds only if certain contingencies trigger a payout.[121] Another category is smart property, for which the rights associated with objects attach to the objects themselves.[122] Networked door locks on a shared car system such as Zipcar could automatically open, but only for the individual that paid the access fee. Or, a lessor could shut off a delinquent lessee's access to a leased car, and give access to the bank, but only until full payment of

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118. *See Smart Oracles: A Simple, Powerful Approach to Smart Contracts*, GITHUB (July 17, 2014), https://github.com/codius/codius/wiki/Smart-Oracles:-A-Simple,-Powerful-Approach-to-Smart-Contracts [https://perma.cc/YWJ3-CQPQ].

119. There are, however, efforts to create distributed oracles using blockchain-based prediction markets such as Augur and Gnosis, which use financial incentives and the wisdom of crowds to evaluate statements. *See* Cade Metz, *Forget Bitcoin. The Blockchain Could Reveal What's True Today and Tomorrow*, WIRED (Mar. 22, 2017, 9:15 AM), https://www.wired.com/2017/03/forget-bitcoin-blockchain-reveal-whats-true-today-tomorrow [https://perma.cc/828D-3R58].

120. *See* Morris, *supra* note 93. A will implemented through smart contracts would specify the distribution of assets in the estate according to a set of rules. The contract could be activated with presentation of a specified private key by the executor of the estate. A hypothetical set of rules might transfer the entire balance of the estate to the private key associated with the decedent's spouse. In the event the spouse was also deceased (as verified by the executor's presentation of another private key), the funds would be divided equally among the decedent's two children. This scenario would work most simply for assets held in the form of cryptocurrencies. However, the blockchain could also record access rights to bank accounts, title to real estate, or other tokens associated with traditional assets.

121. *See* Stan Higgins, *Bitcoin-Powered Crowdfunding App Lighthouse Has Launched*, COINDESK (Jan. 20, 2015), http://www.coindesk.com/bitcoin-powered-crowdfunding-app-lighthouse-launches-open-beta/ [https://perma.cc/W7WQ-9VLN]; Paul Vigna & Michael J. Casey, *The Car of the Future May Ownerless as well as Driverless*, MARKETWATCH (Mar. 3, 2015), http://www.marketwatch.com/story/how-bitcoin-technology-could-power-driverless-cars-2015-03-03 [https://perma.cc/37NV-W5EL].

122. *See* Fairfield, *supra* note 57, at 863.

the principal. More broadly, over twenty-five billion devices comprising the Internet of Things, from light switches to crop moisture monitors, are expected to connect to the internet by 2020.[123] Smart contracts would allow these devices to operate autonomously, share resources, and exchange data without central management.[124]

Some blockchain advocates go further. They envision smart contracts as the foundation of a new kind of economic entity, the distributed autonomous organization (DAO).[125] If a corporation is simply a nexus of contracts,[126] why not encode those agreements into digital self-enforcing agreements? A DAO could have stock ownership, corporate governance rules, payroll arrangements, and virtually all of the economic trappings of a modern corporation, all running automatically in a completely distributed manner.

With the success of Ethereum and other blockchain-based platforms offering smart contracting capabilities, Szabo's twenty-year-old hypothetical has become an operational reality. Over one hundred major corporations including JPMorgan Chase, IBM, BP, Microsoft, Toyota, and Merck, have joined a consortium to promote enterprise adoption of Ethereum.[127] Many others are supporting competing initiatives.[128]

As is so often the case, though, this technology's adoption is preceding full consideration of its legal implications. Smart contracts are not just an interesting computer science innovation, because they

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123. *See* Colin Barker, *Is Blockchain the Key to the Internet of Things? IBM and Samsung Think It Might Just Be*, ZDNET (Jan. 21, 2015), http://www.zdnet.com/article/is-blockchain-the-key-to-the-internet-of-things-ibm-and-samsung-think-it-might-just-be/ [https://perma.cc/SR5T-ERN4].

124. *See id.*

125. Vitalik Buterin, *Bootstrapping A Decentralized Autonomous Corporation: Part I*, BITCOIN MAG. (Sept. 19, 2013), https://bitcoinmagazine.com/7050/bootstrapping-a-decentralized-autonomous-corporation-part-i [https://perma.cc/V8ZY-NK2J]; David Johnston et al., *The General Theory of Decentralized Applications, Dapps*, GITHUB, https://github.com/DavidJohnstonCEO/DecentralizedApplications [https://perma.cc/4C9S-J3ZH].

126. Michael C. Jensen & William H. Meckling, *Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure*, 3 J. FIN. ECON. 305, 311 (1976).

127. *See* Matthew Leising, *Toyota, Merck Join Ethereum Group To Build Blockchain Network*, BLOOMBERG (May 22, 2017, 12:00 AM), https://www.bloomberg.com/news/ articles/ 2017-05-22/toyota-merck-join-ethereum-group-to-build-blockchain-network [https://perma.cc/GJ67-ZHKW].

128. *See, e.g.*, Arjun Kharpal, *Intel and Major Banks, Including HSBC and BOAML, Pour $107 Million Into Blockchain Group*, CNBC (May 23, 2017, 8:30 AM), http://www.cnbc.com/2017/05/23/r3-funding-blockchain-intel-bank-of-america-hsbc.html [https://perma.cc/SV2Y-GX54] (detailing new funding for the financial industry blockchain platform R3).

tread on one of the most fundamental territories of the common law: the domain of contract.

II. CONCEPTUALIZING SMART CONTRACTS

A. Are Smart Contracts Contracts?

The first important question that smart contracts pose is: Are they actually contracts? Ultimately, we think the answer is "yes." But this question turns out to be ambiguous, requiring the answer to another question first: What do we mean by a "contract"? Different ways of defining contracts, in terms of legal enforceability, intent of the parties, or an exchange of promises, all complicate the analysis of whether smart contracts are contracts at all. After considering such standard definitions, we will suggest that smart contracts should nonetheless be considered contracts because they are agent-generated mechanisms to shift rights and obligations.

According to the standard legal definition, a contract is a promise or an agreement that is legally enforceable.[129] This definition, though widely accepted, has the unfortunate linguistic consequence of implying that agreements that turn out to be unenforceable were not contracts to begin with. Terms like "unconscionable contract," "fraudulent contract," and "illegal contract," all become something like oxymorons.[130] Even commonplace judicial iterations of this standard, like "[t]o be legally enforceable, a contract must be supported by consideration,"[131] become essentially redundant.

But we care about whether smart contracts are contracts in the ordinary sense, whether they are enforceable or not.[132] At a general conceptual level, are smart contracts actually contracts? So it seems

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129. *E.g.*, RESTATEMENT (SECOND) OF CONTRACTS § 1 (AM. LAW INST. 1981) ("A contract is a promise or a set of promises for the breach of which the law gives a remedy, or the performance of which the law in some way recognizes as a duty.").

130. *But cf., e.g.*, United States v. Nunez, 673 F.3d 661, 664 (7th Cir. 2012) ("'[C]onspiracy' . . . is simply a pejorative term for a contract, both 'conspiracy' and 'contract' signifying an agreement, a meeting of minds.").

131. *See, e.g.*, Hartbarger v. Frank Paxton Co., 857 P.2d 776, 780 (N.M. 1993) ("[T]o be legally enforceable, a contract must be factually supported by an offer, an acceptance, consideration, and mutual assent.").

132. Along these lines, Thomas Joo distinguished between "Rs," which are simply relationships of reciprocal expectations and behavior, and "Ks," which are legally enforceable. *See* Thomas W. Joo, *Contract, Property, and the Role of Metaphor in Corporations Law*, 35 U.C. DAVIS L. REV. 779, 790 (2002). One way to pose the question that we are now asking would be: Are smart contracts Rs, whether or not they are Ks?

that we need a different definition of "contract" for these purposes.

One way to understand the question would be: Do smart contracts constitute promises or agreements that are *intended* to be legally enforceable? Corresponding to this formation of the question, another definition of a contract is an agreement intended to be legally enforceable, whether it turns out to be or not.[133] This definition has the advantage of avoiding the issues raised above, because it leaves open the question of enforceability. The unenforceable contract is still, conceptually, a contract as long as the parties thought that it would be enforceable, wrong though they may have been.

Of course, the intent that matters here is objective, not subjective, intent as it is manifested by the actions of the parties. As Judge Hand famously explained, "[a] contract has, strictly speaking, nothing to do with the personal, or individual, intent of the parties. A contract is an obligation attached by the mere force of law to certain acts of the parties, usually words, which ordinarily accompany and represent a known intent."[134] Still, according to this understanding, a contract exists if and only if the actions of the parties, judged objectively, manifest an intention that an agreement is to be legally enforceable.

When applied to smart contracts, this definition raises a serious issue. Smart contracts are designed to eliminate the need for legal enforcement. The central feature of a smart contract—what supposedly makes them smart—is that legal enforcement will not be necessary, or even possible. In a very real way, smart contracts are *not* intended to be legally enforceable. This is not to suggest that they are intended to be legally invalid; rather, the question of legal enforcement should never arise. In this sense, smart contracts are *not* intended to be enforced in a legal proceeding. This lack of intent may lead to the conclusion that, even conceptually, smart contracts are not truly contracts at all. They may look more like so-called "gentlemen's agreements," intended to be carried out, but never intended to reach a

133. *See, e.g.*, EARL OF HALSBURY, 7 LAWS OF ENGLAND § 682 (1909) ("A contract is an agreement made between two or more persons which is intended to be enforceable at law . . . ."); *see also* Barnes v. Yahoo!, Inc., 570 F.3d 1096, 1108 (9th Cir. 2009) ("[O]nce a court concludes a promise is legally enforceable according to contract law, it has implicitly concluded that the promisor has manifestly intended that the court enforce his promise.").

134. Hotchkiss v. Nat'l City Bank, 200 F. 287, 293 (S.D.N.Y. 1911); *see also* Lucy v. Zehmer, 84 S.E.2d 516, 522 (Va. 1954) ("If his words and acts, judged by a reasonable standard, manifest an intention to agree, it is immaterial what may be the real but unexpressed state of his mind."); RESTATEMENT (SECOND) OF CONTRACTS § 17 cmt. c (AM. LAW INST. 1981) ("[I]t is clear that a mental reservation of a party to a bargain does not impair the obligation he purports to undertake.").

courtroom.

This appearance would be misleading, however, because it is quite different to intend that a solution will not be needed than to intend that it will be unavailable. I do not intend that my car will be needed as a vehicle for escaping the zombie apocalypse, but if the zombie apocalypse comes, I do not intend to abandon my car and traverse the wasteland on foot. By the same token, smart contracts are not intended to be enforced by a court, but that's not to say that, if they end up in court, the parties intend them to be unenforceable.

It is better to think of a contract as any agreement that is meant to have practical consequences on the rights and duties of the parties—that is, is not merely aspirational.[135] This avoids the above difficulty, because whether legal enforcement was anticipated is irrelevant.[136] Smart contracts would be contracts as long as they manifest an exchange of concrete obligations. They would be contracts as long as they are meant to alter concretely the normative relation between the parties.

Yet there is still some difficulty with this definition, because this understanding of a contract requires an exchange of promises or obligations. Do smart contracts involve promises or obligations? In a significant sense, "no." The smart contract sets in motion machinery that the parties cannot subsequently prevent. The smart contract is not fulfilled by some further action of a contracting party, but rather by the completion of this mechanical process. As an analogy, if Bob balances a pail of water on top of a door, he does not promise to drop water on whoever next opens the door. Rather, he has merely set up the mechanical process by which that will inevitably happen. In a similar way, a smart contract to transfer one Bitcoin upon such-and-such event occurring is not really a promise at all. A smart contract would not say, "I will pay you one Bitcoin if such-and-such happens," but rather something like, "you will be paid one Bitcoin if such-and-such happens."

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135. *See, e.g.*, W. David Rankin, *Concerning an Expectancy Based Remedial Theory of Promissory Estoppel*, 69 U. TORONTO FAC. L. REV. 116, 142 (2011) ("[A] contract creates rights and duties because, as purposive beings, self-determining agents may transfer the power to direct their choices to other persons, and rights and duties are required to mark the resultant scope of the parties' freedom after the transfer.").

136. *See* Gregory Klass, *Intent to Contract*, 95 VA. L. REV. 1437, 1460 (2009) (arguing that departure from any intention to create legal enforceability makes sense because "[c]ontracts create legal rights and duties" and "[t]he conditions of contractual validity function . . . to inform people of their rights and duties ex ante").

Some of the computer scientists working on smart contracts appear to be vaguely aware of this point. For example, Ethereum's white paper states that its contracts "should not be seen as something that should be 'fulfilled' or 'complied with'; rather, they are more like 'autonomous agents' that live inside of the Ethereum execution environment."[137] As this suggests, the language of "contracts" is a poor fit, because this sort of smart contract is not an exchange of promises or commitments. Creation of a smart contract—while setting certain events in motion—does not commit any party to do anything, or make any prospective promise.

Nevertheless, we believe that smart contracts are, at the conceptual level, still contracts.[138] Though they might not constitute promises per se, smart contracts are voluntary mechanisms that purport to alter the rights and duties of the parties. After all, not all traditional contracts are executory, either. A deal may still count as a contract even though it leaves nothing open to be done or performed. A conveyance, for example, is a contract that alters rights presently, and does not involve any further, open promises. Smart contracts similarly constitute present agreements without further promises to perform. The simple Bitcoin smart contract just imagined is more like a present but contingent conveyance than it is like an executory promise to pay.

Thus, the smart contract somewhat breaks down the traditional line between executory and executed contracts. Like the conveyance, there is no promise left to be performed. Unlike the conveyance, though, the smart contract does not transfer property at the time. It is neither executory, insofar as there is no action left to be performed, nor is it executed, insofar as the result is yet to be accomplished. This causes conceptual difficulty. Smart contracts are both committing to something in the future, but not exactly making a promise. As we discuss below,[139] this hybrid between ex ante commitment and ex post

137. *A Next-Generation Smart Contract and Decentralized Application Platform*, *supra* note 105; *see also Explainer: Smart Contracts*, *supra* note 14 ("[S]mart contracts are neither particularly smart nor are they, strictly speaking, contracts."); Leithaus, Comment to *Isn't Ethereum Just a DSL for the Blockchain?*, REDDIT.COM, https://www.reddit.com/r/ethereum/comments/31rnmh/isnt_ethereum_just_a_dsl_for_the_blockchain/ [https://perma.cc/44DG-ZV54] ("I now regret calling the objects in Ethereum 'contracts', [sic] as you're meant to think of them as arbitrary programs and not smart contracts specifically.").

138. For a more doctrinal analysis by an international law firm that reaches a similar conclusion, see NORTON ROSE FULBRIGHT LLP, *supra* note 12.

139. *See infra* Part II.B.3.

enforcement is novel.

In the end, though, this complication raises more questions about the conventional definitions of contracts than it does about whether smart contracts are contracts. There can be little doubt that smart contracts purport to alter the rights of the parties. The smart contract can explain, normatively as well as descriptively, why the Bitcoin belongs to one party and not the other. It constitutes an agreement between the parties, and not an idle one. That, we believe, is the essence of a contract. But it is an interesting conceptual observation—illuminated by the smart contract—that even yet-to-be-executed contracts need not create promissory obligations.

There is one final difficulty to overcome. Are smart contracts really agreements? After all, they are simply a chunk of code. Superficially, they may look nothing like a set of declarations in the form "Party X agrees to do such-and-such." In general, a legal contract requires mutual assent, a "meeting of the minds,"[140] meaning that both parties must have expressed assent to the contract.[141] That is, contracts require overt acts of assent.[142] Parties must engage in some expression that displays a shared understanding of the agreement, and a shared intent to bind themselves by its terms. Can smart contracts, simply a chunk of code in a blockchain, constitute such shared expression?

Nothing, so far as we can tell, prevents an expression of mutual assent from being formulated in code.[143] In general, mutual assent can take many forms, so long as it clearly implies agreement.[144] As Surden puts it, "[a]t a minimum, contract laws do not explicitly prohibit expressing contractual obligations in terms of data. More affirmatively, basic contracting principles actively accommodate data-oriented

140. *See, e.g.*, Krasley v. Superior Court, 161 Cal. Rptr. 629, 633 (Cal. Ct. App. 1980) ("The essence of a contract is the meeting of minds on the essential features of the agreement." (citations omitted)).

141. *See* 1 ARTHUR LINTON CORBIN, CORBIN ON CONTRACTS § 4.13 (Matthew Bender & Co. 2017) (1950) ("[A contract requires] mutual expressions of assent to the exchange. These expressions . . . are external symbols of the thoughts and intentions of one party, symbols that convey these thoughts and intentions to the mind of the other party.").

142. *See, e.g.*, Kitzke v. Turnidge, 307 P.2d 522, 527 (Or. 1957) ("The law of contracts is not concerned with the parties' undisclosed intents and ideas. It gives heed only to their communications and overt acts.").

143. We are assuming the parties have some understanding of what the code is intended to accomplish. As Scholz points out, they could essentially agree to agree, and let the algorithms do the rest. This may be the case with some computable contracts today, as in the case of high-frequency trading. *See* Scholz, *supra* note 33. However, this is not an inherent problem with smart contracts, whose key differentiation lies in complete enforcement.

144. *See* RESTATEMENT (SECOND) OF CONTRACTS § 4 & illus. 1 & 2 (AM. LAW INST. 1981).

representation."[145] In the present context, such data-oriented representations could easily include a blockchain. Where one party puts on the blockchain that assets of theirs will transfer to another party if some condition is satisfied, that seems to easily satisfy the requirement of an expression of assent.

This description in terms of a party putting the code on the blockchain does point to a wrinkle. Smart contracts, on Ethereum and presumably on other platforms, are by default unilateral, because only one party places them on the blockchain.[146] That is, the default involves one party specifying a transfer to another if certain conditions are met. Out of this default, one could approximate a bilateral or multilateral contract through the creation of two or more interrelated unilateral contracts.[147] But two unilateral contracts are not precisely the same as a bilateral contract.[148] Fashioning interdependent conditions in a way that would emulate a bilateral contract might be a challenge for smart contracts. But for the purposes of this Article, we will leave this issue aside and generally focus on unilateral contracts, because we think the same basic analysis would apply to bilateral contracts as they might be formulated as smart contracts.

To sum up, smart contracts are contracts. They are agreements to shift legal rights and responsibilities, no less than an agreement between two parties physically exchanging goods for payment over a counter. Their status as contracts might be obscured by the fact that the parties intend litigation to be impossible, may not make any promise, and may be expressed only in code. We suggest that these details do not alter the fact that smart contracts are, indeed, contracts in the important sense.

B. What's New Here?

Is a smart contract really any different than an ordinary one? The fact that smart contracts manifest agreements in machine-readable code is not novel, and neither is the possibility of automated performance based on rules-based judgments by computers. Both are

145. Surden, *supra* note 15, at 656.

146. *See* Raskin, *supra* note 23, at 314; Casey Kuhlman, Legal Approaches to Smart Contract Development (Apr. 9, 2014), https://www.youtube.com/watch?v=wnFqOfR5a7I#t=29m25s.

147. *Id.*

148. *See* Francesco Parisi, Barbara Luppi & Vincy Fon, *Optimal Remedies for Bilateral Contracts*, 40 J. LEGAL STUD. 245, 247 (2011) (illustrating from an economic perspective that, "contrary to intuition, the incentives faced in a bilateral contract are different from those that the parties would face if entering into two separate unilateral contracts").

features of data-oriented and computable contracts, which have been around for some time.[149] And just because smart contracts are being implemented today on the exotic technology of the blockchain does not mean they raise novel or interesting legal issues. As Judge Frank Easterbrook has argued, new technologies do not necessarily call for new legal doctrines, when fact patterns are fundamentally unchanged.[150]

We consider two perspectives suggesting that smart contracts are just technological manifestations of familiar contractual processes: escrow and self-help. One perspective focuses on the mechanism smart contracts use to ensure the execution of agreements, and the other perspective focuses on the way smart contracts employ technology to impose a remedy outside of the court system. Each perspective sheds light on the nature of smart contracts. However, neither perspective fully captures the way smart contracts operate. Smart contracts are distinct from preexisting forms because the digital code is not just a representation of the agreement; it is the agreement.

1. *Smart Contracts as Escrow.* One could view smart contracts as simple escrow arrangements with a digital veneer. In a typical escrow agreement, such as a house purchase, the buyer places funds in a special account. The escrow agent can only withdraw and disburse these funds to the seller after successful inspection and resolution of any other prepurchase issues. More generally, escrow suspends execution of a valid contract, and empowers a trusted third party to complete the process. Among other attributes, this approach overcomes the possibility of a prisoner's dilemma when the parties do not fully trust one another; otherwise, whichever one acted first would be vulnerable. The escrow arrangement substitutes mutual trust in the escrow agent for bilateral trust between the parties.

Smart contracts mimic the functionality of escrow. The smart contract code can place Bitcoins or other cryptocurrency tokens in a suspended state on the blockchain, where they cannot be spent until performance of the contract.[151] The execution step may be fully

149. *See supra* Part I.A.

150. *See* Frank H. Easterbrook, *Cyberspace and the Law of the Horse*, 1996 U. CHI. LEGAL F. 207, 208. Judge Easterbrook was surely correct about this general point, but he may not have won the particular debate about the viability of cyberlaw. *See* Kevin Werbach, *The Song Remains the Same: What Cyberlaw Might Teach the Next Internet Economy*, 69 FLA. L. REV. (forthcoming 2017).

151. *See* NARAYANAN ET AL., *supra* note 12, at 84–85 (explaining how Bitcoin scripts can

automated, or it may be implemented through multiple-signature verification, known as multisig.[152] In order for a multisig smart contract to execute, more than one party must provide its private encryption keys, indicating approval to execute the previously agreed-upon transaction.[153] If Abby wishes to purchase digital goods from Bob using a smart contract, the parties can use a multisig smart contract, for which the ultimate execution requires the digital signatures of two out of three parties, typically the buyer, the seller, and a trusted third party, such as an arbitrator. If the contract is satisfactory, the buyer and seller sign, executing the terms of the contract. If either party refuses, claiming breach, the arbitrator's signature decides the outcome.

Startups are already using the sophisticated capabilities of smart contracts to apply escrow in new ways. For example, CryptoCorp uses multisig for preclearance checks on Bitcoin transactions, similar to the way credit card companies decline transactions if the card has been subject to fraud or the payment exceeds preset limits.[154] BitHalo has implemented an escrow system for e-commerce transactions that avoids the participation of third parties entirely, by requiring collateral to be stored on the blockchain.[155]

The fact that smart contracts can implement escrow agreements does not make them identical to escrow. Conventional escrow depends upon a trusted firm or third party, because the parties themselves cannot serve as the escrow agents. A smart contract reliant on an arbitrator gives up the decentralized trust that the blockchain makes possible. Smart contracts performing only escrow-like functions are therefore more like standard data-oriented contracts. A true smart contract may employ the escrow-like mechanism of holding Bitcoins temporarily, but it does so through automated execution of scripts running on the network of computers maintaining the blockchain, without an escrow agent equivalent.

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mimic escrow transactions); Cassano, *supra* note 93.

152. *See* Ben Davenport, *What Is Multi-Sig, and What Can It Do?*, COIN CENTER (Jan. 1, 2015), https://coincenter.org/2015/01/multi-sig/ [https://perma.cc/W4VN-HTQT].

153. *See* NARAYANAN ET AL., *supra* note 12, at 80.

154. *See* John Villasenor, *Could "Multisig" Help Bring Consumer Protection to Bitcoin Transactions?*, FORBES (Mar. 28, 2014, 9:43 PM), http://www.forbes.com/sites/johnvillasenor/2014/03/28/could-multisig-help-bring-consumer-protection-to-bitcoin-transactions/ [https://perma.cc/QGG8-LAXB].

155. *See* Diana Ngo, *BitHalo Releases Decentralized Escrow Client v2.1 to Rival PayPal, Western Union*, COINTELEGRAPH (Jan. 12, 2015), http://cointelegraph.com/news/113286/bithalo-releases-decentralized-escrow-client-v21-to-rival-paypal-western-union [https://perma.cc/JY2K-CVCB].

2. *Smart Contracts as Self-Help*. Researcher Max Raskin provides a different interpretation of smart contracts. He views them not as legal enforcement at all, but as a form of self-help.[156] To Raskin, "[a]utomated execution of a contract is a preemptive form of self-help because no recourse to a court is needed for the machine to execute the agreement."[157] He draws an analogy to starter interrupters, which are remote-controlled devices installed in cars to prevent them from operating.[158] A creditor can invoke the starter interrupter if the lessee of the car fails to pay. As Raskin notes, such devices are likely to be legal in most states, under the self-help repossession provisions for secured creditors at Section 9-609 of the UCC.[159] A smart contract could serve the same function, by refusing to authorize operation of the car unless the creditor receives payment.

Viewing smart contracts as self-help mechanisms accurately places the emphasis on the ex post enforcement function.[160] The blockchain can be used to record contractual provisions, execute contractual obligations, and perform intermediary functions like escrow, but so can garden-variety digital contracts. It is only when disputes arise, or when the remedies provided in the contract must be invoked, that smart contracts do something special. The algorithmic enforcement mechanisms, running automatically on the blockchain computing fabric, replace judicial enforcement.[161]

Self-help, traditionally, is a judicially supervised process.[162] Courts may restrain creditors from "disturbing the peace" to enforce their self-help rights, for example, or if a creditor's rights are inferior to other legal obligations, such as those of bankruptcy.[163] With a smart contract, there is no one to restrain, because the smart contract code is

156. *See* Raskin, *supra* note 23, at 306 ("Over the past few years, a group of innovators have begun designing computer technologies that bring self-help to the realm of contracts. They call these new contracts 'smart contracts.'").

157. *Id.* at 333.

158. *See id.* at 329–33.

159. *See id.* at 332.

160. *See* Zoë Sinel, *De-Ciphering Self-Help*, 67 U. TORONTO L.J. 31, 58–65 (2017) (explaining that self-help, properly understood, is responding to a committed wrong, and that ex ante measures are not properly considered self-help because they are not so responding).

161. *See supra* Part I.C.

162. *See* Sinel, *supra* note 160, at 66–67 ("[S]elf-help is a [limited] privilege . . . . Only the state's legal institutions (which include legally recognized agreements between two parties – that is, contracts) can effect [it] . . . . As such, self-help is not an alternative to the civil justice system but rather one small part of it.").

163. *See* Raskin, *supra* note 23, at 310.

immutable once embedded in the blockchain. A smart contract could even include terms that are illegal, unconscionable, or otherwise legally unenforceable.[164]

More deeply, the self-help model focuses on what smart contracts *do* to the exclusion of what they *say*. Functionally, the primary distinction between smart contracts and more limited data-oriented or computable contracts lies in enforcement. The smart contract, as we have explained, fully executes the agreement. It addresses the possibility of breach, not through the deterrent potential of judicial remedies, but by making breach practically impossible. The smart contract is not merely an accessory added to the end of the contractual process to mitigate the risk of breach.

Raskin's analogy between smart contracts and starter interrupters breaks down on closer examination. The starter interrupter is a mechanism introduced, after an agreement is reached, to enforce its terms; but, unlike smart contracts, this mechanism has nothing to do with the substance of the agreement. By contrast, a smart contract literally contains the terms of the agreement, transformed into machine-readable scripting code. The fact that the agreement is enforceable algorithmically, without the participation of legal institutions, is a commitment represented in the smart contract. Thus, the self-help model paints too limited a picture of smart contracts.

At the same time, the self-help model is too expansive. This analogy attributes functions to smart contracts that they do not actually perform; the smart contract itself does not perform the breach-limiting action, the blockchain and its computing nodes do. In the self-help model, by contrast, one party enforces the agreement consistent with, but *outside* the legal machinery of contract law. The smart contract is a component of a larger smart contract system, which ensures that, for example, the cryptocurrency tokens are transferred according to the contractual terms. Just as the state's ex post remediation role distinguishes a legal contract from an informal exchange of promises,[165]

164. Raskin's proposed solution to the possibility of illegal smart contracts is to suggest that some forms of smart contracts be prohibited through regulation. *See* Raskin, *supra* note 23, at 340. This begs practical questions about enforcement. Smart contract platforms on public blockchains, such as Ethereum and Bitcoin, are open-source software adopted voluntarily by networks of mining node operators. There is not a central smart contract administrator to regulate. And the fact that identity on the blockchain generally takes the form of digital signatures rather than real names means it may not be feasible even to identify the counterparty who created an undesirable smart contract.

165. *See infra* Part III.C.

the integration of specific contractual terms and a general enforcement infrastructure makes a smart contract smart. The distributed ledger software both instantiates the contractual terms and enforces the contractual obligations. These functions are distinguishable, but necessarily connected.

3. *Smart Contracts as Entire Agreements.* Both the escrow model and the self-help model explain smart contracts as technical mechanisms overlaid on the basic contractual process. Escrow does so to facilitate performance, while self-help provides a remedy for nonperformance. These tools may reduce transaction costs and thereby make contracting more efficient. They are not, however, strictly necessary to the outcome. Neither fully captures the essence of smart contracts, because both treat smart contracts as external enhancements to the contractual process. The distinctive aspect of smart contracts is not that they make enforcement easier, it is that they make enforcement unavoidable. In order to do so, they change the nature of the contract itself.

In Szabo's vending machine example, the physical security of the device is sufficient to make breach less attractive than compliance.[166] But alongside physical security, another element is at work in Szabo's example. The vending machine takes cash, which is a bearer instrument. Once the coins or bills are in belly of the machine, value has been transferred. No third parties need to be brought into the process to facilitate or secure the exchange. Szabo's example does not easily translate to other payment mechanisms, like checks or credit cards, which require a bank to validate the transaction. This step introduces transaction costs and delay, and it means the contracting process is no longer contained within the hardware and software of the vending machine. And, intermediary validation potentially changes the performance equation. The consumer can breach the agreement by instructing the bank to reverse the charge, even after receiving the product. At that point, the smart contract would no longer govern the relationship between the parties.

Cash works for a vending machine, but not for complex financial derivatives transactions, international supply chains, or major crowdfunding initiatives. Only a limited subset of transactions are sufficiently localized, low value, and low velocity for cash to be a viable

166. *See supra* note 48 and accompanying text.

option.[167] For this reason, Bitcoin and other cryptocurrencies are very important for the growth of smart contracts. Bitcoin tokens are digital bearer instruments, functionally equivalent to cash, yet flexible and scalable in the manner of credit cards. A blockchain-based smart contract, like a cash transaction, therefore involves the complete exchange of value.

If I buy an e-book for my Kindle on Amazon.com, a complete transfer of value does not occur immediately. When I click the "buy" button, the company's computers transfer the e-book to my device, with associated digital rights to prevent additional copying, and they also process my credit card and debit my account. Yet, I am in a position to prevent a complete transfer of value, because I can still ask Amazon for a refund, or dispute the charge with the credit card company. This is possible because my contract with Amazon is executory—I have traded the e-book for the promise to pay my credit card issuer. Imagining the same exchange with a smart contract, by contrast, it is as though when I click the buy button, a drone picks up a stack of one-dollar bills from my house and flies them to Amazon. The contract fully executes with no human intervention. I can still dispute the transaction with Amazon, but now the contract is fully executed. Amazon has the cash; I am now asking them to return the money, rather than preventing them from receiving it.

Because the exchange of value is entirely contained in the smart contract environment, there is no need to look anywhere else. In other words, the contract *is* the scripting code that tells the network what to transfer and when. In the Amazon example, the site's computer system transfers the e-book and processes my credit card. Those machine instructions, however, are separate from my contract with Amazon, agreeing to exchange my payment information for a particular e-book.[168] If Amazon's programmers make an error and send me an entirely different e-book, there is no question that my contract with

167. Or, they are transactions the parties do not want traced because they are somehow illicit. Unsurprisingly, one of the major early uses of Bitcoin was for illegal transactions. *See* Joshuah Bearman, *The Rise and Fall of Silk Road: Part II*, WIRED (May 2015), http://www.wired.com/2015/05/silk-road-2 [http://perma.cc/4BCZ-LTBG] (recounting the story of a Bitcoin exchange commonly used for drug sales and other illegal activity); Joshuah Bearman, *The Rise and Fall of Silk Road: Part I*, WIRED (Apr. 2015), http://www.wired.com/2015/04/silk-road-1 [http://perma.cc/6BKF-BKY7] (same).

168. There may be questions about what constitutes that contract. Perhaps it is a combination of what I saw on the shopping cart screen and Amazon's Terms of Service, or perhaps some judicial gap filling is required. Under no circumstances, however, is the contract exclusively the software code executed on Amazon's servers.

Amazon controls, rather than the software code the computer system uses to effectuate the contract.

For the smart contract, in contrast, everything beyond the code is just commentary. The code is a necessary part of the agreement itself, whereas Amazon's software code is just a tool to execute the human-made contract. For example, imagine that at the same time I place my order for the e-book on Amazon's website, I type up a written agreement for a different book and send it to an Amazon customer service agent, who countersigns it. In the event of a dispute, there would be an evidentiary question as to which version of the agreement controlled. In the smart contract context, such an inquiry would be meaningless. The smart contract has the entire life of the contract immutably embedded into its code, which leaves no room for a separate written agreement to specify the parties' intent. If a court concludes that some writing better reflects the parties' meeting of the minds, it would be powerless to invalidate the smart contract; it would have to find some way to reverse the transfer of value ex post.

The notion that smart contracts can supersede legal enforcement has been tested in the real world.[169] A group of developers associated with Ethereum created a distributed crowdfunding system in mid-2016 called "The DAO."[170] It was designed to implement the concept of DAO, in which corporate governance and operations are conducted automatically through smart contracts.[171] Users pledged Ether (the Ethereum cryptocurrency) in return for tokens that gave them authority to vote on projects to fund. Organizations seeking funding would sign up through another interface, and collect Ether if they received sufficient votes. Despite the novelty of the arrangement, Ethereum users pledged over $150 million in Ether in a matter of weeks after The DAO launched.[172]

Users signed up to participate in The DAO on a website that stated explicitly, in its terms of service, that the smart contract on the

169. We note that whether smart contracts can displace contractual enforcement is a different question than whether, as we consider in Part III, they can displace contract law.

170. Christoph Jentzsch, Decentralized Autonomous Organization to Automate Governance (unpublished manuscript), https://download.slock.it/public/DAO/WhitePaper.pdf [http:// perma.cc/SE35-Y8CC].

171. *See supra* note 125 and accompanying text.

172. Nathaniel Popper, *A Venture Fund With Plenty of Virtual Capital, but No Capitalist*, N.Y. TIMES (May 21, 2016), http://www.nytimes.com/2016/05/22/business/dealbook/crypto-ether-bitcoin-currency.html?_r=0 [https://perma.cc/2GP2-H9N7].

Ethereum blockchain was the controlling legal authority.[173] Any human-readable documents or explanations, including those on the website, were "merely offered for educational purposes and do not supercede [sic] or modify the express terms of The DAO's code set forth on the blockchain."[174]

Within weeks of launch, something went wrong. A hacker took advantage of a bug in The DAO's code to siphon off over $60 million worth of Ether.[175] Although clearly an attempt at theft, the hack was executed through a series of smart contracts that were formally valid within the rules of The DAO. Even though the stolen funds were temporarily quarantined in an account, and not immediately disbursed, from the perspective of the smart contracting system, the transactions were perfectly legitimate. Even if a court ordered the funds returned, there was no one to carry out that order. Thus, there was no legal or technical way to recover them without undermining the entire system. Ultimately, the leaders of Ethereum project had to convince a majority of mining nodes to implement a "hard fork," which split the entire Ethereum blockchain into two incompatible paths.[176] Only through this dramatic step, which effectively killed off The DAO and undermined confidence in the Ethereum platform, could the stolen funds be returned.[177]

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173. The DAO's original terms of service page, which was located at https://daohub.org/explainer.html, has been removed from the Web. For a contemporaneous quotation of the relevant language on the site, see Joel Ditz, *DAOs, Hacks and the Law*, MEDIUM (June 17, 2016), https://medium.com/@Swarm/daos-hacks-and-the-law-eb6a33808e3e [https://perma.cc/N9M5-F2GT].

174. *Id.*

175. Michael del Castillo, *The DAO Attacked: Code Issue Leads to $60 Million Ether Theft*, COINDESK (June 17, 2016, 2:00 PM), http://www.coindesk.com/dao-attacked-code-issue-leads-60-million-ether-theft/ [https://perma.cc/3P4G-59MZ]; Nathaniel Popper, *A Hacking of More than $50 Million Dashes Hopes in the World of Virtual Currency*, N.Y. TIMES (June 17, 2016), http://www.nytimes.com/2016/06/18/business/dealbook/hacker-may-have-removed-more-than-50-million-from-experimental-cybercurrency-project.html?_r=2 [https://perma.cc/5NBQ-CFFN]. The varying valuations of the hack are due to the floating exchange rate between Ether and dollars.

176. Miners of one chain do not recognize the validity of blocks mined by the other clients, and vice versa, even though they may otherwise use exactly the same protocols. *See* Joseph Bonneau et al., *Research Perspectives and Challenges for Bitcoin and Cryptocurrencies*, IEEE TECHNICAL COMMITTEE ON SECURITY & PRIVACY 104, 113 (May 18, 2015), http://www.ieee-security.org/TC/SP2015/papers-archived/6949a104.pdf [https://perma.cc/SWM8-MQZC].

177. *See* Frances Coppola, *A Painful Lesson for the Ethereum Community*, FORBES (July 21, 2016, 1:54 PM), https://www.forbes.com/sites/francescoppola/2016/07/21/a-painful-lesson-for-the-ethereum-community/#56d3a488bb24l [https://perma.cc/FRP2-7TDR]. The hard fork was considered a "nuclear option" because it was not just a reversal of transactions by the operator of The DAO; it broke the fundamental immutability of transactions on the Ethereum blockchain.

The DAO example shows the power of smart contracts, and also their limitations. Smart contracts seemed to be able to replace the legal system as an enforcement mechanism for The DAO users' contractual relationship with the crowdfunding system. However, doing so came at a significant cost. Because the only enforcement mechanism was the Ethereum network's computers executing the terms of The DAO software code, there was no way to distinguish between a legitimate string of transactions and one with malicious intent.

III. WHAT THEY TEACH US ABOUT CONTRACT LAW

As we have discussed, there are reasons to be skeptical about whether smart contracts can deliver all the hoped-for gains in efficiency and flexibility. But there is a much deeper, more theoretical reason to be skeptical of smart contracts. Even if the technology could deliver all that its proponents promise, it is not clear whether its implementation would be an improvement over courts or simply orthogonal. Put simply, the question is whether smart contracts could do what courts do, only better. We think not. Although we can see why some conclude otherwise, we think that contract litigation plays a role in our social system that smart contracts do not even purport to replicate.

Ostensibly, smart contracts remove the role of courts as enforcement agents. One might say that the contract enforces itself, or that the code itself enforces it. This means that parties no longer have the escape hatch of litigation. Once the smart contract is made, the machinery for its execution is unavoidably set in motion, ending the parties' opportunity to affect the transaction ex post.[178] This may be a bit of an overstatement. Parties can use multisig, for example, to

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See Joon Ian Wong & Ian Kar, *Everything You Need to Know About the Ethereum "Hard Fork,"* QUARTZ (July 18, 2016), https://qz.com/730004/everything-you-need-to-know-about-the-ethereum-hard-fork/ [https://perma.cc/B6DA-XC2L] ("If contracts held to be inviolable can effectively be overturned by a collective decision to run new software, what guarantee do financial institutions have that their transactions and funds are secure?"). A faction of the Ethereum community considered this such a breach of trust that it began mining the deprecated chain on which The DAO hack was not reversed, creating a duplicate token called Ethereum Classic. *See* David Z. Morris, *The Bizarre Fallout of Etherum's Epic Fail*, FORTUNE (Sept. 4, 2016), http://fortune.com/2016/09/04/ethereum-fall-out [https://perma.cc/ZK78-NCJX]. Broader questions about the legal or governance relationships among users, smart contract applications such as The DAO, and blockchain platforms such as Ethereum are beyond the scope of this Article. *See generally* Werbach, *supra* note 17 (discussing the governance implications of The DAO fiasco in connection with the trust architecture of the blockchain).

178. Note that this is consistent with the regular aim of business agreements to try to dictate remedies ex ante; for example, clauses pertaining to mandatory arbitration, choice of law/forum, disclaimer of incidental/consequential damages, among others.

maintain some control over the execution of the contract.[179] And in extreme cases such as The DAO hack, the entire blockchain could conceivably be forked if enough network nodes agreed.[180] Still, if smart contracts are to be a disruptive force in contracting, this potential turns on the ability to eliminate the possibility of breach and the resultant litigation to enforce.

Does this mean that smart contracts can replace courts in the adjudication of contract cases?[181] Courts, it might be argued, serve the function of enforcing contractual obligations. But, because courts serve this function in a costly and time-consuming way, technological advancement offers the possibility of making courts obsolete; surpassed by mechanisms that can enforce obligations, and serve the same function, with greater efficiency and customization.

Smart contracts thus offer a window into thinking about contract law at a theoretical level. Even if one were uninterested in the technology, smart contracts could illuminate foundational issues in the theory of contract. Their theoretical possibility, whether the technology can deliver or not, raises a pointed question about what function courts play when they adjudicate a contract case. Put another way, the basic question about whether smart contracts do what courts do, only better, introduces a reciprocal question about contract law more generally: Does contract law do what smart contracts aim to do? Taking smart contracts seriously is therefore a fruitful way to examine the function of courts and contract law.

In order to answer the question whether smart contracts can do what courts do, this Section describes three competing conceptions of what role courts play—or ought to play—in contract cases. Each view informs how its proponents think that smart contracts might interact with contract law. Ultimately, we argue that through the correct understanding of contract law, it is clear that smart contracts cannot supplant the role that courts play. Smart contracts are not, even conceptually, a replacement for judicial contract adjudication.

Our argument in this Section is bidirectional. Insofar as many readers may already intuitively grasp that smart contracts can, at best, avoid courts but cannot substitute for them, this Section provides the argument and reasoning to support that understanding.

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179. NARAYANAN ET AL., *supra* note 12, at 62–63.

180. *See supra* note 175.

181. *See supra* notes 6–8 and accompanying text.

A. *Contract Law as Enforcing Promises*

According to one view, contract law provides legal enforcement for promises.[182] When a promisor makes a commitment to a promisee, this commitment, the promise, generates an obligation to do the thing promised.[183] Even without contract law, a moral obligation is created when one party makes a promise to another. While the exact source of this moral obligation is subject of philosophical dispute, there is little doubt that promises generate obligations.[184] Contract law, the argument goes, serves to strengthen and support these moral obligations by creating corresponding legal obligations. At its core, contract law binds promisors, not simply morally, but also legally.

The paradigmatic articulation of the view that contract law enforces promises is Charles Fried's 1981 book, *Contract as Promise*.[185] For Fried, the capacity to make promises is a form of freedom, allowing parties to bind themselves and thus shape their obligations.[186] By enforcing such voluntarily assumed obligations, the state supports the freedom of contracting parties.[187] The core idea is that contracts are binding, as the self-imposed obligations of contracting parties. Contracts, like promises, are the result of voluntary acts performed with the intent to place the actor under an obligation. The ability to bind oneself in this way—to assume an obligation voluntarily—is itself a form of freedom. But one need not share Fried's account of

182. *See generally* CHARLES FRIED, CONTRACT AS PROMISE: A THEORY OF CONTRACTUAL OBLIGATION (1981) (grounding contract law in the morality of promises).

183. *See, e.g.*, *id.* at 8 ("By promising we transform a choice that was morally neutral into one that is morally compelled.").

184. Theoretical debate exits between convention-based views and reliance-based views. Conventionalist accounts understand promises as social conventions and understand their obligations as arising from the fact that failing to keep one's promise would do violence to a valuable social institution. *See, e.g.*, DAVID HUME, A TREATISE ON HUMAN NATURE 524–25 (L.A. Selby-Bigge ed., 1967). Fried's account of contract law appeals to such a convention-based account of promises. FRIED, *supra* note 182, at 11–17. Convention-based accounts face a problem explaining the sense that promissory obligations are owed directly to the promisee, which can be explained better by appealing to the interests of the promisee. *See* T.M. SCANLON, WHAT WE OWE TO EACH OTHER 295–327 (1998). For a picture of contract law built on such a reliance-based account of promissory obligation, see generally Joseph Raz, *Promises in Morality and Law*, 95 HARV. L. REV. 916 (1982) (reviewing P.S. ATIYAH, PROMISES, MORALS, AND LAW (1981)). For further discussion of this philosophical debate, see generally WILLIAM VITEK, PROMISING (1993) and Niko Kolodny & R.J. Wallace, *Promises and Practices Revisited*, 31 PHIL. & PUB. AFF. 119 (2003).

185. FRIED, *supra* note 182, at 17–21.

186. *Id.* at 8.

187. *Id.* at 21.

promissory obligations in order to think that contract law's purpose is to provide legal obligations that correspond to the moral obligations of promises.[188]

The essential idea is that promises are an important part of human life, and that contract law supports promising by offering legal recognition and enforcement. Contract law layers legal obligation on top of our moral obligations in order to bolster them. By making it the case that a party must, legally, do what it has promised, we affirm that people ought to do what they promise, and we thereby affirm the institution of promising. The point of contract law, then, is to help ensure that people are truly bound by their promissory commitments.

From this perspective, contract law might appear incrementally more successful the more it affirms that promisors must do as they have promised. In this light, elements of contract law that diverge from ensuring that parties keep their promises may seem troubling.[189] Particularly, it may appear problematic that contract law generally imposes only expectation damages, rather than specific performance.[190] Specific performance more closely matches our moral obligation to do the thing promised.[191] Insofar as the point of contract law is to strengthen and affirm our moral obligations, and insofar as our moral obligations are to do as we have promised, then contract law should aim to align morality and legal obligation.

If one holds this conception of contract law's function, then smart contracts may seem like an appealing alternative to court-based contract law. Courts exert legal force upon us to do as we have promised, thus strengthening our voluntarily assumed commitments. But legal force is a relatively clumsy mechanism. If we want people to

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188. *See generally, e.g.*, T.M. Scanlon, *Promises and Contracts*, *in* THE THEORY OF CONTRACT LAW 86 (Peter Benson ed., 2001) (defending a view of contract law based on the importance of providing assurance to another that promising allows); Daniel Markovits, *Contract and Collaboration*, 113 YALE L.J. 1417 (2004) (defending a view of contract law based on the community created between promisor and promisee).

189. *See, e.g.*, Seana Valentine Shiffrin, *The Divergence of Contract and Promise*, 120 HARV. L. REV. 708, 749 (2007) (noting the aim of "advanc[ing] an accommodationist approach that renders the norms of interpersonal morality relevant to the shape of law" and "deploy[ing] this approach to sound some alarms about the divergence of promise and contract, particularly with respect to contract's remedial doctrines").

190. *Id.* at 724 ("The law . . . fails to use its distinctive powers and modes of expression to mark the judgment that breach is impermissible as opposed to merely subject to a price.").

191. *Id.* at 722 ("Contract law would run parallel to morality if contract law rendered the same assessments of permissibility and impermissibility as the moral perspective, except that it would replace moral permissibility with legal permissibility and it would use its distinctive tools and techniques to express those judgments.").

do as they have promised, then a mechanism that automatically and completely ensures performance may look like a triumph, at least to the extent that it does not come at the expense of other freedoms.[192]

Smart contracts, according to this line of thought, are like specific performance on steroids and without the state's coercive machinery. Smart contracts make it the case that promisors will do precisely what they promise, radically strengthening promises. If this is the point of judicial contract enforcement, then it looks like smart contracts offer a superior technology, and smart contracts would leave judicial enforcement essentially obsolete.

Of course, there is room for concern within this picture of contract law as enforcing promises. First, one might suggest that smart contracts, by making performance inevitable, are no longer promises at all.[193] If so, smart contracts would not reinforce the practice of promising. Whereas contract law supports promising by giving promisors legal reasons to perform, smart contracts do away with the need for reasons altogether, and fail to support the moral agency involved in promising. Pragmatically, it may not be obvious why we should value promising, apart from the reliable commitments that promising enables.[194] But, assuming we should value promising for other reasons, then smart contracts highlight the fact that contract law

192. One reason to disfavor specific performance, even while recognizing that it would be preferable in terms of accurately corresponding with the underlying moral commitment, is that the coercion involved with implementing such a remedy would be too burdensome. This reason is often noted particularly with regard to personal service contracts. *See, e.g.*, 12 ARTHUR LINTON CORBIN, CORBIN ON CONTRACTS § 65.25 (Matthew Bender & Co. 2017) (1950) ("A second reason [against specific performance] is that we have a strong prejudice against any kind of involuntary personal servitude. We insist upon liberty even at the expense of broken promises."). It is sometimes even suggested that specific performance might violate the constitutional prohibition on slavery, though the merits of this constitutional claim is questionable. *See* Nathan B. Oman, *Specific Performance and the Thirteenth Amendment*, 93 MINN. L. REV. 2020, 2025 (2009).

193. One must be cautious not to overstate the point though. Smart contracts do require a voluntary act by the contracting agent at the outset.

194. In any event, a significant further argument would be needed here. It's not transparent that a hypothetical world in which making a promise produced an unfailing compulsion to do the thing promised would be a morally impoverished world. If smart contracts make our world more like this, then they would not bolster agents' choices to keep their promises. But it's not clear why we should care about *that*.

One obvious rationale for creating reasons, as opposed to action directly, would be to respect the freedom or agency of others. I can give you reasons to raise your right hand, but I ought not simply thrust your hand upwards. But this rationale does not apply in as straightforward a way when it is one's own action, as contracting involves. If what I aim to do is to get myself to act, what I may seek is motivation rather than merely reasons.

is about creating or supporting reasons to fulfill our moral obligations, and not only about creating reliable consequences.

Second, one might think that contract law is not only about supporting promises, but about the community or state being the entity lending support. On this view, it is essential that contract law strengthens promising through a political medium. In a contract case, we collectively express our affirmation of an obligation and lend our resources to enforcing that obligation.[195] Smart contracts, by contrast, would strengthen promissory obligations without this state involvement. Of course, to their proponents, this is a key feature of smart contracts.[196] But, to others, this might be a bug. Even though smart contracts would strengthen promises, it would be problematic that this strength fails to come from the political community. Smart contracts would thus raise worries similar to those expressed toward private arbitration or penalty clauses.[197] That is, one might worry that something is lost simply by transferring the power away from the political community.

Leaving aside worries like these, the general point is that if the function of contract law is to strengthen moral obligations to keep promises by adding legal coercion, then smart contracts seem well suited to supplant this function. In short, if contract law is about making people keep their promises, then smart contracts look like they can do that job even better than courts.

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195. *See, e.g.*, Seana Valentine Shiffrin, *Paternalism, Unconscionability Doctrine, and Accommodation*, 29 PHIL. & PUB. AFF. 205, 221 (2000) ("[T]he institution of contract is an institution in which the community assists people who make agreements by providing a measure of security in those agreements.").

196. *See* Popper, *supra* note 49.

197. *See, e.g.*, Owen M. Fiss, *Against Settlement*, 93 YALE L.J. 1073, 1075 (1984) ("I do not believe that settlement as a generic practice is preferable to judgment or should be institutionalized on a wholesale and indiscriminate basis. It should be treated instead as a highly problematic technique for streamlining dockets."); Seana Valentine Shiffrin, *Remedial Clauses: The Overprivatization of Private Law*, 67 HASTINGS L.J. 407, 411 (2016) (noting that remedial clauses are objectionable since they "displace the public's role in determining the content of an important area of law and objectionably displace the judiciary's role in providing fair and impartial judgments about the public significance of legal wrongs"). There is a significant difference for smart contracts, however. Arbitration and penalty clauses ultimately depend on judicial sanction, so that state power is ultimately at issue. Smart contracts, in contrast, do not implicate state authority in this way. So, whereas arbitration and penalty clauses necessarily implicate state power and thus arguably make the political community complicit in their results, it is harder to make such a case about smart contracts.

B. *Contract Law as Voluntary Liability*

A second view of contract law conceives it as a method to create legal liability voluntarily, in a way that is not necessarily connected to morality or promising. According to this view, contractual obligations need not correspond to moral obligations.[198] Instead, contractual obligations can be fashioned where it is in the interest of parties to create them. By creating legal liability, parties can create a distinctive obligation that can serve any number of purposes, from enhancing agency[199] to facilitating efficient transactions.[200]

There are three key elements in this second view. First, contracts—as opposed to promises—involve parties agreeing to legal liability if they fail to perform. The crucial element of contract law is that certain agreements are legally binding; that is, they are subject to agreed-upon legal sanctions for breach. But whether and how any agreement is legally binding is ultimately up to the parties.[201] Rather than understanding legal liability as parasitic on existing moral obligations, this view sees legal liability as the elective creation of the parties involved.

Second, the legal obligations of contract reflect parties opting into liability. Insofar as parties opt into a system of legal penalties, the legal obligations describe those actions to which a legal sanction will attach.[202] Thus, by making it the case that a party will face a sanction

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198. *See* Jody S. Kraus, *The Correspondence of Contract and Promise*, 109 COLUM. L. REV. 1603, 1617 (2009). As Professor Kraus explains:

> When a correspondence account insists on enforcing a promise made by a promisor who intended it not to be legally binding, it paradoxically purports to justify a legal obligation on the ground that it enforces a moral responsibility derived entirely from the individual's free will, even though legally enforcing that obligation violates the will of the very same individual whose autonomy the moral obligation is supposed to vindicate.

Id.; *see also* Michael G. Pratt, *Contract: Not Promise*, 35 FLA. ST. U. L. REV. 801, 809–10 (2008) ("The objection to the claim that contracts are promises, which I have been pressing, exploits the fact that at least some contractual undertakings generate nothing like the moral obligation to perform that attaches to the making of a binding promise.").

199. *See, e.g.*, Robin Kar, *Contract as Empowerment*, 83 U. CHI. L. REV. 759, 761 (2016) ("[C]ontract law aims to empower people to use promises as tools to influence one another's actions and thereby to meet a broad range of human needs and interests.").

200. *See, e.g.*, Charles J. Goetz & Robert E. Scott, *Enforcing Promises: An Examination of the Basis of Contract*, 89 YALE L.J. 1261, 1266 (1980) (arguing that allowing people to bind themselves legally improves utility by shaping and encouraging promise-making activity).

201. *See, e.g.*, Randy Barnett, *A Consent Theory of Contract*, 86 COLUM. L. REV. 269, 319 (1986) (offering a theory of contract in which "[c]ontractual enforcement . . . will usually reflect the will of the parties").

202. On this view, it would be incoherent to imagine parties agreeing to create a legal

for failing to perform, that party thereby generates its own obligation to perform.

Third, because contracting is about parties choosing to attach legal consequences to future actions, questions of contract law should address how to determine what the parties intended, or would have chosen, ex ante.[203] The basic question is what the parties would want, perhaps subject to certain additional nuances.[204] A range of contract doctrines can then be explained as default rules, presumed to be what most parties would want unless they explicitly indicate otherwise.[205] Contract law, then, is fundamentally about enabling transactional activity, by creating a system in which one can voluntarily bind oneself through opting into flexible and predictable consequences for breach.

If this is what contract law does, then smart contracting again looks like it could supplant it. According to this second view, the fundamental purpose of contract law is allowing people to create reliable consequences, enabling them to shape their behavior. The essential feature of contracts is the communication of information about what will happen in the future.[206] Efficient or agency-enhancing transactions can only take place if such communication is intelligible and trusted.

Smart contracts offer the possibility of highly reliable

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obligation to φ and yet attaching no ex post legal consequences to a failure to φ. The legal obligation necessarily and completely reflects that fact that some consequence attaches. This does not mean that obligation and the consequences are one and the same. Any given obligation might have a range of legal consequences.

203. *Cf.* Goetz & Scott, *supra* note 200, at 1264 ("It is important to emphasize that the proper focus here is on prospective effects, that future promising is the behavior to be influenced by the rules summarized above.").

204. *Cf.* Ian Ayres & Robert Gertner, *Filling Gaps in Incomplete Contracts: An Economic Theory of Default Rules*, 99 YALE L.J. 87, 91 (1989) ("We suggest that efficient defaults would take a variety of forms that at times would diverge from the 'what the parties would have contracted for' principle.").

205. *See, e.g.*, Kraus, *supra* note 198, at 1648 (noting that "majoritarian default rules respect personal sovereignty—by maximizing the likely convergence between individuals' promissory obligation and their subjective intent—and by increasing the benefits and reducing the costs of exercising the positive individual liberty to undertake self-imposed moral obligations"); *cf.* Charles J. Goetz & Robert E. Scott, *The Limits of Expanded Choice: An Analysis of the Interactions Between Express and Implied Contract Terms*, 73 CALIF. L. REV. 261, 263 (1985) ("Our framework departs from the conventional view that state-supplied contract clauses are means merely of reducing negotiating and other resource costs; it focuses instead on the value of implied terms as widely useful, predefined signals that reduce the incidence of certain identifiable types of formulation errors.").

206. *See* Goetz & Scott, *supra* note 200, at 1267 ("[T]he promisor informs the promisee about the proposed future receipt of a benefit. The promise itself is merely the production of a piece of information about the future.").

communication about future outcomes. This is true in two ways. First, because the agreed-upon result occurs automatically, uncertainty about performance, and about judicial recognition, disappears. A promisee no longer needs to wonder whether the promise will be kept, or whether a court will recognize the breach. Second, because the code is itself the contract, provisions are laid out in precise, operational terms by definition, to a heightened degree as compared to traditional contract language.

In a well-functioning smart contract, the contract necessarily answers interpretive questions in determinative ways. In short, if contract law exists to facilitate reliance through the ability to opt into predictable future consequences, then smart contracts seem to serve this function even more seamlessly. If contract law is a commitment mechanism, then smart contracts seem to be a superior commitment mechanism.

Again there is room for concern. Specifically, one might worry that the ex ante information costs to determine all contingencies could make smart contracting overly costly. While this is undoubtedly a significant concern, it is ultimately a practical rather than theoretical objection. If smart contracts came with an array of well-understood default rules,[207] that could mitigate the ex ante information costs. To the extent that they persist, it would be a contingent matter to decide in what situations the information costs outweigh the gains in certainty. Smart contracts would, at least some of the time, be a better technology than ex post contract litigation. And this reflects the fact that, on this view, smart contracts and contract law serve the same underlying function.

C. Contract Law as Ex Post Adjudication

We believe that smart contracts are not, even theoretically, a substitute for contract law. Consequently, we believe that the above views about contract law's function, which appear to suggest that smart contracts could replace contract law, are unsatisfactory. These two arguments are mutually reinforcing: one can see the incommensurability of smart contracts and contract litigation by attending to the true function of contract law; and one can see the inadequacy of the above views about contract law by attending to the way in which smart contracts cannot serve the same function as

207. Presumably part of any smart contracting platform—and much of what competing platforms might compete over—would be supposedly majoritarian and efficient default rules.

contract law.

Both views of contract law described thus far assume an ex ante perspective that focuses on how contract law shapes our deliberations and motivations. That is, for both views, contract law is about giving us reasons to act. On the first view, contract law shapes our deliberation by supplementing our moral obligations with corresponding legal obligations. As such, contract law gives us an additional legal consideration in favor of keeping our promises. On the second view, contract law allows us to generate obligations that will shape our deliberations going forward, by electing to impose liability for some actions. As such, contract law creates motivations to comply, which need not correspond with our moral reasons, through the imposition of potential legal liability.

If one holds the second, motivation-creating view of contract law, then it is natural to see smart contracts as supplanting contract law. After all, why create motives for action when one can ensure the action itself?[208] If contract law is about facilitating our actions going forward, then the smart contract seems like an appealing innovation.

But that is not what contract law is about. Contract law does not exist to alter our reasons going forward—though it surely does that. Rather, it exists to adjudicate the justice of a situation ex post.[209] It is backward looking. Its basic function is to decide whether one party has wronged another party by failing to perform a promised action. That is, contract law is a fundamentally remedial institution, not aimed at creating new reasons to perform, but aimed at resolving disputes, taking those reasons as already given. One can see this backward-looking, remedial character in the way that contract law waits for breach, waits for an aggrieved party to bring forward a complaint, and even then rarely orders conduct.[210] We suggest that contract law is not about creating forward-looking reasons, because other mechanisms might serve that purpose equally or better.

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208. The same thing might be said about creating reasons for action, *see* Shiffrin, *supra* note 189, at 749, but there are significantly more questions here. It may be that there is a value to an institution that creates reasons—causes a certain kind of normative engagement—apart from its ability to create motivation. We leave that possibility very open. But, if so, then this again highlights the inability of smart contracts to supplant contract law.

209. *Cf.* RESTATEMENT (SECOND) OF CONTRACTS ch. 16, intro. note (AM. LAW INST. 1981) ("The traditional goal of the law of contract remedies has not been compulsion of the promisor to perform his promise but compensation of the promisee for the loss resulting from [the] breach.").

210. *See generally* Cornell, *supra* note 19 (arguing that rather than enforcing promises and their obligations, contract law enforces complaints against promissory wrongs).

A simple example can illustrate the differences between the three views. Suppose Abby promises Bob that she will pay him back the money that he is considering lending to her. By promising, Abby creates a moral obligation. She now has a special sort of reason to pay the money back. These points about obligation and reasons are true independent of the law. What might contract law add? On one view, it might add an additional obligation—a legal obligation—that corresponds with the moral obligation. So, Abby's moral reasons to pay the money back would now be bolstered by parallel legal reasons or legal motivations. On another view, contract law might add an option for an additional liability. By promising, Abby has subjected herself to moral responsibility, and in doing so, she has created reasons to perform by opening herself up to moral sanctions. In addition, contract law allows her, if she would like, to subject herself to even more accountability—legal accountability. Thus, she could create more, or different, motivations to perform by opening herself up to a new set of sanctions. The difference between these two views is that on the first, but not the second, the legal obligations correspond with the moral obligations. But, according to both answers, contract law adds additional obligations and thus additional motivation to pay Bob back.

But an altogether different answer about what contract law adds is the view that contract law creates a forum to determine what happens if Abby does not perform.[211] On this view, contract law does not change anything about Abby's obligations. Those were complete the moment that she promised—she has reason to pay the money back because she promised to pay the money back.[212] Contract law did not make it that case that Abby *had to* do anything; Abby herself made it the case that she *had to* do something. Contract law adds something ex post to deal with failure. It is not about ensuring that she performs, but about responding if she does not. Contract law enables an avenue for Bob to

211. This idea appears to be an element of recent civil recourse theory. *See generally* Nathan B. Oman, *Consent to Retaliation: A Civil Recourse Theory of Contractual Liability*, 96 IOWA L. REV. 529 (2011) (noting that contract law helps facilitate social welfare by holding individuals accountable without the need for recourse to private violence); Benjamin C. Zipursky, *Civil Recourse, Not Corrective Justice*, 91 GEO. L.J. 695 (2003) (arguing that contract law is a form of corrective justice designed to make aggrieved parties whole). One need not accept all aspects of current civil recourse theory to maintain that contract law is not fundamentally about the creation of reasons ex ante.

212. Of course, this reason may have certain special characteristics—in particular, it may be content-independent and it may be exclusionary. *See* JOSEPH RAZ, MORALITY OF FREEDOM 35 (1986) ("A reason is content-independent if there is no direct connection between the reason and the action for which it is a reason.").

complain if Abby does not fulfill her obligations.

One might think that this avenue for complaint feeds back into the reasons that Abby has to perform. And, in a way, that is true. Abby does get a reason to perform from contract law—specifically, she will be liable to a complaint from Bob if she does not. But that is an indirect, independently empty reason, because it is a new reflection of the reason that she already had. It would be almost absurdly circuitous to think that contract law's primary function was about shaping reasons in such a redundant way. It is much more straightforward to see contract law as fundamentally about adjudicating the wrongs of broken agreements, and the function of creating reason or motivation as incidental.

When one views contract law in this way, then it is apparent that smart contracting does not even purport to do what contract law does. The two have fundamentally different objectives. Smart contracting functions to ensure action. Contract law functions to recognize and remedy grievances. Smart contracts could not—even in theory—replace contract law. At best, smart contracts might reduce the need for contract litigation. But that would not mean that smart contracts serve the same function in a superior fashion.[213] Rather, shifting to smart contracts would mean a shift to an altogether different mode of interaction, and one not clearly superior.

IV. SMART CONTRACTS IN PRACTICE

If smart contracts do something fundamentally different than contract law, does that mean legal scholars can safely ignore them? Perhaps it was all just a misunderstanding, borne out of Szabo's unfortunate choice of terminology two decades ago. If he had called his idea "intelligent agents" or "virtual vending machines," perhaps there would be no reason to examine the legal implications further, but we believe there are still reasons. Our conclusion, that smart contracts are orthogonal to contract law, does not end the inquiry. Smart contracts will be used in situations otherwise subject to contract, and will still be nominally subject to contract law. Problems are likely to

213. To think otherwise would be like thinking that text messaging supplants the function of reading facial expressions insofar as the complete adoption of the former might make the latter unnecessary. *Cf.* Jeffrey Kluger, *We Never Talk Anymore: The Problem with Text Messaging*, TIME (Aug. 16, 2012), http://techland.time.com/2012/08/16/we-never-talk-anymore-the-problem-with-text-messaging/ [https://perma.cc/AGN6-AVAG] ("Habitual texters . . . don't get to practice the art of interpreting nonverbal visual cues.").

arise. These in turn will produce responses with real consequences, both for the parties involved, and for the development of contract law.

Proponents of smart contracts argue they will eliminate the friction of legal disputes.[214] This view is overly optimistic.[215] While the potential benefits of smart contracts are substantial, the potential problems are significant as well. There is a Frankenstein dimension to a smart contract: an instrument that fuses something innately human, entering into and enforcing agreements, with something mechanical, derived from scientific experiments. Science fiction authors since Mary Shelley have warned of the consequences of such cyborgs.[216] Perhaps the benefits of smart contracts will exceed the costs. Perhaps the benefits can be magnified, or the costs minimized. We should, nonetheless, carefully assess both sides of the ledger.

Contract law is, of course, far from perfect. Yet by switching from the ex post adjudication of contract to the ex ante reduction of agreements to software code, smart contracts will in some cases merely shift problems rather than eliminate them. Smart contracts are likely to face two kinds of problems, practical and doctrinal. These difficulties will create pressure for responses. Some traditional solutions can be grafted onto the technical apparatus with limited disruption. Others, however, will involve reintroduction of law. They may even lead to greater regulatory involvement in contract.

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214. *See, e.g.*, TAPSCOTT & TAPSCOTT, *supra* note 8, at 109 ("[T]hrough smart contracts . . . [c]ompanies can program relationships with radical transparency . . . . And overall, like it or not, they must conduct business in a way that is considerate of the interests of other parties. The platform demands it."); Cassano, *supra* note 93 ("Someday, these programs may replace lawyers . . . ."); Andrew Keys, *Memo from Davos: We Have a Trust Problem. Personal Responsibility and Ethereum Are the Solutions*, CONSENSYS BLOG (Jan. 19, 2017), https://media.consensys.net/memo-from-davos-we-have-a-trust-problem-personal-responsibility-and-ethereum-are-the-solutions-19d1104946d8#.c46zvkcks [https://perma.cc/4AQC-T4SW] ("It is early days, and there will surely be the need of attorneys, auditors, and regulators to learn, educate and facilitate smart contracts, but the process will become much more automated, intermediaries will be removed and the cost of trust will plummet.").

215. How widespread litigation will be is an open question. There is also the question of whether aggrieved parties in smart contract arrangements can effectively litigate. As with any transactions on a blockchain, smart contracts designate parties based on cryptographic signatures. The counterparty may be anonymous, or in a different jurisdiction.

216. *See generally* MARY WOLLSTONECRAFT SHELLEY, FRANKENSTEIN, OR, THE MODERN PROMETHEUS (1818) (highlighting the dangers that result from creating a new being). *Cf.* Andrea M. Matwyshyn, *Corporate Cyborgs and Technology Risks*, 11 MINN. J. L. SCI. & TECH. 573 *passim* (2010) (describing firms in the securities industry increasingly dependent on information technology as "corporate cyborgs").

A. Imperfections of Algorithmic Enforcement

There are significant practical limitations in replacing human enforcement of agreements with software running on the blockchain. Things simply do not always go according to plan.[217] Anyone who has seen an error code on their computer knows that sophisticated software-based systems are imperfect. Even if the underlying blockchain consensus mechanisms are reliable, the smart contract applications running on top of them may not be.[218] The failure of The DAO should be a cautionary note for smart contract developers.[219]

Even without bugs, there are reasons to doubt smart contracts will always operate as desired. First, they require reduction of human-readable language to machine-readable code. This limits their scope to those subjects and activities that can readily be specified.[220] For example, a contract to unlock my connected car upon presentation of a certain cryptographic key can easily be encoded through a programming language such as Ethereum's Solidity. The network address for the car lock, the desired key, and the action to be taken, are all subject to precise definition. At the other extreme, some contractual terms simply cannot be expressed through formal logic, because they imply human judgment. A machine has no precise way to assess whether a party used "best efforts," for example.[221]

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217. *See* Scholz, *supra* note 33 ("First, the use of algorithms to determine terms in a contract creates the possibility for emergence, that is, results that are not and indeed could not be foreseen by the algorithm's creator. This creates situations where the entity responsible for the algorithm does not know how it works and cannot predict its behavior.").

218. Peter Vessenes, cofounder of the Bitcoin Foundation, reviewed publically available Ethereum smart contracts and estimated there were 100 errors per 1000 lines of software code. *See* Peter Vessenes, *Ethereum Contracts Are Going To Be Candy for Hackers*, VESSENES (May 18, 2016), http://vessenes.com/ethereum-contracts-are-going-to-be-candy-for-hackers/ [https://perma.cc/6ARK-9NGV]. Even for commercial software, the industry average is as high as 25 errors per 1000 lines of code. *See* STEVE MCCONNELL, CODE COMPLETE: A PRACTICAL HANDBOOK OF SOFTWARE CONSTRUCTION 521 (2d ed. 2004).

219. *See supra* notes 173–77 and accompanying text.

220. *See* Surden, *supra* note 15, at 682–83.

221. A computable or smart contract could be encoded with an algorithm to evaluate such imprecise terms. Human courts and juries often use proxies, formulas, or framing mechanisms to evaluate concepts such as reasonableness or best efforts. At best, however, this reduces but does not eliminate the grey areas around imprecise terms. And even when it offers a precise answer, something is lost in the process in the conversion from analog to digital.

The other way smart contracts can address non-machine-encodable terms is to reintroduce humans. The oracles that the smart contract code references to assess performance may be powered by people rather than just reporting facts in the world. Or the smart contract may incorporate an arbitrator who can resolve uncertain cases in favor of one party or the other through the multisig mechanism. *See supra* note 152 and accompanying text. At some point,

Building a computerized system able to interpret smart contracts like humans can is effectively a challenge for artificial intelligence.[222] And that challenge is unlikely to be solved any time soon.[223] Despite great advances in machine learning, computers do not have the degree of contextual, domain-specific, subtle understanding required to resolve contractual ambiguity. In this regard, smart contract platforms like Ethereum are also vastly less sophisticated than state-of-the-art artificial intelligence systems like IBM's Watson.

Even if the smart contract operates exactly as designed, it may produce suboptimal results, either in the minds of one or both parties, or as a matter of economic efficiency, because it is fixed. Sometimes, for example, nonperformance is the desirable outcome. Much has been made of the idea of efficient breach.[224] If a builder contracts with a carpenter to make custom woodwork for a new home, but notifies the carpenter that the home will not be built before initiation of that work, nonperformance and compensation to the carpenter may be the best result. One interpretation is that contract law is designed to facilitate such nonperformance, assuming the legal default rules for contractual remedies stood behind the parties' negotiation.[225] But, one need not accept the theory that the law sanctions efficient breach to appreciate that the law does not lock parties into performance.[226]

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however, doing so transforms the smart contract into a conventional contract with an arbitration clause, eliminating the alleged benefits of the approach.

222. Steve Omohundro, *Cryptocurrencies, Smart Contracts, and Artificial Intelligence*, 1 AI MATTERS 19, 20 (2014), http://delivery.acm.org/10.1145/2690000/2685334/p19-omohundro.pdf?ip=152.3.34.48&id=2685334&acc=ACTIVE%20SERVICE&key=7777116298C9657D%2E18C4EEC63BFE39A6%2E4D4702B0C3E38B35%2E4D4702B0C3E38B35&CFID=814801535&CFTOKEN=37250381&__acm__=1506721336_f72d6efe11d8ca2344c4f38501c0dee5 [https://perma.cc/T46Y-QCKH].

223. "The conventional view has been that the automation of contract monitoring or compliance is beyond the capability of contemporary technology." Surden, *supra* note 15, at 632 (citing ENRICO FRANCESCONI, SIMONETTA MONTEMAGNI & WIM PETERS, SEMANTIC PROCESSING OF LEGAL TEXTS: WHERE THE LANGUAGE OF LAW MEETS THE LAW OF LANGUAGE 60–62 (2010)); Symposium, *Legal Reasoning and Artificial Intelligence: How Computers Think Like Lawyers*, 8 U. CHI. L. SCH. ROUNDTABLE 1, 19 (2001).

224. *See, e.g.*, RICHARD A. POSNER, ECONOMIC ANALYSIS OF LAW 13–14 (1998); Robert L. Birmingham, *Breach of Contract, Damage Measures, and Economic Efficiency*, 24 RUTGERS L. REV. 273, 284 (1970) ("Repudiation of obligations should be encouraged where the promisor is able to profit from his default after placing his promisee in as good a position as he would have occupied had performance been rendered.").

225. *See* Steven Shavell, *Is Breach of Contract Immoral?*, 56 EMORY L.J. 439, 452 (2006) ("[B]reach could be immoral or moral. To know which is the case, we have to inspect the reasons for breach and the knowledge of the party committing breach.").

226. *See* Cornell, *supra* note 19, at 1175 ("Contract law does not offer a norm against breach of contract. This is not—as the theory of efficient breach would suggest—because contract law

The general lesson is that facts may change between the ex ante specification of contract rights and the ex post adjudication of legal effects. Parties to smart contracts can try to hedge against such changes by incorporating qualifying language or *force majeur* clauses, but those kinds of imprecise terms are difficult to specify in computer code. In other cases, parties may wish to advantageously alter a contract prior to performance. Under standard contract law, such modifications are unproblematic.[227] For smart contracts, such modifications pose a difficulty. Upon agreement, a smart contract is locked in place and secured by pledged cryptocurrency. To enable an intermediate step before execution, the smart contract code would need to incorporate the possibility of modification explicitly. As a technical matter, this would increase the complexity of the process. It would also introduce the kinds of difficulties already described about how to express complex ideas in code, like when and how parties can modify the set terms of a smart contract.

As the literature on relational contracts recognizes, contracts are often more than a one-time interaction between parties, followed by performance or judicial resolution of a dispute.[228] Instead, contracts are elements of ongoing relationships.[229] Both the parties and the courts view the contract in light of social and relational norms. Ex ante, parties to a relational contract must anticipate later renegotiation, and ex post, courts must determine how to fill gaps in the agreed-upon contract.[230] Smart contracts attempt to atomize the contractual process. They formally strip away the time dimension of interactions between the parties, and the uncertainties of future judicial resolution. Yet, smart contracts bind real people, who have real relationships, and their performance unfolds over time. This makes it impossible to avoid some of the messiness that attends traditional contracts.

B. Doctrinal Concerns

Contract law developed over centuries to account for situations that arise in the execution of agreements. Through the inductive

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judges breach of contract permissible when the costs are high enough. Contract law simply does not determine permissibility.").

227. *See* RESTATEMENT (SECOND) OF CONTRACTS § 89 (AM. LAW INST. 1981).

228. *See* Ian R. Macneil, *Contracts: Adjustment of Long-Term Economic Relations Under Classical, Neoclassical, and Relational Contract Law*, 72 NW. U. L. REV. 854, 900–01 (1978).

229. *See, e.g.*, Macauley, *supra* note 91.

230. *See* Eric A. Posner, *A Theory of Contract Law Under Conditions of Radical Judicial Error*, 94 NW. U. L. REV. 749, 751 (2000).

process of the common law, courts evolved solutions to novel problems. Upon closer examination, many of these rules are in tension with smart contracts' mechanism of automatic, irrevocable enforcement.

At a basic level, a smart contract can meet the legal requirements for a valid and enforceable common law contract: offer, acceptance, consideration, capacity, and legality.[231] But a host of potential problems lurk beneath the surface. At virtually every turn, smart contracts might operate in ways contrary to legal contracts. That is, although smart contracts may be legal contracts, they may also fall victim to almost every legal deficiency. Nothing in a smart contract ensures a true meeting of the minds; nothing ensures consideration; and so on. Below, we describe a number of ways that smart contracts might operate problematically, and contrary to the law of contracts.[232]

1. *Problems with Meeting of the Minds.* A smart contract is computer code representing an agreement between two or more parties, so one question might be whether it truly represents a meeting of the minds. Computers, after all, do not have minds, at least not outside the realm of science fiction. But this objection is quickly overcome. In modern contract law, offer and acceptance are evaluated objectively;[233] that is, we allow evidence that both parties intend to be bound, and discard evidence about indicia of internal mental states. The fact that parties submit their cryptographic private keys to commit their resources to the smart contract is proof of such an intent.

The parties' mutual intent to be bound does not, however, prove a meeting of the minds about the specific contractual provisions. The doctrine of mutual mistake excuses performance when both parties were mistaken about an essential fact.[234] If the smart contract refers to cotton delivered by the ship *Peerless* but there are two—or

231. *See, e.g.*, Cohn v. Fisher, 287 A.2d 222, 224 (N.J. Super. Ct. Law Div. 1972) ("The essentials of a valid contract are: mutual assent, consideration, legality of object, capacity of the parties and formality of memorialization."); RESTATEMENT (SECOND) OF CONTRACTS §§ 12, 17, 71, 178–79 (AM. LAW INST. 1981).

232. In all the cases below, it may be possible to write exceptions into the smart contract, or into the basic code of the underlying blockchain platform, to address these situations. *See infra* Part IV.C.1. Such mechanisms are likely to be imperfect, however, and will compromise the efficiency of fully automated smart contracts. They will not automatically apply to every smart contract like a common law doctrine or statutory provision in conventional contract law.

233. *See supra* note 134 and accompanying text.

234. *See* RESTATEMENT (SECOND) OF CONTRACTS §§ 20(1) & illus. 2, 152 (AM. LAW INST. 1981).

seventeen—ships of that name, standard contract law can hold the agreement unenforceable.[235] But the smart contract would go ahead and execute.[236] In a unilateral contract, the mistake might not even need to be mutual for a court to rescind it.[237] In other words, there might be an executable smart contract that does not satisfy the legal conditions for mutual assent. This is because even seemingly ex ante elements of contract law, like assent, actually turn on how matters look ex post.

The basic problem here is that smart contracts are not really smart, at least not in the way that contract law is smart. Smart contracts are not smart enough to adjust as events unfold. Even beyond mistakes, parties may not anticipate the exact scenario that arises at the time of performance. Most contracts are incomplete, in the sense that they do not specify an outcome for every possible state of the world.[238] Courts can fill in the blanks when the contractual expression of the parties' intent is unclear. With a smart contract, this approach is foreclosed.

A second problem related to meeting of the minds arises when the contract itself is clear, but does not represent the intent of the parties, for example, if a party enters into an agreement due to fraud or duress. In such a situation, performance may be excused.[239] The contract itself is valid; it is simply not enforceable. Yet, the distinction between validity and enforceability is precisely the one that smart contracts elide.

A smart contract is valid if it is accepted as part of the consensus process on the blockchain ledger. Once that happens, it is ineluctably enforced, even if fraudulently induced. The blockchain does not have

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235. *See* Raffles v. Wichelhaus, 159 Eng. Rep. 375, 376 (Ex. 1864). For the fact that there were at least eleven ships called *Peerless*; *see* A. W. Brian Simpson, *Contracts for Cotton to Arrive: The Case of the Two Ships Peerless*, 11 CARDOZO L. REV. 287, 295 (1989).

236. Probably the smart contract would use whichever *Peerless* arrived first. If a multisig arbitration arrangement were built into the smart contract, the arbitrator could choose one option. However, the arbitrator would not have the ability, absent a specific contractual provision, to return the funds to both parties and recreate the ex ante status quo.

237. *See, e.g.*, Conduit & Found. Corp. v. Atlantic City, 64 A.2d 382, 385 (N.J. Super. Ct. Ch. Div. 1949) ("Quite plainly, this is a unilateral mistake in a contract for which equity may, under certain circumstances, grant relief by way of rescission."); Chicago, St. Paul, Minneapolis & Omaha R.R. v. Washburn Land Co., 161 N.W. 358, 361 (Wis. 1917) ("[E]quity will grant relief by rescission in proper cases for the mistake of one party as readily as for mutual mistake, where it is shown that it would be contrary to equity and against conscience to allow the enforcement of the contract.").

238. *See* Oliver D. Hart, *Incomplete Contracts and the Theory of the Firm*, 4 J.L. ECON. & ORG. 119, 123 (1998).

239. *See* RESTATEMENT (SECOND) OF CONTRACTS §§ 162, 175 (AM. LAW INST. 1981).

any context regarding *why* parties provide private keys to authorize a smart contract, only that they did. And no one can ask an arbiter to excuse performance because she signed with a gun to her head, because there is no arbiter. The arbiters are the computers operating the blockchain, and they only listen to the code of the smart contracts themselves.

As a practical matter, furthermore, the plaintiff in such a scenario would have difficulty asserting an affirmative cause of action. Duress itself is not a tort. And fraud is significantly different as a cause of action than as an affirmative defense.[240] The most effective recourse for someone improperly induced to enter in a smart contract would likely be to sue for restitution of the ill-gotten gains, after the smart contract executes.

2. *Problems with Consideration.* Similar problems arise with consideration, another basic requirement for an enforceable contract. Consideration distinguishes contracts from unenforceable gifts.[241] All promises may create moral duties, but not all promises create legal obligations. For smart contracts, there is no test for consideration. A typical smart contract involves some consideration that induces the reciprocal promise. However, there is nothing stopping someone from encoding a gift promise to the blockchain. Such a promise would execute irrevocably, in the same manner as any other smart contract. The rest of consideration doctrine, like the distinction between adequacy and sufficiency, similarly goes by the wayside when there is no way to test enforceability before execution.[242]

The absence of consideration from smart contracts sheds further light on how they differ from legal contracts. Consideration doctrine supports the view that contract law exists to provide remedies for

240. *See* RESTATEMENT (SECOND) OF CONTRACTS ch. 7, topic 1, intro. note (AM. LAW INST. 1981) ("Because tort law imposes liability in damages for misrepresentation . . . the requirements imposed by contract law are in some instances less stringent. Notably, under tort law a misrepresentation does not give rise to liability for fraudulent misrepresentation unless it is both fraudulent and material, while under contract law a misrepresentation may make a contract voidable if it is either.").

241. *See* JOSEPH M. PERILLO & JOHN D. CALAMARI, CALAMARI AND PERILLO ON CONTRACTS § 4.1 (6th ed. 2009); Lon L. Fuller, *Consideration and Form*, 41 COLUM. L. REV. 799, 815 (1941).

242. As another example, the preexisting duty rule in contract law rejects modifications which lack independent consideration. *See* Lingenfelder v. Wainwright Brewery Co., 15 S.W. 844, 848 (1891); RESTATEMENT (SECOND) OF CONTRACTS § 73 (AM LAW INST. 1981). If a smart contract does specify the opportunity for mutual modification, it need not incorporate a consideration requirement when doing so.

breach, and not to generate ex ante obligations.[243] If the point of contract were to enforce promises, or to allow parties to advert to liability voluntarily, contract law ought to allow them to make binding gift promises. But from its ex post vantage point, contract law can distinguish unenforceable gifts and mutual legal obligations. By contrast, smart contracts load all the effort into the ex ante specification of contractual terms.

3. *Problems with Capacity*. The issues with legal capacity are somewhat different. Here, the question is not what the contract includes, but who it binds. Those without legal capacity, including children, people with significant mental impairments, and the excessively intoxicated, are excused from contractual performance.[244] As with consideration, smart contracts have no means to test for capacity. There is no legal limitation on minors having private encryption keys or owning Bitcoins, as they are currently restricted from having credit cards or accounts on payment services like PayPal.[245] And if someone digitally signs a smart contract while dead drunk, or another person exploits those circumstances to get them that person do so, there is no future opportunity for subjective evaluation by the other party.

The absence of a capacity test raises a deeper set of issues for smart contracts. The parties to a smart contract, at a technical level, are not people. They are cryptographic private keys. The secret private key represents the individual, based on a mathematical relationship with the associated public key. It is virtually impossible for someone who does not possess the private key to generate a valid digital signature that matches a given public key. This allows cryptographic keys to form the basis for digital identity systems.[246] Identity, however, is a rich

243. *See supra* Part III.C.

244. *See* RESTATEMENT (SECOND) OF CONTRACTS § 12 (AM. LAW INST. 1981). As with meeting of the minds, this is an objective test. *See id.* § 12(1) ("Capacity to contract may be partial and its existence in respect of a particular transaction may depend upon the nature of the transaction or upon other circumstances.").

245. *See* Sean Williams, *Americans' Average Credit Score Is Rising—How Does Yours Compare?*, NEWSWEEK (Dec. 4, 2016, 8:00 AM), http://www.newsweek.com/americans-average-credit-score-rising-527641 [https://perma.cc/3AVE-HBEU] (noting that the CARD Act of 2009 prohibited those under 21 from obtaining credit cards without a parent cosigning or evidence of sufficient income to pay debts); PAYPAL, USER AGREEMENT FOR PAYPAL SERVICES § 1.2, https://www.paypal.com/ga/webapps/mpp/ua/useragreement-full [https://perma.cc/75M2-GGXN] ("To be eligible to use the PayPal Services, you must be at least 18 years old . . . .").

246. *See* L. Jean Camp, *Digital Identity*, IEEE TECH. & SOC'Y, Fall 2004, at 34, 40.

concept, and requires layering various capabilities for authentication, access, and more.[247] Moreover, even if a key uniquely belongs to an individual, the person and the key are not the same. An individual may possess many digital identities, backed by different private keys. The key may be linked to personally identifiable information that points to the specific individual. On the other hand, the key may designate a persistent digital identity hiding the associated real-world person, "pseudonymity," or, it may give no information at all about identity, "anonymity."

It may not be right, then, to say that smart contracts are agreements between people. In the case of the computable or data-oriented contract, the negotiation and specification of an agreement may be left entirely to machines.[248] But there, it is generally easy to view the computers as agents for their human programmers, who specify the conditions under which the computers can contract. The relevant practical difficulties, are not so different from those which agency law has addressed for centuries. With a smart contract, however, the connection between the humans and the agreement becomes more attenuated. The power of execution and enforcement is given over entirely to machines. The humans no longer have the capacity, in the colloquial sense, to avoid performance of the agreement. Perhaps they likewise do not have the capacity, in the legal sense, to perform it.

This analysis connects with the conclusion above that smart contracts are not promises, even if they are contracts.[249] That may be easy to accept conceptually, but as the foregoing discussion shows, things start to unravel when viewed doctrinally. Law bakes in assumptions about the human nature of contract. It may not be difficult as a thought experiment to imagine a contract that does not meet contract law's doctrinal specifications. However, once one dives into the analytical problems of contract law, the difficulties quickly multiply. This illustrates why smart contracts could not supplant contract law.

4. *Problems with Legality*. Perhaps tautologically, a legally enforceable contract cannot effectuate an illegal purpose. Smart contracts, however, are not enforced by the legal system. Imagine, for

247. *See id.*

248. *See supra* Part I.A.

249. *See supra* Part II.A.

example, a price-fixing conspiracy implemented through a series of smart contracts that adjust prices in lockstep.[250] The participants could be prosecuted under antitrust law, but the smart contracts would continue to operate. Further, there is no mechanism to stop a smart contract from implementing an unconscionable term, or a term that incorporates liquidated damages amounting to a penalty. Because the smart contract is self-executing, an action in court finding the terms unenforceable may have no practical effect; the contract will be performed regardless.

The legality test and various public policy rules hint that contract, generally considered a bastion of private law, retains a penumbra of public law. Again, this reinforces the view that contract law is an adjudicative mechanism, and is not principally concerned with reasons and obligations.[251] Legal adjudication is a public function, drawing on the coercive power of the state. Individuals acting together may have no problem effectuating a scheme in derogation of public policy, but as Thomas Hobbes argued, the state is granted an extraordinary monopoly on violence for the very purpose of preventing the war of all against all.[252]

These arguments of political theorists imagining a hypothetical state of nature become tangible with smart contracts. The hacking of The DAO illustrated the problem with contracts that have no opportunity for public oversight.[253] The hack was simultaneously valid as an enforceable smart contract within the software system, yet demonstrably invalid as theft in the minds of the contracting parties. If the perpetrator had exploited a bug in a conventional crowdfunding service such as Kickstarter to siphon off investors' funds, there would be no practical or legal difficulty in canceling the suspect transactions and returning the funds. Ethereum, in contrast, had no alternative to the nuclear option of the hard fork. While that may have fixed the immediate problem, the solution used a bazooka to shoot a mouse and caused significant collateral damage.

Even if a hard fork is effective, it transfers final adjudication from the institution of the courts to the polity of validation nodes.[254] A hard

250. This scenario of an algorithmic conspiracy has in fact been suggested by competition law experts. *See* ARIEL EZRACHI & MAURICE E. STUCKE, VIRTUAL COMPETITION 47–52 (2016).

251. *See supra* Part III.

252. *See* HOBBES, *supra* note 6.

253. *See* Popper, *supra* note 172.

254. Even if a court wished to halt execution of a smart contract such as the one through which funds were stolen from The DAO, there would not necessarily be any party to enjoin. *See supra*

fork stands or falls on whether a majority of the mining power in the blockchain network adopts it. This is not how contracts work. We do not adjudicate disputes through opinion polls or the ballot box. We grant the judge or jury authority to decide, constrained by the procedures of the legal system, the traditions of the common law, and the opportunity for legislative modification going forward. The limitations of direct democracy are familiar to anyone who has read the *Federalist Papers*.[255] Miners' interests may be even further removed from those of the community as a whole than "factions" in a democracy.

This is not to say that smart contracts are a threat to democratic values. One can imagine many scenarios in a world where smart contracts are prevalent, but legal analysis cannot rest entirely on imagined scenarios. We have no way of knowing how popular smart contracts will become, let alone how frequently controversies like The DAO hack will arise. What matters is that the seemingly abstract conflicts between smart contracts and basic doctrines of contract law touch deeper nerves, with potentially significant consequences. And, as in Part III, we investigate smart contracts for what they illuminate about conventional contracts.

C. Looking Forward

Having established that smart contracts both clarify the purpose of contract law in theory and challenge its application in practice, we conclude with a sketch about what happens next. Any recommendations at this time are necessarily provisional. Smart contracts are so new, and their prospects are so uncertain, that firm predictions are unwise, let alone normative judgments from those predictions. However, that is no reason to ignore potential consequences while there is still time to avoid them. And given the various considerations we have discussed, it is unreasonable to assume smart contracts will be implemented seamlessly.

1. *Best Practices.* The parties entering into smart contracts are not powerless to avoid their shortcomings. Knowing they cannot rely on the judicial decisionmakers to fill gaps, one can expect parties to put more effort into contract design and drafting.[256] Additionally, just as

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note 96 and accompanying text.

255. *See, e.g.*, THE FEDERALIST NO. 10 (James Madison).

256. *See* Karen Eggleston, Eric A. Posner & Richard Zeckhauser, *The Design and*

transactional lawyers provide expertise in the construction of business agreements, a new class of "legal engineers" may arise to aid in the creation of smart contracts.[257] Parties can also employ technical mechanisms to lessen the rigidity of smart contracts. For example, giving authority to human oracles who decide whether the factual basis for performance has been met,[258] or employing arbitrators who resolve disputes through a multisig arrangements,[259] may avoid some of the draconian implications of fully self-enforcing agreements.

Already, organizations involved in the development of smart contract platforms are starting to create templates that embody best practices for smart contract drafting.[260] Using these templates, parties could avoid repeating mistakes in prior smart contracts, and they could draw on the expertise of industry groups carefully thinking about potential pitfalls. Smart contracting systems or, "contractware" to use Raskin's term,[261] could be programmed to offer templates automatically based on the desired agreement. Default terms, for example, requiring an opportunity for mutual modification prior to execution, could be mandatory to issue a smart contract on a particular platform. Parties could consult technical auditing firms to certify the integrity of smart contract code.[262] Even if the platforms are not subject to any legal duties regarding the contracts they enable, they still may care about avoiding harmful outcomes due to either ignorance or malfeasance by parties.

We cannot predict how well this optimistic story will play out. Surely, technical mechanisms for improving the quality of smart

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Interpretation of Contracts: Why Complexity Matters, 95 NW. U. L. REV. 91, 120 (2000) (making a similar point about parties entering into incomplete contracts with uncertainty about enforcement).

257. *See* Nina Kilbride, *Blockchain Legal Engineering*, MONAX BLOG (May 2, 2016), https://monax.io/2016/05/02/blockchain-legal-engineering/ [https://perma.cc/5RUG-VCV7].

258. *See supra* note 118.

259. *See supra* note 152.

260. *See* CHRISTOPHER D. CLACK, VIRAM A. BAKSHI & LEE BRAINE, BARCLAYS BANK PLC, SMART CONTRACT TEMPLATES: FOUNDATIONS, DESIGN LANDSCAPE AND RESEARCH DIRECTIONS (Aug. 4, 2016), https://arxiv.org/pdf/1608.00771v2.pdf [https://perma.cc/6FZR-NGPW]; Ian Allison, *Barclays' Smart Contract Templates Stars in First Ever Public Demo of R3's Corda Platform*, INT'L. BUS. TIMES (Apr. 18, 2016 3:45 PM), http://www.ibtimes.co.uk/barclays-smart-contract-templates-heralds-first-ever-public-demo-r3s-corda-platform-1555329 [https://perma.cc/8JHG-45BY].

261. *See* Raskin, *supra* note 23, at 307.

262. Such smart contract code auditing firms are already beginning to spring up. *See, e.g.*, *About*, ZEPPELIN SOLUTIONS (2017), https://zeppelin.solutions/about [https://perma.cc/85BK-Z7RJ].

contracts will not eliminate the potential problems, any more than the ready availability of skilled lawyers prevents disputes over legal contracts.

2. *Restitution.* It would be a grave mistake to think that smart contracts will eliminate litigation. Litigation—like nature—will find a way. Parties will inevitably feel they were treated unfairly at times, and they will inevitably bring those complaints to court. The difference, however, will be the posture of the litigation. Rather than complaining parties seeking fulfillment of alleged promissory obligations, complaining parties will seek to undo or reverse completed transactions. Litigation will persist, but it will shift from claims of breach, to claims of restitution.

One might think that this effectively shifts contracts from liability rules to property rules.[263] That's not quite right, because one could have a smart contract that awards liability damages in a self-executing way. Rather, the difference is between ex ante enforcement and ex post adjudication. We have tried to illustrate that it is a mistake to conceive of these as simply two different forms of "enforcement."[264]

An effort to recover already-transferred resources is different than an effort to enforce an agreement. Thus, an action for restitution is very different than an action for breach of contract. At a minimum, the roles of the parties are reversed. In an action for breach, the nonperforming party seeks to enforce a transaction; whereas, in an action for restitution, the performing party seeks to reverse the transaction. Reversing who stands as plaintiff shifts the burdens of proof and litigation. In situations such as mutual mistake, there may be no a priori reason to favor one side. But when actions arise from claims of fraud, repugnance to public policy, or gifts without consideration, the balance of equities may shift in undesirable ways.

Those seeking redress for injuries suffered due to smart contracts may be forced to plead actions beyond quasi contract. To take an example highlighted earlier, both the plaintiff and the defendant can raise a claim of fraud, but the legal context is quite different. The plaintiff's claim is a tort, the defendant's claim is an affirmative defense in contract, and the legal requirements are different. Moreover, in

263. *See* Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089, 1106–10 (1972) (distinguishing property and liability rules).

264. *See supra* Part III.

practice, such litigation may unfold quite differently if the focus shifts from the contract to the technical structures associated with it.[265] Because the transfer of value associated with the smart contract is tied to the parties' cryptographic private keys, the plaintiff may need to sue to force the defendant to give up that key, or perhaps computer passwords protecting it. Law enforcement agencies have done just that, when pursuing proprietors of Bitcoin exchanges promoting illegal activity like drug trafficking.[266] If that is the model, however, we have strayed quite far from the private law domain of contract.

3. *Regulation.* Indeed, the paradoxical result of smart contracts may be to expand the scope of government intervention into technological advancements, which has traditionally been a paradigmatic environment of private ordering. Once again, the shift from ex post adjudication to ex ante enforcement creates an inversion. Contracts free individuals to trust each others' commitments because they can rely on the power of the state to enforce them in cases of breach. Smart contracts remove the state from adjudication, but in so doing, they create pressure to reintroduce the state at the front end of the process. The only way to prevent smart contracts from facilitating illegal or disfavored conduct is to regulate them.[267]

It is a myth that the blockchain is inherently incompatible with regulation.[268] Any distributed ledger system may be more or less

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265. By analogy, the development of autonomous vehicles has given new life to the philosophical Trolley Problem and raised the question of how one can sue a car for injuries caused by its algorithms. *See* John Markoff, *Should Your Driverless Car Hit a Pedestrian to Save Your Life?*, N.Y. TIMES (June 23, 2016), https://www.nytimes.com/2016/06/24/technology/should-your-driverless-car-hit-a-pedestrian-to-save-your-life.html [https://perma.cc/C5DZ-26NG] (relating autonomous vehicles to the classic Trolley Problem); Matt McFarland, *Who's Responsible When an Autonomous Car Crashes?*, CNN TECH (July 7, 2016), http://money.cnn.com/2016/07/07/technology/tesla-liability-risk/ [https://perma.cc/8DLM-ELXS]. Uber required passengers of its autonomous vehicle pilot program in Pittsburgh to agree to terms of service waiving any right to sue for injuries. *See* Mark Harris, *Passengers in Uber's Self-Driving Cars Waived Right to Sue for Injury or Death,* GUARDIAN (Sept. 26, 2016), https://www.theguardian.com/technology/2016/sep/26/uber-self-driving-passengers-pittsburgh-injury-death-waiver [https://perma.cc/85DX-XSY9]. Whether this waiver is enforceable is another question.

266. *See* Jon Matonis, *Key Disclosure Laws Can Be Used to Confiscate Bitcoin Assets*, FORBES (Sept. 12, 2012, 9:50 AM), https://www.forbes.com/sites/jonmatonis/2012/09/12/key-disclosure-laws-can-be-used-to-confiscate-bitcoin-assets/#4e414655ef54 [https://perma.cc/3JS9-L9GE].

267. *See* Raskin, *supra* note 23, at 340; *cf.* Scholz, *supra* note 33 (making similar arguments for regulation of algorithmic contracts).

268. *See* Jerry Brito, *Foreword* to PAUL ANNING ET AL., THE LAW OF BITCOIN, at xiii, xiii (Stuart Hoegner ed., 2015) ("A common misconception about Bitcoin is that it is not regulated."); Jerry Brito, *Bitcoin Remains a Tool for Freedom, Even While Going Mainstream*, REASON.COM

decentralized, and more or less anonymous, based on its technical design. Bitcoin and Ethereum are examples of "permissionless" systems that have no supervisory entity authorized to accept or reject participation in the mining network.[269] Other smart contract platforms, such as the Corda system for interbank transactions, only recognize trusted nodes, such as member banks.[270] This makes them less resistant to government intervention or private domination. A Corda smart contract could easily be subject to regulatory oversight, like the Anti-Money Laundering and Know Your Customer regulations that mandate identification of bank customers.[271] Even for a permissionless system, centralized intervention is not impossible; it is just very difficult and costly, as shown by the Ethereum hard fork to resolve The DAO hack.[272]

Perhaps a more apt parallel is the regulation of digital signatures. With the rise of e-commerce in the 1990s, it quickly became clear that digital signatures based on public-key cryptography could solidify commitments in the same manner as conventional signatures on traditional contracts.[273] A digital signature, however, is not really a

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(May 19, 2014), http://reason.com/archives/2014/05/19/bitcoin-remains-a-tool-for-freedom-even [https://perma.cc/AAW8-6FCR] ("The cold logic of economies of scale tend to lead to greater centralization, and thus more regulation, and this will likely happen to Bitcoin, too."); Wright & de Filippi, *supra* note 22, at 4 ("[T]here will be an increasing need to focus on how to regulate [blockchain technology]."). *But see* Ariel Deschapell, *Why Regulating Bitcoin Won't Work*, COINDESK (Feb. 25, 2014, 14:00) http://www.coindesk.com/why-regulating-bitcoin-will-not-work [https://perma.cc/BM4R-BXEW] ("This is what scares governments, but the point they seem to miss, is that for better or worse, they can't do anything about [regulating Bitcoin]."). *See generally* Werbach, *supra* note 17 (arguing that in fact, legal harmonization and regulation are essential to fulfilling the promise of the blockchain).

269. *See* Swanson, *supra* note 99 (explaining the distinction between permissioned and permissionless blockchains).

270. *See id.*; Michael del Castillo, *R3 Announces New Distribution Ledger Technology Corda*, COINDESK (Apr. 5, 2016, 10:34 PM), http://www.coindesk.com/r3cev-blockchain-regulated-businesses/ [https://perma.cc/4L4Z-2M2U].

271. *See* Ian Allison, *R3 Develops Proof-of-Concept for Shared KYC Service with 10 Global Banks*, INT'L. BUS. TIMES (Nov. 10, 2016, 4:15 PM), http://www.ibtimes.co.uk/r3-develops-proof-concept-shared-kyc-service-10-global-banks-1590908 [https://perma.cc/7AM7-7TPP]; Aleya Begum, *R3's Corda Uncovered: It's Not Blockchain*, GLOBAL TRADE REV. (Oct. 1, 2017), http://www.gtreview.com/magazine/volume-15issue-3/r3s-corda-uncovered-not-blockchain [https://perma.cc/LZ7K-HMZ9] ("Corda takes a different approach. By default, information about transactions is only shared with those parties to a transaction.").

272. *See supra* note 173 and accompanying text.

273. *See* Tim Squitieri & Paul Davidson, *E-Signatures Seen as Big Boon to Business: Companies Expect to See Huge Savings*, USA TODAY, June 15, 2000, at 7A; John Schwartz, *E-Signatures Become Valid for Business*, N.Y. TIMES (Oct. 2, 2000), http://www.nytimes.com/2000/10/02/business/e-signatures-become-valid-for-business.html [https://perma.cc/J5YK-7XDM].

signature at all. It is a private key that generates an associated public key. Ultimately, the E-SIGN Act preempted contrary state law, and ensured that rules requiring signatures could be satisfied with their digital analogues.[274] The legal effects and limitations of digital signatures were therefore not defined by handwriting specialists, but by government.

Under many scenarios, regulators might interpose themselves into the workings of smart contracts. Generally speaking, these will involve regulation of the contracting software platforms or blockchain validation nodes, rather than the parties themselves. Someone knowingly entering into an illegal smart contract has still violated the law, but it will likely be easier to police the enabling systems.[275] The kinds of smart contracts parties can form will depend on the functionality and interfaces of the available tools. This recalls the fate of P2P file-sharing systems like Napster, which facilitated widespread copyright infringement. The Supreme Court eventually concluded that even when P2P services had no specific knowledge of or ability to prevent infringing transfers, the services were still liable if set up to induce them.[276] A smart contract system that facilitated copyright infringement, for example, by granting users digital rights to content without proper licenses, would likely suffer the same fate.

As noted earlier, nothing technically prevents execution of an illegal smart contract.[277] The infamous Silk Road online marketplace used Bitcoin payments to facilitate sales of illegal goods, but the transactions themselves used the same electronic contracting mechanisms as legitimate sites like Amazon.com or Ebay.[278] If smart contracts can further automate such activities, or financial crimes like money laundering, there will be pressure to prohibit intermediaries from enabling or processing them. Moreover, legal requirements, like the automatic stay in bankruptcy law, can supersede contractual obligations. Courts and legislatures may attempt to require smart

274. Electronic Signatures in Global and National Commerce Act, Pub. L. No. 106-229, § 101.114 Stat. 464 (2000) (codified at 15 U.S.C. § 7001 (2012)); *see also* Jay M. Zitter, Annotation, *Construction and Application of Electronic Signatures in Global and National Commerce Act (E-Sign Act), 15 U.S.C.A. §§ 7001 to 7006*, 29 A.L.R. Fed. 2d 519 (2008) (explaining that a signature may not be denied solely because it is electronic, but that acceptance of electronic signatures are not mandatory).

275. *See* Raskin, *supra* note 23, at 340 (suggesting that illegal smart contracts be subject to regulation).

276. Metro-Goldwyn-Mayer Studios Inc. v. Grokster, Ltd., 545 U.S. 913, 936–37 (2005).

277. *See supra* Part IV.B.4.

278. *See supra* note 100.

contracting systems to incorporate exceptions for such contexts.[279]

Administrative regulation of smart contracts is also a possibility. Various agencies, including the Federal Trade Commission (FTC), the Securities and Exchange Commission, and the Consumer Financial Protection Board, have authority to prevent unfair or deceptive practices. This extends to situations where companies do not intend consumer harms, but fail to take sufficient precautions against them. For example, the FTC successfully brought an enforcement action against Wyndham Hotels for inadequate information security practices, which led to losses of customer data.[280] One could imagine a similar action against the developers of The DAO, the Ethereum Foundation, or miners who processes its transactions, based on their failure to offer adequate safeguards for funds pledged to the crowdfunding system.[281] It is difficult to evaluate what this would mean in practice. The Ethereum Foundation is a Swiss nonprofit, The DAO software is an open-source project, and the miners are a changing collection of voluntary participants around the world. Imposing regulatory obligations on any of them would be problematic. Yet if significant consumer harms materialize, regulators are unlikely to walk away.

An analogous situation occurred in the early days of the commercial internet. The Digital Millennium Copyright Act of 1998[282] gave intermediaries immunity from liability for copyright infringement, but only if they complied with notice-and-takedown procedures when notified of infringing material.[283] Congress or a state legislature concerned about smart contracts running amok might grant a safe harbor to software creators, application providers, and validation node operators, but condition that safe harbor on the adoption of templates, functional limitations, and audits for executable smart contracts. Such rules could be vague or overbroad, chilling the adoption of smart contracts, or they might provide security for parties who otherwise would be disinclined to use smart contracts. At this point, the specifics are too difficult to predict with any confidence.

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279. *See* Raskin, *supra* note 23, at 327–29.

280. *See* F.T.C. v. Wyndham Worldwide Corp., 10 F. Supp. 3d 602, 615 (D.N.J. 2014), *aff'd*, 799 F.3d 236 (3d Cir. 2015) (upholding the FTC's action).

281. One way to reach these parties would be to treat the smart contracts as legal agents of their creators. *See* Scholz, *supra* note 33.

282. Digital Millennium Copyright Act of 1998, Pub. L. No. 105-304, 112 Stat. 2860 (codified at scattered sections of 17 and 28 U.S.C.).

283. 17 U.S.C. § 512 (2012).

To some degree, this is a familiar story. Where freedom of contract stands in the way of important public policy objectives, it must give ground. That occurred most famously when the New Deal eventually broke through the *Lochner* Court's resistance to economic regulation.[284] Smart contracting systems offer a kind of technical due process protection from legislative or judicial interference. While they may hold the state at bay to an extent, they will not eliminate it from the picture.

CONCLUSION

Our goal has been to analyze smart contracts from the perspective of law—and vice versa. Though there is significant evidence smart contracts will eventually enjoy widespread adoption, we make no assumptions about their technical and business trajectory. Even if smart contracts turn out to be a fad, they can help us better understand legal contracts. And if blockchain-based smart contracts fail, another technology will inevitably arise to achieve the same objectives. The very act of unpacking smart contracts may help to anticipate—and thus, to mitigate—potential difficulties.

Smart contracts are just one part of the larger trend of computerized technologies purporting to displace or replace human decisionmaking.[285] In areas like hiring, finance, and copyright enforcement, algorithmic systems are touted for their speed, efficiency, and reliability, unlike error-prone and potentially biased humans. Indeed, the benefits are considerable. But it quickly becomes clear that machines are prone to their own errors and biases.[286] Additionally, the introduction of algorithmic systems into historically judgment-laden fields creates challenges for legal and practical accountability.[287] As a

284. *See, e.g.*, Nebbia v. New York, 291 U.S. 502, 523 (1934) (upholding government price regulation on the grounds that "neither property rights nor contract rights are absolute; for government cannot exist if the citizen may at will use his property to the detriment of his fellows, or exercise his freedom of contract to work them harm").

285. *See generally* ANDREW MCAFEE & ERIK BRYNJOLFSSON, RACE AGAINST THE MACHINE (2011) (detailing the replacement of workers by computers).

286. *See generally* FRANK PASQUALE, THE BLACK BOX SOCIETY: THE SECRET ALGORITHMS THAT CONTROL MONEY AND INFORMATION (2015) (arguing that powerful economic actors use "black box" computer algorithms to expand their power, often unfairly); Solon Barocas & Andrew D. Selbst, *Big Data's Disparate Impact*, 104 CALIF. L. REV. 671 (2016) (describing how machine learning algorithms can produce discriminatory outcomes).

287. *See generally* PASQUALE, *supra* note 286; Maayan Perel & Niva Elkin-Koren, *Accountability in Algorithmic Copyright Enforcement*, 19 STAN. TECH. L. REV. 473 (2016) (examining the difficulties of enforcing copyrights through online intermediaries and proposing a

result, both legal scholars and computer scientists are developing techniques to promote fairness and transparency in these decisions.[288] A similar dynamic can be expected for smart contracts.

Contract law is nothing if not resilient. We have little doubt it will survive the onslaught from smart contracts, if indeed that is what is happening. However, contract law may learn something about itself from its new challenger.

new accountability framework).

288. *See* Barocas & Selbst, *supra* note 286, at 675; Nicholas Diakopoulos, *Accountability in Algorithmic Decision Making*, 59 COMM. OF THE ACM 56, 62 (2016); Joshua A. Kroll et al., *Accountable Algorithms,* 165 U. PA. L. REV. 633, 637–38 (2017); Michael Feldman et al., *Certifying and Removing Disparate Impact*, *in* 21 PROC. ACM SIGKDD CONF. ON KNOWLEDGE DISCOVERY & DATA MINING 259 *passim* (2015), https://ww3.haverford.edu/computerscience/faculty/sorelle/papers/kdd_disparate_impact.pdf [https://perma.cc/7GSG-5BAJ].

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Title of Invention

METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	9843	FILED BY	Jackeline De Ranieri
PATENT CENTER #	64093885	FILING DATE	05/14/2023
CUSTOMER #	24341	FIRST NAMED INVENTOR	Paresh K. Patel
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Douglas Crisman

Documents

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DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
104402-5075-US Information Disclosure Statement 25JAN2024.pdf	4	Transmittal Letter	131 KB
104402-5075-US List of References Form 1449 25JAN2024.pdf	2	Information Disclosure Statement (IDS) Form (SB08)	104 KB
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Notice of Allowance US18197070 20DEC2023.pdf	10	Non Patent Literature	500 KB
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Part 15.4 Wireless Medium Access Control- Part 1 of 3.pdf	250	Non Patent Literature	21319 KB
Part 15.4 Wireless Medium Access Control- Part 2 of 3.pdf	250	Non Patent Literature	11926 KB
Part 15.4 Wireless Medium Access Control- Part 3 of	179	Non Patent Literature	10249 KB

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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PRINTING 3D OBJECTS WITH AUTOMATIC DIMENSIONAL ACCURACY COMPENSATION

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Abstract of CN108367497 (A)

Techniques are described for improving dimensional accuracy, and more specifically z-axis or vertical dimensional accuracy in generating a 3 dimensional (3D) object comprising a plurality of formablelayers. In one example, a height configuration parameter, (such as a selected layer height, a print resolution, one or more tolerance values for certain layers or portions of a 3D object to be printed, etc.,) and a total object height, may be obtained. A first height corresponding to a subset of the plurality of formable layers may be selected based on the received height configuration parameter and the total object height. In some aspects, the first height may include a

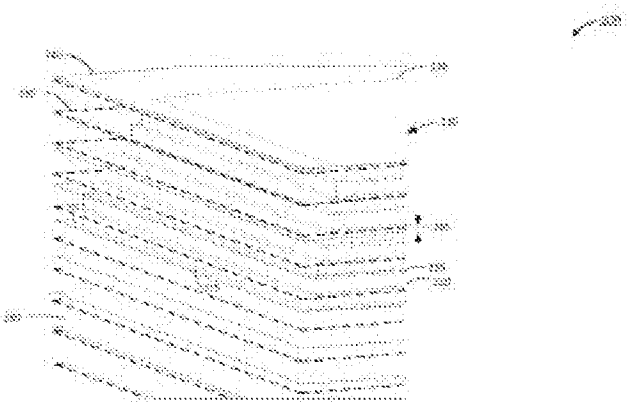

FIG. 2

global layer height for the 3D object. The first height may be selected to optimize accuracy of the height configuration parameter or the total object height.

Notice

DESCRIPTION CN108367497A

10 Print 3D objects using automatic dimensional accuracy compensation

[0001]

14 Technical field

[0002]

18 The present disclosure relates generally to three-dimensional (3D) printing or additive manufacturing, and more specifically to improving scale accuracy when creating 3D objects.

[0003]

23 background

[0004]

27 Creating 3D objects presents special challenges in terms of the complexity of modeling the 3D objects and the complexity of generating the 3D objects to accurately depict real-life objects.

29 Many 3D printers or additive manufacturing devices print or generate objects from a 3D model generated from a computer-aided design application, such as by slicing the model into thin horizontal layers and depositing material vertically layer by layer (e.g., melted plastic, clay, concrete, metal powder, food).

32 Layer height (thickness) is typically selected via a user interface (UI) control that allows either a direct fixed setting of the layer height (e.g., .25mm or 250 microns) or in a simpler general form with correlation to standard printer items Layer resolution associated with a predetermined layer height (e.g., fine, standard, coarse, etc.).

36 Layer height or layer resolution is closely linked to the trade-off between print speed versus vertical step resolution print quality. Contemporary slicing applications (slicing programs) generally fail to take into

account the impact of fixed layer height on the overall vertical scale accuracy of the printed object. Quantization in the form of fixed-height layer slices can result in a vertical (z-axis) scale error of +-50% for the selected layer height (e.g. .125mm for a .25mm layer height), larger than what can typically be achieved by a well-tuned 3D printer. The resulting typical x-y plane scale of 2 microns (0.002mm) is two orders of magnitude more accurate.

[0005]

46 As a result of blind selection of layer heights, 3D printed objects turn out to have vertical or z-axis features (including the top of the object) aligned with multiples of the desired layer height and with potentially large errors in the z-dimension of the printed object.

49 For example, printing a 1.12mm 3D object using 250 micron layers will result in an object that is actually 1mm tall, or a 12% error. This error occurs because the object would require 4.48 layers, but the slicing program rounds down to 4 layers. The effect of this error is not limited to the top of the object, but to all features of the object at different z-level heights. For example, consider printing a chair object where the step increments are not aligned with the layer height. This configuration results in errors at every step up to the upper surface of the object. Typically controlled by steppers or servo motors or other moving devices, 3D printer hardware is capable of much higher accuracy in the Z axis - in practice, typically in the range of 10 microns to less than 1 micron (100 steps/mm - 1600 steps/mm) resolution. This fine positioning control in the z-axis hardware results in the creation of objects with z-scale accuracy in the range of 1-10 microns (0.1% to 1% error). Accordingly, improvements to the 3D printing process can be made.

[0006]

62 Overview

[0007]

66 Illustrative examples of the present disclosure include, but are not limited to, methods, systems, and various devices.

68 In one aspect, scale accuracy may be improved when generating three-dimensional (3D) objects that include multiple formable layers.

70 Receives at least one height configuration parameter and the total object height. A first height corresponding to at least a subset of the plurality of formable layers is selected based on the received at least one height configuration parameter and the total object height. The first height may be selected to optimize accuracy of at least one of the at least one height configuration parameter or the total object height. The first height can be passed to a 3D printer to generate a 3D object.

[0008]

78 Other features of the system and methods are described below.

79 Features, functions, and advantages may be implemented independently in each example, or may be combined

in yet other examples, and further details of the features, functions, and advantages may be seen with reference to the following description and drawings.

[0009]

85 Brief description of the drawings

[0010]

89 Various embodiments of the present disclosure will be described more fully hereinafter with reference to the accompanying drawings, in which:

[0011]

94 Figure 1 depicts an example of a computing device in communication with a 3D printer capable of printing three-dimensional (3D) objects.

[0012]

99 Figure 2 depicts an example perspective view of a 3D object split into a set of 2 layers, each layer having a different thickness or layer height.

[0013]

104 Figure 3 depicts an example process for segmenting an object into layers via a slicing program associated with a 3D printer.

[0014]

109 Figure 4 depicts an operational procedure for selecting layer heights for at least a subset of a plurality of layers forming a 3D object.

[0015]

114 Figure 5 depicts an example of a more detailed operational procedure for selecting a global layer height and a localized layer height for at least a layer subset of a 3D object.

[0016]

119 Figure 6 depicts another example of a detailed operational procedure for selecting a layer height of at least a layer subset of a 3D object.

[0017]

124 Figure 7 depicts an example process for segmenting an object into layers by a slicing program associated with a 3D printer in accordance with the operating procedures of Figures 4 and/or 6.

[0018]

129 Figure 8 depicts an example process for segmenting an object into layers by a slicing program associated with a 3D printer according to the operating procedures of Figures 4, 5 or 6.

[0019]

134 Figures 9A and 9B depict example perspective views of a 3D object with certain z-axis features positioned between layers of the 3D object.

[0020]

139 Figure 10 is an example general computing environment in which techniques described herein may be implemented.

[0021]

144 Detailed description of illustrative embodiments

[0022]

148 At least for the purposes of this specification, the terms and phrases selected herein may have the following meanings:

[0023]

153 a) Bed Leveling: Refers to the 3D printer calibration process that measures the height of the print nozzle (hot end) relative to the surface on which the printed object will be made (also known as the print surface, print bed, build plate).

156 The calibration process may include moving the printhead across the print bed and stopping at multiple locations to measure the clearance between the nozzle and the surface.

158 Calibration measurements may be used by the printer controller to adjust the z-axis height during printing, or may be used by the slicing program to adjust the layer height of one or more layers where it is necessary to compensate the printer at the point being measured. Changes in nozzle-surface clearance.

[0024]

b) Feature: refers to any area or aspect of the 3D model in which the scale tolerance of the printed object is important.

[0025]

c) Local features: refers to 3D model features such as vertical slopes or sloping surfaces, or high/low points that have a higher/lower height than nearby surrounding surfaces but always lower than the total height of the 3D model (also known as maxima) /minimum) of those surfaces.

[0026]

d) Layer: A single incremental z-axis fixed-height plane horizontal slice of the 3D model through which the 3D printer is guided to deposit material on the platform or forwardly deposited layer of material.

[0027]

e) Slice: refers to a single (usually vertical) section layer of a 3D object model.

[0028]

f) Slicing program: a software program that converts a 3D object model into a collection of sliced layers of one or more layer heights.

The sliced layers may be viewed graphically on a display or converted into tool path commands used to instruct the 3D printer to create a physical representation of the 3D object model.

Slicing program functionality may be implemented entirely or partially on a mobile or other personal computing device, on computing components within a 3D printer, or locally or remotely that may include physical or virtualized computing resources (e.g., data center servers, virtual machines) executed on the computing environment.

[0029]

g) Global layer height: refers to the layer height defined by the print quality selection (e.g., coarse, normal, fine), which is adjusted as needed to produce precise and in some cases the most accurate overall results in the 3D printed object. Height scale, as specified by the corresponding model data.

[0030]

h) Optimal layer height: refers to the layer height that is such that when combining multiple parameters such as, for example, tolerances for multiple object model height characteristics, minimum resolution capabilities of 3D conductor rows, or local layer height characteristics (proximity to other layer height features), the printed 3D object height features have exactly the same scale as the model or as close to the scale as can be achieved.

[0031]

209 i) Height configuration parameter: Specifies the height aspect (z-axis scale) of the 3D model or object.

210 For example, this could be, but is not limited to, nominal story height, overall height, local feature height, height tolerance, z-axis height tolerance for vertical slopes or curved surfaces, etc.

[0032]

215 j) Total height: refers to the distance from the lowest surface of the 3D model to the highest surface or highest point (ie, the total z-axis scale).

[0033]

220 This article describes systems and techniques for selecting layer heights to generate 3D objects to improve the scale accuracy of the generated 3D objects.

222 In this aspect, the layer height may be determined based on the total height (z-axis scale) of the 3D object model to be generated using a 3D printer or other additive manufacturing technology and at least one height configuration parameter that may be obtained or received.

225 The layer heights selected for at least a subset of the plurality of formable material layers to be printed to form the 3D object may be determined based on the total object height and at least one height configuration parameter.

228 The layer height may be selected to maximize the accuracy of at least one of the total height of the 3D object or one or more local/global maximum height features or other configuration parameters of the 3D object model.

230 In some aspects, for example, based on design considerations or user choices/preferences, optimal layer heights may be calculated and printed using nominal or current layer heights to achieve the next local/global maximum height feature of the 3D object model or to achieve the total object height. The required remaining layers are selected with associated errors.

234 In some aspects, when selecting an optimal layer height, the error associated with the total object height is compared to the error associated with using the nominal or current layer height to print the remaining layers to achieve the next local maximum height characteristic of the 3D object model. Errors may be weighted more heavily, vice versa, or in any proportion (e.g., based on user preference, etc.).

238 In some aspects, the calculated positive error in printing the remaining layers to reach the next local/global maximum height characteristic of the 3D object model or to reach the total object height can result in a selection due to a slightly higher print resolution than the user selected. The layer height is slightly smaller than the slice layer height, while the negative error of selecting a slightly higher layer height can be attributed to the slightly lower print resolution and not being selected.

[0034]

246 In some cases, height configuration parameters that may be obtained or received may include print resolution (e.g., slice layer height), such as a selection of fine, standard, or coarse print modes (similar to inkjet or other

such printers).), user-selected layer height value (e.g., 250 microns), selection of the total height of the 3D object (with corresponding tolerances or required accuracy), local/global maximum/minimum height characteristics of the 3D object (with corresponding tolerances) or required accuracy), one or more layer height variance constraints (e.g., to preserve uniform ridges on vertical walls or side walls of a 3D object by not changing the layer height too much), etc.

[0035]

256 In some cases, a single level height value can be selected as the global level height.

257 In this scenario, the global layer height can be chosen so that the total object height is as close as possible to an even multiple of the layer height.

259 In some aspects, the total number of layers may also be chosen in conjunction with the global layer height to be equal to or optimally close to the total object height.

261 Global layer height.

262 May also be selected to maximize the accuracy of at least one height configuration parameter (such as print resolution, user-selected layer height value), or to meet tolerance values, or to maximize the accuracy of one or more local maxima/minimum height characteristics. Error minimization.

265 It should be appreciated that several different techniques may be used to determine global or other layer height values, including the weighting schemes described above, machine learning techniques, and the like.

[0036]

270 In some aspects, the described techniques may also include local optimization of layer heights (eg, dynamic adjustment of layer heights) corresponding to subsets of multiple layers that form local maximum/minimum height characteristics of the 3D object.

273 In some cases, selection of layer heights corresponding to a subset of layers may be performed in a similar manner as described above for global layer heights.

275 In some cases, the total height or z-dimension of the layer subset may be considered the total object height.

276 In some aspects, the localized error can be weighted less heavily than the global error, such that for selecting one or more layer heights, the total object height/total height of the layer subset is more accurate than the local z-scale accuracy. Important factor.

279 In other cases, acceptable error bounds may be configured or selected individually.

[0037]

283 In some aspects, a 3D printing software application (generally referred to as a slicer or 3D printing driver) (which may execute on a computing device) may perform the above for selecting one or more layer heights of a 3D object to be printed or generated. Technology.

286 Any of, for example, several input devices of the computing device may be used to obtain the total object height and height configuration parameters.

288 In some cases, the slicer or other device or application may determine the total object height and/or based on a model of the 3D object to be printed (e.g., from a computer-aided design (CAD) package, image data from

a 3D scanner, etc.) One or more height configuration parameters (e.g., identifying z-axis features) so that scale accuracy optimization can be performed dynamically.

[0038]

295 In some cases, the layer height associated with the first layer height may be selected individually, such as selected to be greater than the global or other layer height associated with the 3D object, to ensure that the bottom layer adheres to the print bed during printing.

298 It should be appreciated that any of several individual 3D object height feature layers, or a subset of 3D object height feature layers, may be configured separately via a similar process that will be described in more detail below.

[0039]

304 It will be appreciated that the techniques described can be applied to a variety of 3D object generation techniques implementing fixed layer approaches, such as extrusion techniques including fused deposition modeling (FDM), fused filament fabrication (FFF), direct ink writing (DIW), or other additive manufacturing technologies using slicing or layering methods, such as Vat Photopolymerisation, material jetting, binder jetting, powder bed fusion, directed energy deposition, etc.

[0040]

312 FIG. 1 illustrates an example system 100 including a computing device 110 in communication with a 3D printer 105 that can be configured to print a three-dimensional (3D) object 130.

314 Computing device 110 may include any of a laptop, desktop or personal computer (PC), a mobile device (such as a smartphone, tablet, etc.), a networked device, a cloud computing resource, or a combination thereof.

317 Computing device 110 may communicate with 3D printer 105 via a wired connection or any of various wireless connections 115 known to those skilled in the art.

319 3D printer 105 may have or be associated with any of a variety of transceivers, modems, NICs, etc. (typically associated with printer controller 117) to communicate with computing device 110 via wired and/or wireless connections 115.

322 Generally speaking, computing device 110 may execute or access (via a network or via the cloud) one that obtains 3D object data and converts the data into instructions (eg, G-code) executable by printer controller 117 that controls 3D printer 105 or multiple software programs or applications to enable the 3D printer 105 to form the 3D object 130 by extruding material in multiple (eg, separately) configurable layers 135 onto the substrate 125.

327 For purposes of reference and as used throughout this document, a software application (which in some cases may include CAD components, CAM components, 3D image capture and conversion functionality, etc.) may be referred to as a slicer or driver 165.

330 In most cases, slicer 165 will be associated with computing device 110.

331 However, it is contemplated herein that slicing program 165 may be associated in whole or in part with a

separate 3D printer 105, which may, but need not, be a function of or within printer controller 117 without departing from the scope of the technology described herein. .

[0041]

337 The 3D printer 105 may include one or more extruder assemblies 120 positioned on an object substrate or bed 125.

339 The extruder assembly 120 may be moved in at least the vertical direction (z-axis) by a movement device 175, which may include one or more steppers or servo motors, as is generally known in the art.

341 The movement device 175 may also move the extruder assembly 120 in a horizontal plane (x or y axis), such as along the upper plate 170 relative to the base 125.

343 Other 3D printer 105 designs fix the extruder 120 in the z-axis and allow it to move in the x- and y-axes when the bed 123 is moved in the z-axis. Still other designs move the extruder 120 in the z- and x-axes while simultaneously moving the bed 125 in the y-axis. Still other designs operate using a polar coordinate system to move the extruder 120 on a stationary bed 125. The techniques described herein are applicable to these and other variations of 3D printer configurations such as DeltaParallel Kinematic (incremental parallel kinematic) printers. In some aspects, the extruder assembly 120 may include or house one or more filaments 150, such as spooled/stored in a spool 145. In other cases, filament 150 may be stored or contained in other parts of 3D printer 105 or completely external to 3D printer 105. The extruder assembly 120 may also include opposing rollers 155 that drive the filament 150 into the heated nozzle 160 at a designated rate, whereby the filament is melted and extruded into the most recently deposited of the layers 135 previously deposited onto the substrate 125 superior. Extruder assembly 120 may include means, such as one or more motors, other drive mechanisms, etc., for controlling the rate at which filament 150 is fed into and extruded from heated nozzle 160 by roller 155 to control the layers. 135 in height of each floor.

[0042]

359 In accordance with the techniques described herein, the extruder assembly 120 may be controlled to extrude a filament at a specified rate to deposit one or more layers of material 135 having a specific layer thickness or having a specific z-dimension.

362 In one aspect, the height of one or more of the layers 135 may be determined, such as based on the total height 140 of the 3D object 130 to be printed. In some aspects, the height of one or more of layers 135 may be determined based on at least one layer height configuration parameter, such as print resolution, a selected or default layer height, hardware limitations of the 3D printer (e.g., the highest possible z-axis resolution, or step size thereof), or various tolerance values or error requirements corresponding to one or more layers 135 (eg, maximum error values), etc. In some cases, tolerance values for certain local object maximum height characteristics or all 3D object height characteristics of the 3D object can be selected and can be based on calculations on the localized feature maximum/minimum height, global layer height, or total 3D object height. The error obtained is used to automatically select the layer height. In some aspects, slicing program 165 may determine or select one or more layer heights for printing 3D object 130. In still other cases, computing device 110 and/or slicer 165 may provide a user interface for enabling a user to manually configure or set one or more parameters for generating 3D object 130.

[0043]

377 Figure 2 illustrates an example diagram of a 3D object (such as 3D object 130 of Figure 1) that is split into 2 sets of layers, each layer having a different thickness or layer height.

379 The 3D object 130 may include a first or bottom portion 210 that includes a plurality of layers and has an upwardly facing surface 215. The 3D object 130 may also include several steps 220 stacked on top of the bottom portion 210, each step having a nearly uniform thickness and an upwardly facing surface 225. 3D object 130 may be further defined by top surface 230.

[0044]

386 3D object 130 may be printed, for example, by 3D printer 105 according to several different configurations, including different global layer heights, as represented by dashed lines 235 and dashed lines 240.

388 The layer height 235 is chosen based on the optimization described in this article for z-axis dimensional accuracy, while the layer height 240 may represent a universal or default layer height. The layer height 235 is smaller than the layer height 240 and is more aligned with the upward facing surfaces 215, 225, resulting in less z-axis error (as illustrated by the distance mark 245).

[0045]

395 In some cases, layer height 240 may be selected to most closely approximate z-axis features of 3D object 130.

396 In the illustrated example, the story height 240 still results in some error in the z-axis (every other step 220 is omitted). This may be due to print resolution limitations, such as coarse or standard modes that specify a minimum layer height (eg, greater than each of steps 220). In other cases, other layer heights may be selected to generate a best-fitting 3D object that more accurately aligns with the data defining the 3D object. In some cases, higher resolutions can result in longer print times, while lower resolutions can result in faster print times. In some aspects, the maximum print time may be selected, such as by user selection, to limit or otherwise constrain the maximum print resolution used.

[0046]

406 Figure 3 depicts an example process 300 for segmenting a 3D object 305 into layers for 3D printing or 3D generation.

408 At operation 310, a layer height may be selected (eg, a default layer height) for printing the 3D object 305 without adjusting the z-size characteristics of the 3D object 305. Operation 310 may result in slicing object 305 into layers having thickness 315. At operation 330, sliced object 305 is then printed. Thickness 315 may not be a multiple of total object height 320, and therefore may result in an error in the total object height at 325d. Level height 315 may also not align with other stepped portions of 3D object 305 (eg, portions 325a, 325c, and 325f), and/or may result in considerable errors in sloped portions of 3D object 305 (eg, 325b and 325e).

[0047]

418 4 illustrates an example operational procedure 400 for selecting layer heights for at least a subset of a plurality of layers to form a 3D object and improve z-dimensional accuracy.

420 In some examples, procedure 400 may be performed by slicer 165, computing device 110, 3D printer 105, or a combination thereof. Procedure 400 may begin at operation 402, where at least one height configuration parameter or total object height may be obtained. In some cases, operation 402 may include receiving the at least one height configuration parameter or the total object height as a selection or input event via a user interface operating in conjunction with slicer 165 (eg, provided via computing device 110). In some cases, one or more of the height configuration parameters or the total object height may be obtained or determined based on 3D object data (eg, associated with a 3D model of the object to be printed). In some aspects, the 3D object data may be accessed from a CAD or other modeling application or program, or obtained from a 3D scanner or associated application, or from other locations or applications.

[0048]

432 In some aspects, 3D object models may have localized height features that may need to be printed with specified accuracy or size tolerances.

434 For example, when a portion of the 3D object model data is selected (e.g., via CAD software or a user interface associated with slicing program 165 , etc.), a higher or specified tolerance (i.e., error margin) may be assigned that must be met), so that the 3D object data is to be sent to the 3D printer and actually printed. Selecting a portion of the 3D object data may include identifying one or more z-axis features of the 3D object data, such as by a graphic. In some cases, accuracy requirements or tolerances may be automatically assigned to certain height values/layers of the 3D object model and specified in the height configuration parameters. In some aspects, the user interface may provide a visual representation including a specific height of 3D objects that will form various layers, such as in a preview or print preview format or screen. This can make it easier and more efficient for designers to optimize the layer heights for printing 3D objects when, for example, not all tolerance requirements for a particular layer can be met in one print, or in other situations, such as with fully custom printing and identify specific locations associated with different accuracy requirements.

[0049]

448 When a user selects a 3D model and prepares to print the modeled object on a 3D printer, a user interface (UI) may be presented to the user to select various options that affect the quality of the printed object, the quality of the object it will print. speed, and other user-selectable related parameters.

451 The UI may be incorporated into slicer 165 , the printing application that is executed when a print command is issued from an application executing on computing device 110 (e.g., clicking a print button), or otherwise (e.g., a cloud service) at the actual layer of execution before high calculation and model slicing capabilities. In one embodiment, a feature may be provided that allows a user to activate 3D printing functionality from a 3D computer-aided design/modeling (CAD) application. This feature may include presenting a menu of 3D printer or vending machine services for the user to select. Upon user selection, the feature may present a UI that presents the user with resolution and other configuration parameter settings (eg, coarse mode, standard

mode, fine mode, with/without raft, support) for selection. Because the UI is activated directly from the CAD application, the UI can have direct and easy access to data related to the 3D model for generating parameter options for selection by the user.

[0050]

464 The UI can process data from the 3D model associated with the print request action, present configuration options for selection by the user, or provide default parameter values based on simple calculations and other parameters related to the characteristics of the 3D model that can be used by the slicing program 165 is used to determine the optimal layer height for slicing the model into preparation for printing corresponding objects.

469 The UI application may receive data describing a 3D model from which it may extract, determine, and identify (e.g., graphically for the user) not only the total 3D modeled object height, but also the fixed layer heights selected for modeling the entire model. Other features of interest may suffer from loss of dimensional accuracy in the case of slicing. For example, the UI may present a graphical representation of the model in which features of interest are identified via markers, colors, circles, highlighting, or other means of identifying features to the user. Selecting a feature (e.g., via user click, finger or stylus touch) may result in a presentation showing the feature's modeled size value and the size of the feature when used with the selected resolution setting (e.g., coarse, standard, fine, user-defined) An option box that associates layer heights with slicing cases and enables the user to specify the maximum dimensional error for selected features. Additionally or alternatively, the UI may present graphical objects that the user can use to scale the model to the various dimensions required to adjust the printed object, and in addition to illustrating the modeled dimensions and resulting errors at the current fixed resolution setting. Present information about features of interest in lists or other collections of UI factors. The UI may present the calculated time to print the object given the current configuration parameter option settings and for the changed settings. In this way, the user can evaluate the trade-offs between the choice of resolution settings, choice of error tolerance, etc., and the time required to print the object. The UI may enable the user to control the dimensional accuracy of selected 3D model features on demand to meet accuracy requirements for printing the object in a minimum amount of time. In some cases, height configuration parameters may include print resolution (such as a selection of fine, standard, or coarse print modes (similar to inkjet or other such printers)), a selection from different print resolution schemes, one or more selected layer height values (e.g., 250 microns for some layers and 150 microns for other layers), one or more selections of subsets of layers with corresponding tolerances or required accuracy, one or more a tolerance or accuracy requirement, a maximum print time or minimum print speed, one or more layer height variance constraints (e.g., to preserve ridges on vertical walls or side walls of a 3D object by not changing the layer height too much), etc. wait.

[0051]

496 In one example, a "Click to Fit" feature may be included in the 3D modeling UI, in a print preview screen or 3D print dialog window, etc., which enables selection of one or more specific points on the z-axis. features to maximize accuracy.

499 The "click fit" feature may be implemented by drawing a region (eg, a box) around one or more z-axis features

or other graphical selection actions by selecting a location on a 3D model of the 3D object to be printed or rendered via the cursor. This feature can optimize error or tolerance calculations to provide solutions to otherwise unsolvable constraints on 3D objects (e.g., by prioritizing which tolerances are most important/which are less important). In one aspect, upon receiving a selection of a plane, instructions may be sent to the slicing program to optimize the fit for that particular z-axis value or height.

[0052]

508 Procedure 400 may continue at operation 404, where layer heights for at least a subset of the plurality of layers may be selected based on the total object height and the one or more height configuration parameters.

510 In some aspects, the global layer height may be determined based on the one or more height configuration parameters such that it is optimized to best fit some or all z-axis (ie, height) characteristics of the 3D object. More details of operation 404 are described below with reference to Figures 5, 6, and 8.

[0053]

516 Next, in some aspects, at operation 406, the slicer may generate a list of tool path commands based on the selected or determined layer height and object model data.

518 The toolpath command list is typically generated in the form of G-code instructing the 3D printer in terms of motion, material temperature and extrusion rate, print bed size, etc., and the 3D printer 105 based on the determined layer height and object model data. Print or any other instructions needed to generate the entire 3D object. The toolpath command list is typically stored in a file (eg, on a computing device or on a removable storage medium (eg, SD card)) or transferred directly to a printer to print the 3D object 408 according to the generated toolpath commands. Generating toolpath files is not limited to using G-code, but can use any various formats or codes optimized for 3D printers.

[0054]

528 Figure 5 illustrates an example of a more detailed operational procedure 500 for selecting a global layer height and a localized layer height for at least a layer subset of a 3D object.

530 Like procedure 400, procedure 500 can be performed by slicer 165, computing device 110, 3D printer 105, or a combination thereof. Procedure 500 may share some operations with procedure 400; for the sake of brevity, repeated operations will not be described again here.

[0055]

536 The procedure 500 may begin at operation 502, where height configuration parameters including a selection of a 3D printing resolution and/or a specified layer height may be received, such as via a user interface associated with or provided by the slicing program 165.

539 Configuration parameters or specifications for the 3D printer 105 may be received 502, such as by querying the 3D printer 105 for hardware specifications, via the slicer 165, a driver associated with the 3D printer 105, or including, for example, in an XML or other type of file. In other ways, information may be obtained that

indicates the minimum z-axis or height increment that the 3D printer 105 is capable of (i.e., minimum printer resolution capability, such as 0.625 microns). Such profiles associated with a particular 3D printer may contain nominal print resolution (i.e., nominal layer height) settings for coarse, standard, and fine modes specified along with other capabilities (e.g., automatic calibration), or may be based on a specific 3D printer capabilities determine operating parameter settings to produce optimal print quality and speed associated with default or user-selected modes. Next, in operation 504, the total object height of the 3D object to be printed may be obtained. The total object height may be derived or obtained from the 3D object data, or may be received via the user interface.

[0056]

553 Next, at operation 404a (which may include further details of operation 404 of Figure 4) the global layer height may be determined.

555 Operation 404a may first include, at operation 506, based on one or more configuration parameters received at operation 502, such as the minimum z-axis increment that the 3D printer 105 is capable of, the selected 3D printing resolution, and at 504 The total object height obtained) determines the optimal global layer height. Ideally, the total height of the 3D object model will be evenly divisible by the determined optimal global layer height. If the determined optimal global layer height cannot be uniformly divided by the minimum height resolution of the 3D printer 105, then the layer height that is higher or lower than the optimal global layer height and can be uniformly divided by the minimum height resolution of the 3D printer 105 The closest global layer height value can be a candidate for the global layer height.

[0057]

566 Determining to use a global layer height higher or lower than the optimal global layer height can be based on the overall height accuracy/tolerance requirements of the 3D object model, or simply based on which will result in the printed object having the closest (higher or higher) The total height below the total height of the 3D model.

[0058]

573 In some cases, if the received height configuration parameters 502 indicate the presence of one or more local height features in the 3D model that have tolerance or accuracy requirements, operation 508 may be performed to determine whose layer heights may be changed to achieve that A subset of layers with tolerance or accuracy requirements.

577 Ideally, variations in layer height determined within this subset of layers (eg, less than +/-10% of the total layer height) will be unnoticeable in the appearance of the outer surface of the resulting object printed from the 3D model.

580 For example, if its accuracy requires a local feature whose high point terminates at a point in the middle (i.e., at 50%) of the global layer height slice, the height of the layer subset may be adjusted linearly or nonlinearly at operation 510 to Make the local height feature reach as close as possible to the top of a layer in this subset of layers. Linear square wave layer height adjustment can be achieved by selecting a subset of ten layers (five

layers above the feature and five layers below the feature), where the first five layers have a height 10% less than the global layer height and the second five The layer has a height that is 10% greater than the global layer height. One non-linear layer height adjustment that can achieve the same size results as a linear adjustment but with less noticeable visual impact could be a sine wave approximation. In this case, each layer height of the subset of layers can be reduced at an incremental rate until an inflection point is reached, and at an incremental rate until a minimum layer height occurs, with its surface layer at a height that matches the local feature. A roughly sinusoidal approximation is applied to the layer height changes to achieve a subset of ten layers of local feature heights in the current example that can include coherent changes to the global layer height value in the following sequence: {-6%, -11%, -16% ,-11%,-6%,+6%,+11%,+16%,+11%,+6%}.

[0059]

596 Table 1 shows a comparison of accumulated object heights, 1) a subset without adjusted layers, 2) a subset with 10 layers adjusted using a linear layer height adjustment scheme, and 3) a subset using nonlinear (e.g., roughly sinusoidal Approximation) layer height adjustment scheme to adjust a subset of 10 layers to meet the local feature height dimensions at sublayer 5 at 50% of the global layer height of that layer.

600 The layer height values shown are in millimeters and the cumulative height is relative to the surface below the ten layers listed. Layer 5 in both the linear and non-linear subset layer adjustment columns is exactly 50% lower than where the printed object surface would be with each subset layer adjustment, and is exactly where the local height feature target is Height dimensions. After layer 5, the subset layer height feature profile compensates for the total global height resolution reduction from the first five height-adjusted subset layers by adjusting the heights of the last five subset layers, where by layer 10 this compensation has been The subset level height reduction is fully corrected and will be at the same accumulated level height that it would have been if the local height characteristics were maintained, and the global level height will be used starting at the next level.

[0061]

612 It should be appreciated that there are many ways to determine a layer subset and adjust the layer height of that layer subset, all of which will not be explicitly described herein.

614 However, most, if not all, of the calculations used to determine the number of subset layers and their heights may take into account other local features with a high degree of tolerance/accuracy that may be located within the selected subset of layers, and in some cases, Compensates for the impact of collective subset layers with different heights on the overall object height.

[0062]

621 Next, in some aspects, at operation 512, the slicing program may generate a list of tool path commands based on the selected or determined global layer height, local subset layer height (if any), and 3D object model data.

623 The toolpath command list is typically generated in the form of G-code instructing the 3D printer in terms of motion, material temperature and extrusion rate, print bed size, etc., and the 3D printer 105 based on the determined layer height and object model data. Print or any other instructions needed to generate the entire

3D object.

627 The toolpath command list is typically stored in a file (eg, on a computing device or on a removable storage medium (eg, SD card)) or may be transferred directly to a printer to print the 3D object 514 according to the generated toolpath commands. Generating toolpath files is not limited to using G-code, but can use any various formats or codes optimized for 3D printers.

[0063]

634 In other aspects, at operation 512, the optimal layer height may be determined in a software module or program, which may be used as a 3D modeling CAD application on the computing device 110, in the computing device, in the 3D printer 105, locally. or part of or associated with a 3D printer driver in a remote computing environment, or a combination thereof.

638 As an alternative to or in addition to generating a list of tool path commands, the software module or program may generate a list of optimal layer heights for slicing the object and send the list to a file stored on the storage device or directly to 3D at operation 514 Printer 105 where the resident slicer 165 module associated with the 3D model printer will slice the model based on the list.

[0064]

645 FIG. 6 illustrates another example of a detailed operational procedure 600 for selecting a layer height of at least a layer subset of a 3D object.

647 In some aspects, procedure 600 may correspond to operations 508-510 described above with reference to FIG. 5. In some examples, procedure 600 may be performed by slicer 165, computing device 110, 3D printer 105, or a combination thereof.

[0065]

653 The procedure 600 may begin at operation 602 after determining the global layer height at operation 506 described above with reference to FIG. 5.

655 Operation 602 may include determining whether local height feature data for the 3D model is available. If no local altitude characteristic data is included in the received altitude configuration parameter data, the procedure 600 may end and continue to operation 512. However, if local height characterization data is available for the 3D model, the process 600 may continue to operation 604 where the received height configuration parameter data may be analyzed to determine the local height characterization of the 3D model, along with specified size tolerances or any associated data with error limits. Next, at operation 606, the layer in the 3D model in which the closest local height feature exists may be determined, such as relative to the current layer being modeled. In some aspects, operation 606 may include determining from lowest to highest which global layer above the current layer being evaluated has the closest local height feature.

[0066]

667 The process 600 may then proceed to operation 608 where the portion of the global layer in which the local

height feature peaks is located.

669 For example, the number of layers from the base of the 3D object pattern to the local height feature can be determined by dividing the height of the base feature by the determined global layer height, where any non-zero remainder indicates where the local height feature is highest That part of the global layer height of the point. Next, at operation 610, the number of layer subsets whose heights can be adjusted to meet dimensional accuracy (tolerance) requirements, if dimensional accuracy requirements are specified for that height characteristic, may be determined. This determination may be based on at least the determined global layer height, the portion of the global layer height in which the local height feature reaches its highest point, and the minimum z-axis height resolution supported by the target 3D printer 105, user selection, etc. One can achieve it.

[0067]

681 Next, at operation 612, any of several approximation algorithms may be applied to adjust the determined number of layers from operation 610.

683 For example, if that portion of the local height feature culminates at half the determined global story height of 0.25 mm, as shown in Table 1, then use a linear square wave comparison to make the subset story height for five stories A 10% reduction (i.e. 0.225mm) would be exactly equal to the dimensional height of the local feature on top of layer 5. The 0.225mm subset layer height works well for 3D printers with a minimum height resolution of 1 micron (0.001mm), but it may not be evenly divisible by the minimum height resolution of other 3D printers (e.g., 0.010mm). In such cases, the number of subset layers, subset layer heights, other types of adjustment profiles (non-linear), and associated feature height tolerances may be considered/adjusted algorithmically to determine what will result in The optimal layer height of the local feature peak within its associated tolerance.

[0068]

695 An additional consideration used in determining subset story height adjustments is the visual impact associated with the incremental difference in height between adjacent stories.

697 In some aspects, at operation 614, the adjusted layer heights of the layer subset may be modified based on the maximum adjacent layer height change value. For example, a 10% change in the height of adjacent layers can affect the visual quality of some models while being inconsequential to others. Referring to the example depicted in Table 1, layer 6 is 20% higher than layer 5 for the linear adjustment scheme and 12% higher than layer 5 for the sinusoidal approximation scheme. Both of these adjustments can accommodate the 10% adjacent story height variation limit requirement by simply slicing the global story height of level 6 and offsetting the story heights shown for levels 6-10 to levels 7-11. Accordingly, the maximum variation in adjacent story heights may be user-adjustable through configuration settings. Some curve fitting algorithms are well suited to solving the problem of determining subset layer heights and numbers (given various potentially determined global layer heights, local feature heights, printer resolutions) and completing visual effects setups.

[0069]

711 Next, at operation 616, it may be determined whether the resulting layer height adjustment for the subset of layers meets a specified tolerance.

713 If so, the process 600 may proceed to operation 622 where it may be determined whether any more local height features are present. If the 3D model data includes more local more adjustments, the process 600 can go back to operation 606 and continue looping through operation 622 until there are no more local height features in the 3D model data, at which time the process 600 can go to Operation 512. If the tolerance has not been satisfied, the procedure 600 may proceed to operation 620 where at least one of a different number of layers or different approximation algorithms in this subset of layers may be implemented, and 610 - 616 may be repeated until satisfactory The layer height adjustment or configuration has been determined. In some aspects, if one or more local feature heights cannot be produced using local feature adjustments, the global layer height of the 3D model may be adjusted at operation 618.

[0070]

725 In some aspects, if the global layer height that will produce a printed object that satisfies the specified tolerance of the total object height cannot be determined as described at operation 506, a layer height adjustment in the subset of layers may be applied to the global height to produce the The printed object closest to meeting the specified tolerance of the total object height.

729 One way to create a global layer height adjustment that brings the total object height within a specified tolerance is to divide the total object height error that would otherwise result from using the determined global layer height by the minimum printer height resolution. For example, if using the determined global layer height with a resulting error of +28 microns would produce an object with a total object height tolerance of +0/-50 microns, and the 3D printer minimum height resolution is 10 microns, then pass By reducing the height of one layer by 30 microns or by reducing the layer height of all 3 layers by 10 microns, it is possible to print a total object height with a -2 micron error (well within its specified tolerance). These layer height adjustments may preferably be made at layers near the top of the object to avoid grouping the local height feature subset layer height adjustment calculations, but may be made individually or together as layer subsets and positioned in the model slice stack any location.

[0071]

742 It should be appreciated that procedure 600 is given as an example only.

743 It is contemplated herein that different error values associated with multiple subsets of layers (including individual layers) may be used to select one or more different layer heights as desired, e.g. to accommodate all aspects of a 3D object in view of user preferences/height configuration parameters. constraint. In one example, if the procedure 600 is unsuccessful in selecting a single layer height for a layer subset, such as due to higher constraints imposed on error bounds, the layer subset may be split into two different subsets. , and each subset of the layer heights may then be tested, each in accordance with individual executions of procedure 600. If an independent solution is available, the error requirement can instead be met using a combination of these two subsets (with different layer heights for each value). If two subsets do not meet the error requirements, the main subset can be divided into 3 or 4 subsets, and so on. In some cases, the amount

of subsetting allowed to occur may be limited by another height configuration parameter such as layer height variance, e.g. implemented to produce printed 3D objects that are more uniform across the z-dimension (e.g. to reduce the impact on the 3D object). Constraints for different layering effects visible on the exterior and vertical or partially vertical surfaces)).

[0072]

759 An example of procedures 500 and 600 is described below.

760 In one example, an object with a total object height of 1.1 mm may be selected for 3D printing (e.g., operation 504) with a user-specified standard mode layer height of 250 microns (.25 mm) (e.g., received from operation 502). At operation 506, the 3D printer driver application in the computing device 110 may receive the 10 micron (0.01 mm) 3D printer minimum resolution capability and calculate the total object height by dividing the total object height of 1100 micron by the 10 micron printer resolution. The height of 1.1 mm (1100 microns) is an even multiple of the minimum height resolution of this 3D printer. This results in uniform 110 layers of 0.01 mm (10 micron) height that will print the 1.1 mm object with zero total object height error. Printing 110 layers (each layer is 0.01 mm high) can take a significant amount of time to complete. However, dividing the 1.1 mm total object height by the selected layer height of 250 microns results in 4.4 layers - not a uniform multiple of layers, so an adjustment to the selected global layer height is warranted.

[0073]

774 Any adjustment to the global layer height that is a uniform multiple of the minimum printer resolution can be used to produce an object with an overall height that is error-free.

776 An iterative technique for determining the global layer height closest to the selected layer height of 250 microns is to coherently divide the total object height (1100 microns) by the selected layer height (250 microns) plus or minus the printer's minimum height resolution (10 microns), up to higher is an integer layer. For example, dividing 1100 by 240 microns gives 4.58333 layers; dividing by 230 microns gives 4.7826 layers; dividing by 220 microns gives exactly 5 layers. In this example, the technique determines that a global layer height of 220 microns (equal to 88% of the selected value) is closest to the selected layer height and will result in a print with no errors in its total height as specified in the associated 3D model object. Similarly, for a 3D model with a total object height of 1.05 mm and a tolerance of +0/-30 microns, following the same technique used for adjusting layer heights with Fine mode selected (0.200 mm), it can be determined that the model can Sliced using a global layer height adjusted to 210 microns (5% higher than selected) to reproduce the total height of the object using 5 layers without finishing.

[0074]

790 A technique for determining the global layer height of a 3D model with a total object height and tolerance to be printed on a printer that has resolution capabilities that may not be evenly divided by the total object height value can divide each global layer into One or more layer subsets that can use linear or curve-fitting adjustments to the subset layer heights to achieve optimal object height accuracy.

794 This technique is similar to the technique for adjusting and compensating layer heights to accurately reproduce local height features discussed with reference to Table 1, except that layer height adjustments for accurately reproducing total object height may not require the compensation of local height features required by the technique. Floor height changes.

[0075]

801 In the example described above, positive user preference errors or errors associated with one or more height configuration parameters may take precedence over negative user preference errors.

803 This may be accomplished by weighting the total object height or print error using a factor It should be understood that other weighting or selection schemes or algorithms are contemplated herein. For example, in one aspect, machine learning techniques may be employed to track user selections (e.g., associated with a single user, tracked via login information, a single 3D printer, or multiple users and/or 3D printers) and 3D printing projects revision. User selections can be aggregated over time to modify default settings that can be automatically entered by slicer 165. In some instances, machine learning can be used, at least in part, to modify the bias applied to the selection algorithm such that certain error ranges are acceptable for a particular user or a particular 3D printer, but not for other users or printers of. In this scenario, factors X and Y may be selected or modified based on tracked and aggregated user preferences/selections.

[0076]

815 In some cases, collected data associated with user selections (such as the "click fit" UI feature described above) can be used as training data for the machine learning process.

817 In one example, each time the user selects "Fit this" or other similar selection associated with the Z-axis feature, that selection and the data associated with it may be added to the training set. A machine learning algorithm (such as a general purpose machine learning algorithm) can be trained and validated on this data such that it identifies the best features in any new objects printed by the user. In this scenario, the 3D modeling application or UI can automatically indicate or recommend which z-axis features to retain or be associated with a higher or specific tolerance or precision based on historical user selection data/training data, thereby reducing the user's need to configure the object. Steps required for 3D modeling/printing.

[0077]

827 Figure 7 depicts a method for segmenting an object 305 previously described with reference to Figure 3 into layers by a slicing program associated with a 3D printer in accordance with the operating procedures 400, 500 and/or 600 described above with reference to Figures 4, 5 and/or 6. Example process 700.

[0078]

833 Process 700 may begin at 705 by selecting a global layer height for printing 3D object 305a based on total object height 320 and one or more height configuration parameters, e.g., in accordance with operations 402 and 404, operations 502-510, and/or procedure 600. .

836 Layer height 710 may be selected to be equal to a multiple of total object height 320 and consistent with one or more height configuration parameters (e.g., minimum and maximum layer resolution or step size, specified layer height, and certain z-dimensions of 3D object 305 Tolerance values for features such as steps 720, 725, and 730 and slopes 735 and 740).

840 Operation 705 may result in slicing object 305d into layers having thickness 710. Sliced object 305d is then printed at operation 715 to produce object 305e. The thickness or layer height 710 may be selected to be a multiple of the total object height 320, and this may result in no total object height error. Layer height 710 may also be selected to minimize any z-dimensional errors, such as those present in process 300, such as errors 325a, 352c, and 325f. Additionally, layer height 710 may result in reduced errors for slopes of 3D object 305 such that errors 325g and 325h are less than errors 325b and 325e associated with process 300.

[0079]

849 FIG. 8 illustrates an example process 800 for segmenting an object into layers by a slicing program associated with a 3D printer in accordance with the operating procedures of FIGS. 4, 5, and/or 6.

[0080]

854 Process 800 may begin at 805 by selecting a global layer height for printing 3D object 305 based on total object height 320 and one or more height configuration parameters, such as in accordance with operations 402 and 404, operations 502-514, and/or procedure 600..

857 Layer height 710 may be selected to be equal to a multiple of total object height 320 and consistent with one or more height configuration parameters (e.g., minimum and maximum layer resolution or step size, specified layer height, and certain z-dimensions of 3D object 305 Tolerance values for features such as steps 720, 725, and 730).

861 In some situations, the errors associated with slopes 735 and 740 (illustrated in Figure 7 as errors 325g and 325h) that exist when using individual and global layer heights 710 may be unacceptable or not within the specified error range. In this case, local layer height optimization may be used (also indicated by 805) to select a second layer height 810 (eg, half the layer height 710 in the illustrated example) to lower portions 735 and 740 Errors that exist in, for example, according to operations 508 and 510. In this manner, when printing sliced 3D object 305f at 820, errors 325i and 325j associated with slopes 735 and 740 of object 305g may be reduced.

[0081]

871 Figures 9A and 9B illustrate examples of specific z-axis features of 3D objects 900a and 900b that can be modeled and/or printed with greater accuracy using the described techniques.

873 Referring to Figure 9A illustrating a top view of 3D object 900a, 3D object 600 is sliced through plane 905 into 4 layers 910, 915, 920 and 935. The top layer 935 includes text (TEXT), such as embossed text, with a specific height 940, which may be less than the global layer height 925 of layers 910 and 915. To accurately model and/or 3D print embossed text 935, the height 930 of layer 920 may be adjusted (eg, in this case, lowered) according to the techniques described above to enable a 3D printer with a specific minimum height

resolution to Prints embossed text with height 940 exactly 935. With traditional techniques for slicing 3D models, such as 3D model 900a, features such as relief features on top of objects may be completely lost in a fixed layer height approach, such as where the feature's height 940 is less than the global or fixed layer height 925 half of the cases. In one example, where a top or bottom layer has detailed features, such as text relief, the techniques described may include adjusting the layer height of the specific layer and/or one or more nearby layers (such as layer 920) to depict the specific features. High degree of accuracy is maximized. In some cases, the height of other layers can be kept constant, thereby preserving perceptible uniformity on all sides of the object, and also improving speed by not having to adjust each layer height individually. This technique can also be applied to mid-layers, by splitting one layer into two or by adjusting both layers equally.

[0082]

890 Figure 9B illustrates another example bottom perspective view of 3D object 900b.

891 3D object 900b as shown is sliced through plane 905 into five layers 975, 945, 950, 955 and 960, for example in reverse printing. The bottom layer 975 includes negative text (TEXT) with a specific height/depth 980, which may be less than the global layer height 965 of layers 945, 950, 955, and 960. To accurately model and/or 3D print negative relief text 975, the height 980 of the layer containing text 975 may be adjusted (eg, in this case, reduced) according to the techniques described above to have a specific minimum height resolution The 3D printer is able to accurately print embossed text with a height of 980° to 975° .

[0083]

900 In some embodiments, a system for printing three-dimensional (3D) objects includes: a computing device configured to: receive at least one height configuration parameter associated with a 3D object and a total object height; and convert the The 3D object is segmented into a plurality of formable layers, wherein the plurality of formable layers includes a first height.

904 Segmenting 3D objects further includes:

[0084]

908 The first height corresponding to the plurality of formable layers is selected based on the received at least one height configuration parameter and the total object height, wherein the first height is selected to optimize the at least one height configuration the accuracy of at least one of the parameter or the total object height; and

[0085]

914 A 3D printer in communication with the computing device, and the 3D printer includes:

[0086]

918 an extruder configured to deposit material in formable layers to form the 3D object; and

[0087]

922 Movement means coupled to the extruder and configured to move the extruder in at least a vertical direction to deposit the plurality of formable layers of the material according to the first height.

[0088]

927 In some embodiments, the at least one height configuration parameter includes a 3D printer resolution selection or layer height.

[0089]

932 In some embodiments, the at least one height configuration parameter includes a tolerance corresponding to a subset of the plurality of formable layers.

[0090]

937 In some embodiments, the computing device is further configured to:

[0091]

941 A second height corresponding to at least the subset of the plurality of formable layers is selected based on the received at least one height configuration parameter and the total object height, wherein the second height is selected to optimize the Accuracy of at least one of at least one height configuration parameter and the total object height.

[0092]

948 In some embodiments, a method for improving dimensional accuracy when generating a three-dimensional (3D) object including multiple formable layers includes:

[0093]

953 Receives at least one height configuration parameter and the total object height;

[0094]

957 A first height corresponding to at least a subset of the plurality of formable layers is selected based on the received at least one height configuration parameter and the total object height, wherein the first height is selected to optimize the at least the accuracy of at least one of a height configuration parameter or the total object height; and

[0095]

964 The first height is communicated to a 3D printer to generate the 3D object.

[0096]

968 In some embodiments, the at least one height configuration parameter includes a global height of the plurality of formable layers, and wherein at least the subset of the plurality of formable layers includes the plurality of formable layers.

[0097]

974 In some embodiments, selecting the first height further includes selecting one of the plurality of formable layers corresponding to the first height based at least in part on the at least one height configuration parameter or the total object height. Several formable layers.

[0098]

980 In some embodiments, the at least one height configuration parameter includes a tolerance for a subset of the plurality of formable layers, and selecting the first height further includes selecting a height associated with the plurality of formable layers based on the tolerance. A first height corresponding to the subset of formable layers or to all of the plurality of formable layers.

[0099]

987 In some embodiments, the method further includes identifying one or more formable layers of the plurality of formable layers associated with a tolerance, and selecting the first height further includes selecting based on the tolerance. A plurality of formable layers of the plurality of formable layers corresponding to the first height or at least one of the first height.

[0100]

994 In some embodiments, identifying the one or more formable layers includes receiving a selection of at least one first tolerance and at least one formable layer corresponding to the at least one first tolerance.

[0101]

999 In some embodiments, the at least one height configuration parameter includes a tolerance for a subset of the plurality of formable layers, and the method includes selecting all height configurations associated with the plurality of formable layers based on the tolerance. The second height corresponding to the subset.

[0102]

In some embodiments, the at least one height configuration parameter includes object height resolution, and wherein optimizing the first height corresponding to at least one formable layer further includes at least one of the following:

[0103]

The first height is selected to meet or exceed the object height resolution; or

[0104]

A plurality of formable layers of the plurality of formable layers corresponding to the first height is selected to meet or exceed the object height resolution.

[0105]

In some embodiments, optimization further includes:

[0106]

determining an object height accuracy error of the 3D object;

[0107]

Determine altitude configuration parameter accuracy errors; and

[0108]

At least one of: selecting the first height based on a comparison of the object height accuracy error and the height configuration parameter accuracy error or selecting a number of the plurality of formable layers corresponding to the first height Formable layer.

[0109]

In some embodiments, selecting the first height or selecting at least one of a plurality of formable layers of the plurality of formable layers corresponding to the first height further includes determining relative to an object height accuracy error. Weighting of altitude configuration parameter accuracy errors.

[0110]

In some embodiments, selecting the first height or selecting at least one of a plurality of formable layers of the plurality of formable layers corresponding to the first height is biased toward a positive height configuration

parameter accuracy error.

[0111]

1050 In some embodiments, the method further includes selecting a bottom formable layer height separate from the first height to ensure bonding of the bottom layer.

[0112]

1055 In some embodiments, a computer-readable storage medium has instructions stored thereon that, when executed by at least one processor, cause the at least one processor to perform a step in generating a layer including a plurality of formable layers. Operations that improve dimensional accuracy on three-dimensional (3D) objects, including:

[0113]

1062 Receives at least one height configuration parameter and the total object height;

[0114]

1066 Selecting a first height corresponding to the plurality of formable layers based on the received at least one height configuration parameter and the total object height, wherein the first height is selected to optimize the at least one height configuration parameter or the accuracy of at least one of the total object heights; and

[0115]

1072 The first height is communicated to a 3D printer to generate the 3D object.

[0116]

1076 In some embodiments, the at least one height configuration parameter includes a 3D printer resolution selection or layer height.

[0117]

1081 In some embodiments, the at least one height configuration parameter includes a tolerance corresponding to a subset of the plurality of formable layers.

[0118]

1086 In some embodiments, a second height corresponding to at least the subset of the plurality of formable layers is selected based on the received at least one height configuration parameter and the total object height,

wherein the second height Selected to optimize accuracy of at least one of the at least one height configuration parameter and the total object height.

[0119]

1093 The 3D object layer height selection techniques and/or slicer/driver 165 described above and any associated user interface may be implemented on one or more computing devices or environments, as described below.

1096 Figure 10 depicts an example general computing environment in which some of the techniques described herein may be embodied, which may include, for example, computing device 110.

1098 Computing system environment 1002 is but one example of a suitable computing environment and is not intended to impose any limitations on the scope or functionality of the presently disclosed subject matter.

1100 Computing environment 1002 should also not be interpreted as having any dependency or requirement on any one or combination of components illustrated in example operating environment 1002.

1102 In some embodiments, the various computing elements depicted may include circuitry configured to instantiate specific aspects of the invention.

1104 For example, the term circuitry, as used in this disclosure, may include specialized hardware components configured to perform function(s) through firmware or switches.

1106 In other example embodiments, the term circuitry may include a general-purpose processing unit, memory, or the like configured with software instructions implementing logic operable to perform the function(s).

1108 In example embodiments in which the circuitry includes a combination of hardware and software, an implementer may write source code embodying the logic, and the source code may be compiled into machine-readable code that can be processed by a general-purpose processing unit.

1111 Because those skilled in the art will appreciate that existing technology has evolved to the point where there is little differentiation between hardware, software, or hardware/software combinations, the choice of hardware or software to perform a specific function is a design choice left to the implementer.

1114 More specifically, those skilled in the art will appreciate that software processes can be transformed into equivalent hardware structures, and the hardware structures themselves can be transformed into equivalent software processes.

1117 Thus, the choice between hardware or software implementation is one of design choice and left to the implementer.

[0120]

1122 Computer 1002, which may include any of a mobile device or smartphone, a tablet, a laptop, a desktop computer, or a collection of networked devices, cloud computing resources, etc., typically includes a variety of computer-readable media.

1125 Computer-readable media can be any available media that can be accessed by computer 1002 and includes both volatile and nonvolatile media, removable and non-removable media.

1127 System memory 1022 includes computer-readable storage media in the form of volatile and/or non-volatile memory, such as read-only memory (ROM) 1023 and random access memory (RAM) 1060.

1129 A basic input/output system 1024 (BIOS), which contains basic routines such as to help transfer information

between elements within the computer 1002 during startup, is typically stored in ROM 1023.

1131 RAM 1060 typically contains data and/or program modules that processing unit 1059 has immediate access to and/or is currently operating on.

1133 By way of example, and not limitation, Figure 10 shows an operating system 1025, applications 1026, other program modules 1027 (including a 3D layer height optimizer 1065), and program data 1028.

[0121]

1138 Computer 1002 may also include other removable/non-removable, volatile/non-volatile computer storage media.

1140 By way of example only, FIG. 10 illustrates a hard drive 1038 reading from or writing to a non-removable, non-volatile magnetic media, and a removable, non-volatile disk 1054 reading from or writing to it. a disk drive 1039, and an optical disk drive 1004 that reads from or writes to a removable, non-volatile optical disk 1053 such as a CDROM or other optical media.

1144 Other removable/non-removable, volatile/non-volatile computer storage media that may be used in this example operating environment include, but are not limited to, magnetic tape cartridges, flash memory cards, digital versatile disks, digital video tapes, solid state RAM, solid state ROM etc.

1147 Hard drive 1038 is typically connected to system bus 1021 through a non-removable memory interface such as interface 1034, while magnetic disk drive 1039 and optical disk drive 1004 are typically connected to system bus 1021 through a removable memory interface such as interface 1035 or 1036. .

[0122]

1153 The drives and their associated computer storage media discussed above and illustrated in FIG. 10 provide storage for computer 1002 of computer-readable instructions, data structures, program modules, and other data.

1156 In Figure 10, for example, hard drive 1038 is shown storing an operating system 1058, application programs 1057, other program modules 1056, and program data 1055.

1158 Note that these components may be the same as the operating system 1025, applications 1026, other program modules 1027, and program data 1028, or may be different from them.

1160 Here, the operating system 1058, application programs 1057, other program modules 1056, and program data 1055 are given different numbers to at least indicate that they are different copies.

1162 A user may enter commands and information into computer 1002 through input devices such as a keyboard 1051 and a pointing device 1052 (often referred to as a mouse, trackball, or touch pad).

1164 Other input devices (not shown) may include microphones, joysticks, game pads, satellite dishes, scanners, retinal scanners, and the like.

1166 These and other input devices are often connected to the processing unit 1059 through the user input interface 1036 coupled to the system bus 1021, but may also be connected through other interfaces and bus structures, such as parallel ports, game ports, universal serial bus (USB) ports. Make a connection.

1169 A monitor 1042 or other type of display device is also connected to system bus 1021 via an interface such as video interface 1032.

1171 In addition to the monitor, the computer may also include other peripheral output devices such as speakers

1044 and printer 1043 (such as 3D printer 105) that may be connected through output peripherals interface 1033.

[0123]

1177 Computer 1002 may operate in a networked environment using logical connections to one or more remote computers, such as remote computer 1046.

1179 Remote computer 1046 may be a personal computer, server, router, network PC, peer-to-peer device, or other common network node, and typically includes many or all of the elements described above with respect to computer 1002, although in Figure 10 only memory storage is shown Device 1047.

1182 The logical connections depicted in Figure 10 include a local area network (LAN) 1045 and a wide area network (WAN) 1049, but other networks may also be included.

1184 Such networking environments are commonly found in offices, enterprise-wide computer networks, intranets, the Internet, and cloud computing resources.

[0124]

1189 When used in a LAN networking environment, computer 1002 is connected to LAN 1045 through a network interface or adapter 1037.

1191 When used in a WAN networking environment, computer 1002 typically includes a modem 1005 or other means for establishing communications over a WAN 1049 such as the Internet.

1193 Modem 1005 may be internal or external and may be connected to system bus 1021 via user input interface 1036 or other suitable mechanism.

1195 In a networked environment, program modules shown with respect to computer 1002, or portions thereof, may be stored in a remote memory storage device.

1197 By way of example, and not limitation, FIG. 10 shows remote application 1048 residing on memory device 1047.

1199 It should be understood that the network connections shown are exemplary and other means of establishing communication links between computers may be used.

[0125]

1204 In some aspects, other programs 1027 may include a 3D layer height optimizer application 1065 that includes the functionality described above, such as functionality in or associated with the 3D printer slicer or driver 165.

1207 In some cases, the 3D layer height optimizer application 1065/slicer 165 may perform some or all of the operations in processes 400, 500, 600, and/or 800, and perform the operations as described above via the graphics interface 1031, the video interface 1032, the output peripheral Interface 1033 and/or one or more monitors or touch screen devices 1042 to provide a user interface.

1211 In some aspects, the 3D layer height optimizer application 1065/slicer 165 can communicate with the 3D printer 105 to generate physical 3D objects of 3D image data, as described above.

1213 In some aspects, other programs 1027 may include one or more 3D virtualization applications that may

obtain and provide images of the sliced 3D model generated by the 3D layer height optimizer application 1065/slicing program 165 that may be displayed.

[0126]

1219 Each of the processes, methods, and algorithms described in the above sections may be automatically instantiated, in whole or in part, in a module of code executed by one or more computers or computer processors.

1222 Code modules may be stored on any type of non-transitory computer-readable medium or computer storage device, such as a hard drive, solid-state memory, and/or optical disk, etc.

1224 Processes and algorithms may be implemented partially or fully in dedicated circuitry.

1225 The disclosed processes and results of process steps may be stored persistently or otherwise in any type of non-transitory computer storage, such as, for example, volatile or non-volatile storage.

1227 Each of the features and processes described above can be implemented independently of each other, or combined in various ways.

1229 All possible combinations and sub-combinations are contemplated to be within the scope of this disclosure.

1230 Additionally, in some implementations, certain methods or process blocks may be omitted. The methods and processes described herein are also not limited to any particular order, and the various blocks, and the states associated therewith, may be executed in other orders as appropriate. For example, the blocks or states described may be performed in a different order than specifically disclosed, or multiple blocks or states may be combined into a single block or state. Example blocks or states may be executed sequentially, in parallel, or otherwise. Blocks or states may be added or removed with respect to the disclosed example embodiments. The example systems and components described herein may be configured differently than as described. For example, elements may be added, removed, or rearranged relative to the disclosed example embodiments.

[0127]

1242 It will also be understood that various items are illustrated as being stored in memory or storage while in use, and that these items, or portions thereof, may be transferred between memory and other storage devices for purposes of memory management and data integrity.

1245 Alternatively, in other embodiments, some or all of the software modules and/or systems may execute in memory on another device and communicate with the illustrated computing system via cross-computer communications. Furthermore, in some embodiments, some or all of the systems and/or modules may be implemented or provided in other ways, such as at least in part in firmware and/or hardware including, but not limited to, application specific integrated circuits (ASICs), Standard integrated circuits, controllers (e.g., by executing appropriate instructions and including microcontrollers and/or embedded controllers), field programmable gate arrays (FPGAs), complex programmable logic devices (CPLDs), etc. Some or all of the modules, systems and data structures may also be stored (e.g., as software instructions or structured data) on a computer-readable medium, such as a hard drive, memory, network, or portable media product for an appropriate drive or via an appropriate connection to read. For purposes of this specification and claims, the phrase "computer-readable storage medium" and variations thereof do not include waves, signals, and/or

other transient and/or intangible communication media. Systems, modules, and data structures may also be transmitted as a generated data signal (e.g., as part of a carrier wave or other analog or digital propagated signal) on a variety of computer-readable transmission media, including Based on wireless and wire/cable-based media, and can take a variety of forms (e.g., as part of a single or multiplexed analog signal, or as multiple discrete digital packets or frames). In other embodiments, such computer program products may take other forms. Accordingly, the present disclosure may be implemented with other computer system configurations.

[0128]

1266 Unless otherwise specifically stated, conditional language such as "can," "could," "may," or "could" as used herein is generally intended to express that certain embodiments include, and other implementations are included in, as understood by the context in which they are used. Examples do not include specific features, elements and/or steps.

1270 Accordingly, such conditional language is generally not intended to imply that features, elements, and/or steps are required for one or more embodiments, or that one or more embodiments necessarily include logic for making decisions, with or without user input or prompts. , whether these features, elements and/or steps are to be included or performed in any particular embodiment. The terms "includes," "includes," "having," etc. are synonyms and are used inclusively without excluding other elements, features, actions, operations, etc. Furthermore, the term "or" is used in its inclusive sense (rather than in its exclusive sense) such that when used, for example, to join a list of elements, the term "or" means one of the elements in the list, some or all.

[0129]

1281 While certain example embodiments have been described, these embodiments are provided by way of example only and are not intended to limit the scope of the invention disclosed herein.

1283 Accordingly, nothing in the foregoing description is intended to imply that any particular feature, characteristic, step, module or block is required or irreplaceable. Indeed, the novel methods and systems described herein may be implemented in a variety of other forms; furthermore, various omissions, substitutions, and changes in the form of the methods and systems described herein may be made without departing from the spirit of the invention disclosed herein. proceed below. The appended claims and their equivalents are intended to cover such forms or modifications as would fall within the certain scope and spirit of the invention disclosed herein.

Notice

CLAIMS CN108367497A

1.

13 A system for printing three-dimensional (3D) objects, including:

14 A computing device configured to:

15 receiving at least one height configuration parameter associated with the 3D object and a total object height; and

17 segmenting the 3D object into a plurality of formable layers, wherein the plurality of formable layers includes a first height, wherein segmenting the 3D object further includes:

19 The first height corresponding to the plurality of formable layers is selected based on the received at least one height configuration parameter and the total object height, wherein the first height is selected to optimize the at least one height configuration the accuracy of at least one of the parameter or the total object height; and

22 A 3D printer in communication with the computing device, the 3D printer including:

23 an extruder configured to deposit material in formable layers to form the 3D object; and

24 Movement means coupled to the extruder and configured to move the extruder in at least a vertical direction to deposit the plurality of formable layers of the material according to the first height.

2.

29 The system of claim 1, wherein the at least one height configuration parameter includes a 3D printer resolution selection or layer height.

3.

34 The system of claim 1, wherein the at least one height configuration parameter includes a tolerance corresponding to a subset of the plurality of formable layers.

4.

39 The system of claim 3, wherein the computing device is further configured to:

40 A second height corresponding to at least the subset of the plurality of formable layers is selected based on the received at least one height configuration parameter and the total object height, wherein the second height is selected to optimize the Accuracy of at least one of at least one height configuration parameter and the total object height.

5.

47 A method for improving dimensional accuracy when generating three-dimensional (3D) objects including multiple formable layers, the method comprising:

49 Receives at least one height configuration parameter and the total object height;

50 A first height corresponding to at least a subset of the plurality of formable layers is selected based on the received at least one height configuration parameter and the total object height, wherein the first height is selected to optimize the at least the accuracy of at least one of a height configuration parameter or the total object height; and

54 The first height is communicated to a 3D printer to generate the 3D object.

6.

58 The method of claim 5, wherein said at least one height configuration parameter includes a global height of said plurality of formable layers, and wherein at least said subset of said plurality of formable layers includes said Multiple formable layers.

7.

64 The method of claim 5, wherein selecting the first height further comprises selecting a corresponding one of the plurality of formable layers based at least in part on the at least one height configuration parameter or the total object height. A plurality of formable layers at said first height.

8.

70 The method of claim 5, wherein the at least one height configuration parameter includes a tolerance for a subset of the plurality of formable layers, and wherein selecting the first height further includes:

72 The first height corresponding to the subset of the plurality of formable layers or to all of the plurality of formable layers is selected based on the tolerance.

9.

77 The method of claim 5, further comprising identifying one or more formable layers of the plurality of formable layers associated with a tolerance, and wherein selecting the first height further includes:

79 A plurality of formable layers of the plurality of formable layers corresponding to the first height or at least one

of the first heights are selected based on the tolerance.

10.

84 9. The method of claim 9, wherein identifying the one or more formable layers includes receiving a pair of at least one first tolerance and at least one formable layer corresponding to the at least one first tolerance. s Choice.

11.

90 The method of claim 5, wherein the at least one height configuration parameter includes a tolerance for a subset of the plurality of formable layers, and wherein the method further includes:

92 A second height corresponding to the subset of the plurality of formable layers is selected based on the tolerance.

12.

97 The method of claim 5, wherein the at least one height configuration parameter includes object height resolution, and wherein optimizing the first height corresponding to at least one formable layer further includes at least one of: By:

100 The first height is selected to meet or exceed the object height resolution; or

101 A plurality of formable layers of the plurality of formable layers corresponding to the first height is selected to meet or exceed the object height resolution.

13.

106 The method of claim 5, wherein optimization further includes:

107 determining an object height accuracy error of the 3D object;

108 Determine altitude configuration parameter accuracy errors; and

109 At least one of: selecting the first height based on a comparison of the object height accuracy error and the height configuration parameter accuracy error or selecting a number of the plurality of formable layers corresponding to the first height For mable layer.

14.

115 The method of claim 13, wherein selecting the first height or selecting at least one of a plurality of formable layers of the plurality of formable layers corresponding to the first height further comprises :

117 The height configuration parameter accuracy error is weighted relative to the object height accuracy error.

15.

121 A computer-readable storage medium having instructions stored thereon that, when executed by at least one

processor, cause the at least one processor to perform operations in generating a three-dimensional (3D) object including a plurality of formable layers. Operations to improve dimensional accuracy, including:

Receives at least one height configuration parameter and the total object height;

Selecting a first height corresponding to the plurality of formable layers based on the received at least one height configuration parameter and the total object height, wherein the first height is selected to optimize the at least one height configuration parameter or the accuracy of at least one of the total object heights; and

The first height is communicated to a 3D printer to generate the 3D object.

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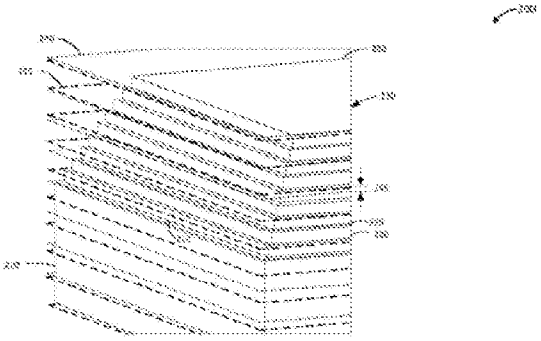
(54)发明名称

使用自动尺寸精度补偿来打印3D对象

(57)摘要

描述了用于改进尺寸精度的技术，且更具体地用于在生成包括多个可成型层的3维(3D)对象时改进z轴或垂直尺寸精度。在一个示例中，可获得高度配置参数(诸如所选择的层高、打印分辨率、要打印的3D对象的某些层或部分的一个或多个容限值，等等)和总对象高度。可基于所接收到的高度配置参数和总对象高度来选择对应于该多个可成型层的一子集的第一高度。在一些方面，第一高度可包括3D对象的全局层高。第一高度可被选择成优化高度配置参数或总对象高度的精度。



CN 108367497 A

1.一种用于打印三维(3D)对象的系统,包括:

计算设备,其被配置成:

接收与3D对象相关联的至少一个高度配置参数和总对象高度;以及

将所述3D对象分割成多个可成型层,其中所述多个可成型层包括第一高度,其中分割所述3D对象进一步包括:

基于接收到的至少一个高度配置参数和所述总对象高度来选择与所述多个可成型层相对应的所述第一高度,其中所述第一高度被选择成优化所述至少一个高度配置参数或所述总对象高度中的至少一者的精度;以及

与所述计算设备处于通信中的3D打印机,所述3D打印机包括:

配置成按各可成型层来沉积材料以形成所述3D对象的挤压器;以及

耦合到所述挤压器并配置成在至少垂直方向上移动所述挤压器以根据所述第一高度沉积所述材料的所述多个可成型层的移动装置。

2.如权利要求1所述的系统,其特征在于,所述至少一个高度配置参数包括3D打印机分辨率选择或层高。

3.如权利要求1所述的系统,其特征在于,所述至少一个高度配置参数包括与所述多个可成型层的子集相对应的容限。

4.如权利要求3所述的系统,其特征在于,所述计算设备被进一步配置成:

基于接收到的至少一个高度配置参数和所述总对象高度来选择与所述多个可成型层的至少所述子集相对应的第二高度,其中所述第二高度被选择成优化所述至少一个高度配置参数和所述总对象高度中的至少一者的精度。

5.一种用于在生成包括多个可成型层的3维(3D)对象时改进尺寸精度的方法,所述方法包括:

接收至少一个高度配置参数和总对象高度;

基于接收到的至少一个高度配置参数和所述总对象高度来选择与所述多个可成型层的至少一子集相对应的第一高度,其中所述第一高度被选择成优化所述至少一个高度配置参数或所述总对象高度中的至少一者的精度;以及

将所述第一高度传达给3D打印机以生成所述3D对象。

6.如权利要求5所述的方法,其特征在于,所述至少一个高度配置参数包括所述多个可成型层的全局高度,并且其中所述多个可成型层的至少所述子集包括所述多个可成型层。

7.如权利要求5所述的方法,其特征在于,选择所述第一高度进一步包括至少部分地基于所述至少一个高度配置参数或所述总对象高度来选择所述多个可成型层中的对应于所述第一高度的数个可成型层。

8.如权利要求5所述的方法,其特征在于,所述至少一个高度配置参数包括所述多个可成型层的一子集的容限,并且其中选择所述第一高度进一步包括:

基于所述容限来选择与所述多个可成型层的所述子集相对应的或与全部所述多个可成型层相对应的所述第一高度。

9.如权利要求5所述的方法,其特征在于,进一步包括标识所述多个可成型层中的与容限相关联的一个或多个可成型层,并且其中选择所述第一高度进一步包括:

基于所述容限选择所述多个可成型层中的与所述第一高度相对应的数个可成型层或

所述第一高度中的至少一者。

10.如权利要求9所述的方法，其特征在于，标识所述一个或多个可成型层包括接收对至少一个第一容限和与所述至少一个第一容限相对应的至少一个可成型层的选择。

11.如权利要求5所述的方法，其特征在于，所述至少一个高度配置参数包括所述多个可成型层的一子集的容限，并且其中所述方法进一步包括：

基于所述容限来选择与所述多个可成型层的所述子集相对应的第二高度。

12.如权利要求5所述的方法，其特征在于，所述至少一个高度配置参数包括对象高度分辨率，并且其中优化与至少一个可成型层相对应的所述第一高度进一步包括以下中的至少一者：

选择所述第一高度以满足或超出所述对象高度分辨率；或者

选择所述多个可成型层中的对应于所述第一高度的数个可成型层以满足或超出所述对象高度分辨率。

13.如权利要求5所述的方法，其特征在于，优化进一步包括：

确定所述3D对象的对象高度精度误差；

确定高度配置参数精度误差；以及

以下至少一者：基于所述对象高度精度误差与所述高度配置参数精度误差的比较来选择所述第一高度或选择所述多个可成型层中的对应于所述第一高度的数个可成型层。

14.如权利要求13所述的方法，其特征在于，选择所述第一高度或选择所述多个可成型层中的对应于所述第一高度的数个可成型层中的至少一者进一步包括：

相对于所述对象高度精度误差对所述高度配置参数精度误差加权。

15.一种其上存储有指令的计算机可读存储介质，所述指令在由至少一个处理器执行时使所述至少一个处理器执行用于在生成包括多个可成型层的三维(3D)对象时改进尺寸精度的操作，所述操作包括：

接收至少一个高度配置参数和总对象高度；

基于接收到的至少一个高度配置参数和所述总对象高度来选择与所述多个可成型层相对应的第一高度，其中所述第一高度被选择成优化所述至少一个高度配置参数或所述总对象高度中的至少一者的精度；以及

将所述第一高度传达给3D打印机以生成所述3D对象。

使用自动尺寸精度补偿来打印3D对象

技术领域

[0001] 本公开一般涉及三维(3D)打印或增材制造，且更具体地涉及在创建3D对象时改进尺度精度。

[0002] 背景

[0003] 创建3D对象在对3D对象建模的复杂性以及生成3D对象以准确描绘现实生活物体的复杂性两方面而言提出了特别的挑战。许多3D打印机或增材制造设备根据从计算机辅助设计应用生成的3D模型来打印或生成对象，例如通过将该模型切片成薄水平层并逐层垂直地沉积材料(例如，熔化塑料、粘土、混凝土、金属粉末、食品)。层高(厚度)通常通过用户界面(UI)控件来选择，该控件允许层高的直接固定设置(例如，.25mm或即250微米)或者以更简单的一般形式来设置具有与标准打印机项相关联的预定层高(例如，精细、标准、粗略等等)的层分辨率。层高或层分辨率紧密链接到打印速度对垂直步长分辨率打印质量之间的折中。当代切片应用软件(切片程序)一般未能考虑固定层高对所打印对象的总体垂直尺度精度的影响。固定高度层切片形式的量化可导致所选层高的+-50％的垂直(z轴)尺度误差(例如，对于.25mm层高而言是.125mm)，比通常可由良好调整的3D打印机所产生的2微米(0.002mm)的典型x-y平面尺度精度高两个量级。

[0004] 作为层高盲选的结果，3D打印对象结果具有与所需层高的倍数对准的垂直或z轴特征(包括对象的顶部)且在打印对象的z维上具有可能很大的误差。例如，使用250微米层来打印1.12mm 3D对象将造成实际上1mm高的对象，或即12％的误差。这一误差由于以下原因而发生：对象将需要4.48层，但切片程序向下圆整到4层。该误差影响不限于对象的顶部，而是对象在不同z层高度处的全部特征。例如，考虑打印椅子对象的情形，其中步长增量没有与层高对准。这一配置导致直到对象的上表面的每一步长处的误差。一般由步进器或伺服电机或者其他移动装置控制，3D打印机硬件能够在Z轴上具有高得多的精度——在实践中，通常在10微米到小于1微米的范围中(100步/mm-1600步/mm)的分辨率。在z轴硬件中的这一精细定位控制造成产生具有在1-10微米(0.1％到1％误差)的z尺度精度的对象。相应地，可作出对3D打印过程的改进。

[0005] 概述

[0006] 本公开的说明性示例包括但不限于方法、系统、以及各种设备。在一方面，在生成包括多个可成型层的3维(3D)对象时的尺度精度可被改进。接收至少一个高度配置参数和总对象高度。基于所接收到的至少一个高度配置参数和总对象高度来选择与该多个可成型层的至少一子集相对应的第一高度。第一高度可被选择成优化该至少一个高度配置参数或总对象高度中的至少一者的精度。第一高度可被传递给3D打印机以生成3D对象。

[0007] 系统和方法的其它特征在下文描述。特征、功能以及优点可在各示例中独立地实现，或者在又一些其它示例中被组合，特征、功能以及优点的进一步细节可参考以下的描述和附图来看到。

[0008] 附图简述

[0009] 以下将参考附图更全面地描述本公开的各实施例，其中：

[0010] 图1描绘了与能够打印三维(3D)对象的3D打印机处于通信中的计算设备的示例。

[0011] 图2描绘了被分割成2个层集合的3D对象的示例透视图，每一层具有不同厚度或层高。

[0012] 图3描绘了用于通过与3D打印机相关联的切片程序将对象分割成各层的示例过程。

[0013] 图4描绘了用于选择形成3D对象的多个层的至少一子集的层高的操作规程。

[0014] 图5描绘了用于选择全局层高和3D对象的至少一层子集的局部化层高的更详细操作规程的示例。

[0015] 图6描绘了用于选择3D对象的至少一层子集的层高的详细操作规程的另一示例。

[0016] 图7描绘了用于根据图4和/或6的操作规程通过与3D打印机相关联的切片程序将对象分割成各层的示例过程。

[0017] 图8描绘了用于根据图4、5或6的操作规程通过与3D打印机相关联的切片程序将对象分割成各层的示例过程。

[0018] 图9A和9B描绘了具有定位在3D对象的各层之间的某些z轴特征的3D对象的示例透视图。

[0019] 图10是在其中可实现本文描述的各技术的示例通用计算环境。

[0020] 说明性实施例的详细描述

[0021] 至少出于本说明书的目的，本文所选择的术语和短语可具有以下含义：

[0022] a)床调平：指的是3D打印机校准过程，其测量打印喷嘴(热端)相对于将在其上制作所打印对象的表面(也称为打印表面、打印床、构建板)的高度。校准过程可包括将打印头移动跨越打印床并在多个位置处停止以测量喷嘴与表面之间的净空。校准测量可由打印机控制器在打印期间使用来调整z轴高度，或可由切片程序使用来调整一个或多个层的层高，在该一个或多个层处有必要补偿在被测量的点处打印机的喷嘴-表面净空的变化。

[0023] b)特征：指的是所打印对象的尺度容限在其中很重要的3D模型的任何区域或方面。

[0024] c)局部特征：指的是3D模型特征，诸如垂直斜面或倾斜表面、或具有高于/低于附近周围表面但总是低于3D模型的总高度的高/低点(也称为最大值/最小值)的那些表面。

[0025] d)层：3D模型的单个增量z轴固定高度平面水平切片，通过它来引导3D打印机将材料沉积在平台上或向前沉积的材料层上。

[0026] e)切片：指的是3D对象模型的单个(通常是垂直)截面层。

[0027] f)切片程序：将3D对象模型转换成一个或多个层高的经切片层的集合的软件程序。经切片层可在显示器上通过图形来查看，或被转换成用来指令3D打印机创建3D对象模型的物理表现的工具路径命令。切片程序功能性可由完全地或部分地在移动或其他个人计算设备上、3D打印机内的计算组件上、或者可包括物理或虚拟化计算资源(例如，数据中心服务器、虚拟机)的本地或远程计算环境上执行。

[0028] g)全局层高：指的是由打印质量选择(例如，粗略、正常、精细)来定义的层高，其按需调整以在3D打印对象中产生精确且在一些情形中产生最精确的总高度尺度，如对应的模型数据所指定的。

[0029] h)最优层高：指的是如下层高：该层高使得在组合多个参数(诸如例如多个对象模型高度特征的容限、3D导体行的最小分辨率能力、或局部层高特征与其他层高特征的邻近度)的约束时，所打印的3D对象高度特征具有与模型完全相同的尺度或所能达到的尽可能

接近的尺度。

[0030] i)高度配置参数:指定3D模型或对象的高度方面(z轴尺度)。例如,这可以是但不限于标称层高、总高度、局部特征高度、高度容限、垂直斜面或弯曲表面的z轴高度容限,等等。

[0031] j)总高度:指的是从3D模型的最低表面到最高表面或最高点的距离(即,总z轴尺度)。

[0032] 本文描述的用于选择层高以生成3D对象来改进所生成的3D对象的尺度准确性的系统和技术。这一方面,层高可基于要使用3D打印机或其他增材制造技术来生成的3D对象模型的总高度(z轴尺度)以及可被获得或接收到的至少一个高度配置参数来确定。被选择用于将被打印以形成3D对象的多个可成型材料层的至少一子集的层高可以基于总对象高度和至少一个高度配置参数来确定。层高可被选择成使3D对象的总高度或3D对象模型的一个或多个局部/全局最大高度特征或其他配置参数中的至少一者的精度最大化。在一些方面,例如,基于设计考虑或用户选择/偏好,最优层高可通过计算与使用标称或当前层高来打印达到3D对象模型的下一局部/全局最大高度特征或达到总对象高度所需的剩余层相关联的误差来被选择。在一些方面,在选择最优层高时,与关联于总对象高度的误差相比,与使用标称或当前层高来打印剩余层以达到3D对象模型的下一局部最大高度特征相关联的误差可被更重地加权,反之亦然,或者按任何比例(例如,根据用户偏好,等等)。在一些方面,计算得到的打印剩余层来达到3D对象模型的下一局部/全局最大高度特征或达到总对象高度的正误差可导致归因于稍微更高的打印分辨率而选择比用户所选择的层高稍微更小的切片层高,而对负误差选择稍微更高的层高可归因于稍微更低的打印分辨率而不被选中。

[0033] 在一些情形中,可被获得或接收到的高度配置参数可包括打印分辨率(例如,切片层高),诸如对精细、标准或粗糙打印模式的选择(类似于喷墨打印机或其他此类打印机),用户选择的层高值(例如,250微米),对3D对象的总高度(具有对应容限或所需精度)的选择,对3D对象局部/全局最大/最小高度特征(具有对应容限或所需精度)的子集的一个或多个选择,一个或多个层高方差限制(例如,以通过不过多地改变层高来保留3D对象的垂直壁或侧壁上的均匀脊),等等。

[0034] 在一些情形中,单个层高值可被选择为全局层高。在这一场景中,全局层高可被选择成使得总对象高度尽可能接近该层高的偶数倍。在一些方面,总层数也可结合全局层高来选择成等于或最佳地接近总对象高度。全局层高。也可被选择成使至少一个高度配置参数(诸如打印分辨率、用户选择的层高值)的精度最大化,或者满足容限值,或者使一个或多个局部最大值/最小值高度特征的误差最小化。应当明白,数种不同技术可被用来确定全局或其他层高值,包括上述加权方案、机器学习技术,等等。

[0035] 在一些方面,所描述的技术还可包括与形成3D对象的局部最大/最小高度特征的多个层的子集相对应的层高的局部最优(例如,层高的动态调整)。在一些情形中,对与层子集相对应的层高的选择可以按以上针对全局层高描述的相似方式来执行。在一些情形中,该层子集的总高度或z尺度可被当作总对象高度。在一些方面,与全局误差相比,局部化误差可被较不重度地加权,使得对于选择一个或多个层高而言,总对象高度/层子集的总高度是比局部z尺度精度更重要的因素。在其他情形中,可接受误差界限可被配置或单独地选

择。

[0036] 在一些方面，3D打印软件应用(一般称为切片程序或3D打印驱动程序)(它可以在计算设备上执行)可以执行上述用于选择要被打印或生成的3D对象的一个或多个层高的技术。计算设备的例如数个输入装置中的任一者可被用来获得总对象高度和高度配置参数。在一些情形中，切片程序或其他设备或应用可以根据要打印的3D对象的模型(例如根据计算机辅助设计(CAD)包、来自3D扫描仪的图像数据，等等)确定总对象高度和/或一个或多个高度配置参数(例如，标识z轴特征)，使得尺度精度优化可被动态地执行。

[0037] 在一些情形中，与第一层高相关联的层高可被单独地选择，诸如选择成大于与3D对象相关联的全局或其他层高，以确保在打印期间底部层粘合到打印床。应当明白，数个单独3D对象高度特征层或3D对象高度特征层的子集中的任一者可经由将在下文更详细地描述的类似过程被分开地配置。

[0038] 应当明白，所描述的技术可被应用于实现固定层办法的各种3D对象生成技术，诸如，包括熔合沉积成型(FDM)的挤压技术、熔丝制造(FFF)、直接墨水书写(DIW)、或使用切片或分层方法的其他增材制造技术，诸如Vat Photopolymerisation(还原聚合)、材料喷射、粘合剂喷射、粉床熔化、定向能沉积，等等。

[0039] 图1解说了包括与能被配置成打印3维(3D)对象130的3D打印机105处于通信中的计算设备110的示例系统100。计算设备110可包括膝上型、台式或个人计算机(PC)，移动设备(诸如，智能电话、平板，等等)，联网设备，云计算资源中的任一者，或它们的组合。计算设备110可经由有线连接或本领域技术人员所知的各种无线连接115中的任一者与3D打印机105通信。3D打印机105可具有或关联于各种收发机、调制解调器、NIC等中的任一者(通常与打印机控制器117相关联)，以经由有线和/或无线连接115与计算设备110通信。一般而言，计算设备110可以执行或(经由网络或经由云)访问取得3D对象数据并将该数据转换成可由控制3D打印机105的打印机控制器117执行的指令(例如，G-代码)的一个或多个软件程序或应用，以使3D打印机105通过将材料按多个(例如，分开地)可配置层135挤压到基底125上形成3D对象130。出于参考的目的且如贯穿本文使用的，软件应用(在一些情形中，它可以包括CAD组件、CAM组件、3D图像捕捉和转换功能，等等)可被称为切片程序或驱动程序165。在大多数情形中，切片程序165将与计算设备110相关联。然而，本文设想了切片程序165可以整体或部分地关联于单独的3D打印机105，其可能但不一定是打印机控制器117的功能或在打印机控制器117内，而不背离本文描述的技术的范围。

[0040] 3D打印机105可包括定位在对象基底或床125上的一个或多个挤压器组装件120。挤压器组装件120可以在至少垂直方向上(z轴)由移动装置175移动，移动装置175可包括一个或多个步进器或伺服电机，如本领域一般所知的。移动装置175还可在水平面中(x或y轴)移动挤压器组装件120，诸如沿相对于基底125的上板170。其他3D打印机105设计在z轴上固定挤压器120，并使得当在z轴上移动床123时使它在x轴和y轴上移动。又一些其他设计在z轴和x轴上移动挤压器120，而同时在y轴上移动床125。又一些其他设计使用极坐标系来操作以在静止床125上移动挤压器120。本文描述的技术适用于3D打印机配置(诸如Delta Parallel Kinematic(增量并行运动)打印机)的这些和其他变型。在一些方面，挤压器组装件120可包括或容纳一个或多个丝150，例如卷绕/存储在线轴145中。在其他情形中，丝150可被存储或容纳在3D打印机105的其他部分中或完全在3D打印机105外部。挤压器组装件

120还可包括以指定速率将丝150驱入加热喷嘴160的相对辊155，由此丝被熔化并挤压到先前沉积到基底125上的层135中的最新近沉积的层上。挤压器组装件120可包括用于控制丝150被辊155馈送入加热喷嘴160并从喷嘴160挤出的速率的装置，诸如一个或多个电机、其他驱动机构，等等，从而控制各层135中的每一层的高度。

[0041] 根据本文描述的技术，挤压器组装件120可被控制以指定速率挤压丝来沉积具有特定层厚度或具有特定z尺度的一个或多个材料层135。在一个方面，层135中的一者或多者的高度可被确定，例如基于要打印的3D对象130的总高度140。在一些方面，层135中的一者或多者的高度可基于至少一个层高配置参数来确定，诸如打印分辨率、所选择的或默认的层高、3D打印机的硬件限制(例如，最高可能z轴分辨率、或其步长)、或者与一个或多个层135相对应的各种容限值或误差要求(例如，最大误差值)，等等。在一些情形中，可选择3D对象的某些局部对象最大高度特征或所有3D对象高度特征的容限值，且可基于在局部化特征最大/最小高度、全局层高或总3D对象高度上计算得到的误差来自动选择层高。在一些方面，切片程序165可以确定或选择用于打印3D对象130的一个或多个层高。在又一些情形中，计算设备110和/或切片程序165可以提供用于使用户能够手动配置或设置用于生成3D对象130的一个或多个参数的用户界面。

[0042] 图2解说了被分割成2个层集合的3D对象(诸如图1的3D对象130)的示例示图，每一层具有不同厚度或层高。3D对象130可包括第一或底部部分210，第一或底部部分210包括多个层且具有面向上的表面215。3D对象130还可包括堆叠在底部部分210的顶部上的数个阶梯部220，每一阶梯部具有近乎均匀的厚度和面向上的表面225。3D对象130还可由顶表面230来进一步限定。

[0043] 3D对象130可例如由3D打印机105根据数个不同配置(包括不同全局层高，如短划线235和虚线240所表示的)打印。层高235是根据本文描述的用于z轴尺寸精度优化来选择的，而层高240可表示通用或默认层高。层高235小于层高240，并且在更大程度上对准面向上的表面215、225，从而得到较少z轴误差(如距离标记245所解说的)。

[0044] 在一些情形中，层高240可被选择成最逼近3D对象130的z轴特征。在所解说的示例中，层高240仍然导致z轴上的一些误差(每隔一个阶梯部220被省略)。这可归因于打印分辨率限制，诸如指定(例如，大于阶梯部220中的每一者的)最小层高的粗略或标准模式。在其他情形中，其他层高可被选择来生成与限定3D对象的数据更精确地对准的最适配3D对象。在一些情形中，较高分辨率可导致较长打印时间，而较低分辨率可导致较快打印时间。在一些方面，最大打印时间可被选择，例如由用户选择，以限制或以其他方式约束所使用的最大打印分辨率。

[0045] 图3描绘了用于将3D对象305分割成各层以用于3D打印或3D生成的示例过程300。在操作310处，层高可被选择(例如，默认层高)来用于打印3D对象305，而不调整3D对象305的z尺寸特征。操作310可导致将对象305切片成具有厚度315的数个层。在操作330处，经切片对象305随后被打印。厚度315可能不是总对象高度320的倍数，并且因此可在325d处导致总对象高度的误差。层高315也可能没有与3D对象305的其他阶梯部(例如，部分325a、325c和325f)对准，和/或可导致3D对象305的斜部(例如，325b和325e)的相当大的误差。

[0046] 图4解说了用于选择多个层的至少一子集的层高以形成3D对象并改进z尺寸精度的示例操作规程400。在一些实例中，规程400可由切片程序165、计算设备110、3D打印机

105、或其组合执行。规程400可在操作402处开始，在此可获得至少一个高度配置参数或总对象高度。在一些情形中，操作402可包括经由结合切片程序165操作(例如经由计算设备110提供)的用户界面作为选择或输入事件来接收该至少一个高度配置参数或总对象高度。在一些情形中，高度配置参数或总对象高度中的一者或多者可根据(例如与要打印的对象的3D模型相关联的)3D对象数据来获得或确定。在一些方面，可从CAD或其他建模应用或程序访问3D对象数据，或者从3D扫描仪或相关联应用或者从其他位置或应用获得3D对象数据。

[0047] 在一些方面，3D对象模型可具有可能需要以指定精度或尺寸容限来打印的局部化高度特征。例如，当选择3D对象模型数据的一部分时(例如，经由CAD软件或与切片程序165相关联的用户界面，等等)，可指派必须被满足的较高或指定容限(即，误差裕度)，以使3D对象数据要被发送给3D打印机并被实际打印。选择3D对象数据的一部分可包括标识3D对象数据的一个或多个z轴特征，例如通过图形来标识。在一些情形中，精度要求或容限可被自动指派给3D对象模型的某些高度值/层并在高度配置参数中指定。在一些方面，用户界面可以提供包括将形成各层的特定高度的3D对象的视觉表示，例如在预览或打印预览格式或屏幕中。这可以在例如并非特定层的所有误差要求能在一次打印中被满足时使设计者能够更容易且更高效地优化用于打印3D对象的层高，或者在其他情形中，诸如以完全定制打印并标识与不同精度要求相关联的特定位置。

[0048] 在用户选择了3D模型并准备在3D打印机上打印所建模的对象时，用户界面(UI)可被呈现给用户以供选择各种选项，这些选项影响所打印对象的质量、它将打印的速度、以及其他用户可选择的相关参数。UI可被合并到切片程序165、当从在计算设备110上执行的应用发出打印命令时所执行的打印应用(例如，点击打印按钮)、或以其他方式(例如，云服务)在执行实际层高计算和模型切片功能之前。在一个实施例中，允许用户从3D计算机辅助设计/建模(CAD)应用激活3D打印功能的特征可被提供。该特征可包括呈现3D打印机或售卖机服务的菜单以供用户选择。在用户选择之际，该特征可以呈现UI，该UI向用户呈现分辨率和其他配置参数设置(例如，粗略模式、标准模式、精细模式、有筏/无筏、支撑)以供选择。因为该UI直接从CAD应用激活，所以该UI可具有对与3D模型相关的数据的直接和容易访问，以用于生成参数选项来供用户选择。

[0049] 该UI可以处理来自与打印请求动作相关联的3D模型的数据，呈现配置选项以供用户选择，或者基于简单计算和与3D模型的特征相关的其他参数提供默认参数值，该3D模型可由切片程序165使用来确定最优层高以用于将该模型切片来准备打印对应对象。UI应用可以接收描述3D模型的数据，可从该3D模型提取、确定以及(例如，为用户通过图形)标识不仅总3D建模对象高度，还有在固定层高被选择用于对整个模型进行切片的情况下可经受尺寸精度的损失的其他感兴趣特征。例如，该UI可以呈现模型的图形表示，其中经由标记、颜色、圆圈、突出显示、或向用户标识特征的其他手段来标识了感兴趣特征。(例如，经由用户点击、手指或指示笔触摸)选择一特征可以使得呈现示出该特征的经建模尺寸值以及在使用与所选分辨率设置(例如，粗略、标准、精细、用户定义)相关联的层高来切片的情况下产生的尺寸误差的选项框，并且使用户能够指定所选特征的最大尺寸误差。作为补充或替换，该UI可以呈现用户可以用来缩放该模型以调整所打印的对象所需的各尺寸的图形对象，并且在示出所建模的尺寸和以当前固定分辨率设置产生的误差的列表中或其他UI因素集合

中呈现与感兴趣特征有关的信息。给定当前配置参数选项设置以及对于改变的设置，该UI可以呈现计算得到的打印该对象的时间。以此方式，用户可以评估分辨率设置的选择、误差容限的选择等等以及打印对象所需的时间之间的折中。该UI可以使用户能够按需控制所选3D模型特征的尺寸精度来满足精度需求以用于在最少量时间内打印该对象。在一些情形中，高度配置参数可包括打印分辨率(诸如精细、标准或粗略打印模式的选择(类似于喷墨打印机或其他此类打印机))、来自不同打印分辨率方案的选择、一个或多个所选层高值(例如，对于某些层而言250微米且对于其他层而言150微米)、对具有对应容限或所需精度的层子集的一个或多个选择、一个或多个容限或精度要求、最大打印时间或最小打印速度、一个或多个层高方差限制(例如，以通过不过多改变层高来保留在3D对象的垂直壁或侧壁上的脊)，等等。

[0050] 在一个示例中，“点击拟合(Click to Fit)”特征可被包括在3D建模UI中在打印预览屏幕或3D打印对话窗口等中，其使得能够选择z轴上的一个或多个特定特征以最大化精度。“点击拟合”特征可通过经由光标选择要打印或呈现的3D对象的3D模型上的位置，从而绘制围绕一个或多个z轴特征的区域(例如，框)或其他图形选择动作来实现。这一特征可以优化误差或容限计算来提供3D对象上以其他方式不可解决的约束的解决方案(例如，通过优先化哪些容限最重要/哪些较不重要)。在一个方面，在接收到对平面的选择之际，可以向切片程序发送优化该特定z轴值或高度的拟合的指示。

[0051] 规程400可在操作404处继续，在此可基于总对象高度和该一个或多个高度配置参数来选择多个层的至少一子集的层高。在一些方面，全局层高可根据该一个或多个高度配置参数来被确定，使得它被优化以最佳地拟合3D对象的一些或全部z轴(即高度)特征。操作404的更多细节将在下文参考图5、6和8来描述。

[0052] 接着，在一些方面，在操作406处，切片程序可以基于所选择或确定的层高和对象模型数据来生成工具路径命令列表。工具路径命令列表通常以如下形式来被生成：在运动、材料温度和挤压速率、打印床尺寸等方面指令3D打印机的G-代码，以及3D打印机105根据所确定的层高和对象模型数据来打印或生成整个3D对象所需的任何其他指令。工具路径命令列表通常被存储在文件中(例如，在计算设备上或可移动存储介质(例如，SD卡)上)或者直接传送到打印机以根据所生成的工具路径命令来打印3D对象408。生成工具路径文件不限于使用G-代码，而是可以使用针对3D打印机优化的任何各种格式或代码。

[0053] 图5解说了用于选择全局层高和3D对象的至少一层子集的局部化层高的更详细操作规程500的示例。与规程400一样，规程500可由切片程序165、计算设备110、3D打印机105、或其组合执行。规程500可以与规程400共享一些操作；为简明起见，重复操作将不在此再次描述。

[0054] 规程500可在操作502处开始，在此可例如经由与切片程序165相关联或由切片程序165提供的用户界面接收包括对3D打印分辨率和/或所指定的层高的选择的高度配置参数。可例如通过查询3D打印机105以寻找硬件规范、经由切片程序165、与3D打印机105相关联的驱动程序、或包括诸如在XML或其他类型的文件中接收502 3D打印机105的配置参数或规范的各种其他方式，可获得指示3D打印机105具备能力的最小z轴或高度增量的信息(即，最小打印机分辨率能力，诸如0.625微米)。与特定3D打印机相关联的此类配置文件可包含所指定的粗略、标准以及精细模式的标称打印分辨率(即，标称层高)设置连同其他能力(例

如，自动校准)，或者基于特定3D打印机能力确定的操作参数设置，以产生与默认地或由用户选择的模式相关联的最佳打印质量和速度。接着，在操作504，可获得要打印的3D对象的总对象高度。总对象高度可以从3D对象数据中导出或获得，或者可经由用户界面来接收。

[0055] 接着，在操作404a(它可包括图4的操作404的更多细节)可确定全局层高。操作404a可首先包括在操作506处，基于在操作502处接收到的一个或多个配置参数(诸如3D打印机105具备能力的最小z轴增量、所选择的3D打印分辨率、以及在504中获得的总对象高度)确定最优全局层高。理想地，3D对象模型总高度将可由所确定的最优全局层高均匀除尽。如果所确定的最优全局层高不能由3D打印机105的最小高度分辨率均匀除尽，则高于或低于最优全局层高的、能由3D打印机105的最小高度分辨率均匀除尽的最接近的全局层高值可以是全局层高的候选。

[0056] 确定使用高于还是低于最优全局层高的全局层高可以基于3D对象模型的总高度精度/容限要求，或简单地基于哪一者将使得所打印的对象具有最接近(高于或低于)3D模型的总高度的总高度。

[0057] 在一些情形中，如果接收到的高度配置参数502指示3D模型中存在具有容限或精度要求的一个或多个局部高度特征，则操作508可被执行以确定其层高可被更改以达到该容限或精度要求的层子集。理想地，在该层子集中所确定的层高变化(例如，小于总层高的+/-10％)在根据3D模型打印的所得对象的外表面的外观上将是注意不到的。例如，如果其精度要求高点终止在全局层高切片的中间(即，50％处)中的点处的局部特征，则层子集的高度可在操作510处线性或非线性地调整，以使得局部高度特征尽可能近地达到该层子集中的一层的顶部。线性方波形层高调整可通过选择十层子集(五层在该特征上方且五层在该特征下方)来实现，其中第一五层具有比全局层高小10％的高度且第二五层具有比全局层高大10％的高度。可达到与线性调整相同的尺寸结果但具有更少的可注意到的视觉影响的一种非线性层高调整可以是正弦波形逼近。在这一情形中，层子集的每一层高可以按递增速率来降低，直至达到拐点，并且以递减速率降低直至发生最小层高，其中其表面层在匹配局部特征的高度处。大致正弦逼近被应用于层高变化以达到在当前示例中的局部特征高度的十层子集可包括按以下序列对全局层高值的连贯变化：{-6％，-11％，-16％，-11％，-6％，+6％，+11％，+16％，+11％，+6％}。

[0058] 表1示出了累加对象高度的比较，1)没有经调整层的子集，2)具有使用线性层高调整方案来调整的10层子集，以及3)具有使用非线性(例如，大致正弦逼近)层高调整方案来调整的10层子集，以在该层的全局层高的50％处的子层5处满足局部特征高度尺寸。所示出的层高值是以毫米为单位的，且累加高度相对于在所列出的十层下方的表面。在线性和非线性子集层调整栏两者中的层5恰好比所打印的对象表面在每一子集层调整的情况下将所处的位置低50％，且恰好是局部高度特征目标的高度尺寸。在层5之后，子集层高特征简档通过调整后五个子集层的高度来补偿得自前五个经高度调整的子集层的总全局高度分辨率降低，其中到层10，该补偿已完全校正了子集层高降低且将处于在保持在局部高度特征的情况下本来将处于的相同累加层高，并且在下一层开始返回使用全局层高。

[0059]

表 1：子集层高调整简档比较						
层号	全局层高	没有子集的累加	线性子集层高（%全局层高）	线性累加高度	正弦子集层高（%全局层高）	正弦累加高度
	表面下		表面下层子集			
1	0.250	0.250	-10%	0.225	-6%	0.235
2	0.250	0.500	-10%	0.450	-11%	0.458
3	0.250	0.750	-10%	0.675	-16%	0.668
4	0.250	1.000	-10%	0.900	-11%	0.890
5	0.250	**1.250**	-10%	**1.125**	-6%	**1.125**
6	0.250	1.500	+10%	1.400	+6%	1.390
7	0.250	1.750	+10%	1.675	+11%	1.668
8	0.250	2.000	+10%	1.950	+16%	1.958
9	0.250	2.250	+10%	2.225	+11%	2.235
10	0.250	**2.500**	+10%	**2.500**	+6%	**2.500**

[0060] 应当明白，在此存在用于确定层子集并调整该层子集的层高的许多办法，它们全部将不在本文中显式地描述。然而，用来确定子集层的数目以及它们的高度的计算如果不是全部也是大部分可考虑可位于所选层子集内的具有高度容限/精度的其他局部特征，且在一些情形中，可补偿具有不同高度的集体子集层对总对象高度的影响。

[0061] 接着，在一些方面，在操作512处，切片程序可以基于所选择或确定的全局层高、局部子集层高度(如果有的话)和3D对象模型数据来生成工具路径命令列表。工具路径命令列表通常以如下形式来被生成：在运动、材料温度和挤压速率、打印床尺寸等方面指令3D打印机的G-代码，以及3D打印机105根据所确定的层高和对象模型数据来打印或生成整个3D对象所需的任何其他指令。工具路径命令列表通常被存储在文件中(例如，在计算设备上或可移动存储介质(例如，SD卡)上)或者可直接传送到打印机以根据所生成的工具路径命令来打印3D对象514。生成工具路径文件不限于使用G-代码，而是可以使用针对3D打印机优化的任何各种格式或代码。

[0062] 在其他方面，在操作512处，最优层高可在软件模块或程序中确定，公司软件模块或程序可作为计算设备110上的3D建模CAD应用、计算设备中、3D打印机105中、本地或远程计算环境中的3D打印机驱动程序一部分或与其相关联、或它们的组合。作为生成工具路径命令列表的替换或补充，软件模块或程序可以生成将对象切片的最优层高的列表，并且在操作514处将该列表发送到存储在存储设备上的文件或直接发送到3D打印机105，其中与3D模型打印机相关联的驻留的切片程序165模块将基于该列表对该模型进行切片。

[0063] 图6解说了用于选择3D对象的至少一层子集的层高的详细操作规程600的另一示例。在一些方面中，规程600可对应于以上参考图5描述的操作508-510。在一些实例中，规程

600可由切片程序165、计算设备110、3D打印机105、或其组合执行。

[0064] 规程600可在以上参考图5描述的操作506处确定全局层高之后在操作602处开始。操作602可包括确定3D模型的局部高度特征数据是否可用。如果没有局部高度特征数据被包括在接收到的高度配置参数数据中，则规程600可结束并继续至操作512。然而，如果局部高度特征数据可供用于该3D模型，则规程600可继续至操作604，在此接收到的高度配置参数数据可被分析以确定该3D模型的局部高度特征，连同指定尺寸容限或误差限度的任何相关联数据。接着，在操作606处，可确定最接近的局部高度特征在3D模型中存在于其中的层，例如相对于被建模的当前层。在一些方面，操作606可包括从最低到最高来确定被评估的当前层上方的哪一全局层具有该最接近的局部高度特征。

[0065] 规程600随后可进至操作608，在此定位局部高度特征在其中达到最高点的全局层的那一部分。例如，从3D对象模式的基底到该局部高度特征的层数可通过将该基本特征的高度除以所确定的全局层高来确定，其中任何非零剩余部分指示该局部高度特征在其中达到最高点的全局层高的那一部分。接着，在操作610，可确定其高度可被调整以满足尺寸精度(容限)要求的层子集的数目，如果针对该高度特征指定了尺寸精度要求的话。这一确定可基于所确定的全局层高、该本地高度特征在其中达到最高点的全局层高的那一部分、以及目标3D打印机105所支持的最小z轴高度分辨率、用户选择等中的至少一者来达成。

[0066] 接着，在操作612处，数种逼近算法中的任一者可被应用来调整来自操作610的所确定的层数。例如，如果局部高度特征的那一部分在所确定的0.25毫米全局层高的一半处达到最高点，如在表1中所示，则使用线性方波比较，对于五层而言使子集层高降低10％(即，0.225mm)将恰好等于该局部特征在第5层顶部的尺寸高度。0.225mm子集层高对于具有1微米(0.001mm)最小高度分辨率的3D打印机而言工作良好，但它可能不能被其他3D打印机的最小高度分辨率(例如，0.010mm)整除。在此类情形中，子集层的数目、子集层高、其他类型的调整简档(非线性)、以及相关联的特征高度容限可通过算法来被考虑/调整，以确定将产生在其相关联的容限内的局部特征峰值的最佳层高。

[0067] 用于确定子集层高调整的附加考虑是与各毗邻层高中的递增差异相关联的视觉影响。在一些方面，在操作614处，层子集的经调整层高可基于最大毗邻层高变化值而被修改。例如，毗邻层层高的10％变化可影响某些模型的视觉质量，而对于其他模型而言无关紧要。参考表1中描绘的示例，对于线性调整方案而言，层6比层5高20％，且对于正弦波逼近方案而言比层5高12％。这些调整方案两者都可接纳10％毗邻层高变化限度要求，通过简单地将全局层高的层6切片并将针对层6-10所示的层高偏移至层7-11。相应地，毗邻层高的最大变化可以是用户可通过配置设置来调整的。一些曲线拟合算法可很好地适用于解决确定子集层高和数目的问题(给定各种潜在确定的全局层高、局部特征高度、打印机分辨率)以及完成视觉效果设置。

[0068] 接着，在操作616处，可以确定所得的对层子集的层高调整是否满足指定容限。如果是，规程600可进至操作622，在此可确定是否存在任何更多局部高度特征。如果3D模型数据包括更多局部更多调整，则规程600可回头进至操作606并继续循环通过到操作622，直至3D模型数据中不存在更多局部高度特征，此时，规程600可进至操作512。如果容限尚未被满足，则规程600可进至操作620，在此层子集中的不同数目的层或不同逼近算法中的至少一者可被实现，且存在610-616被重复直至令人满意的层高调整或配置已被确定。在一些方

面，如果一个或多个局部特征高度不能用局部特征调整来产生，则在操作618处3D模型的全局层高可被调整。

[0069] 在一些方面，如果将产生满足总对象高度的指定容限的打印对象的全局层高不能如在操作506处所描述地被确定，则层子集中的层高调整可被应用于全局高度以产生将最接近满足总对象高度的指定容限的打印对象。一种制作全局层高调整以将总对象高度带到指定容限内的办法是将本来从使用所确定的全局层高得到的总对象高度误差除以最小打印机高度分辨率。例如，如果通过使用所确定的具有+28微米的所得误差的全局层高将产生具有+0/-50微米的总对象高度容限的对象，并且3D打印机最小高度分辨率是10微米，则通过将一层的高度降低30微米或者通过将3层的层高都降低10微米，可以打印具有-2微米误差(很好地处于其指定容限内)的总对象高度。这些层高调整可被优选地在接近对象顶部的层处作出以避免使局部高度特征子集层高调整计算分组化，但可被单独地或作为层子集一起作出并定位在模型切片堆中的任何位置。

[0070] 应领会，规程600仅仅作为示例给出。本文设想了与多个层子集(包括单个层)相关联的不同误差值可被用于按需选择一个或多个不同层高，例如以鉴于用户偏好/高度配置参数来接纳3D对象的所有约束。在一个示例中，如果规程600在选择层子集的单个层高时不成功，例如归因于施加在误差范围上的较高约束，则该层子集可被拆分成两个不同子集，且每一子集的层高可随后被测试，每一者都根据规程600的单独执行。如果可获得独立的解决方案，则可改为使用这两个子集(每一值具有不同层高)的组合来满足误差要求。如果两个子集没有满足误差要求，则主子集可被分成3或4个子集，以此类推。在一些情形中，允许发生的子集划分的量可以受另一高度配置参数(诸如层高方差限制，例如被实现来产生在z尺寸上更均匀的打印3D对象(例如，以降低对3D对象的外部和垂直或部分垂直面上可见的不同分层效果))的约束。

[0071] 规程500和600的一示例将在下文描述。在一个示例中，具有1.1mm总对象高度的对象可被选择用于3D打印(例如，操作504)，其中用户指定的标准模式层高为250微米(.25mm)(例如，从操作502接收)。在操作506处，计算设备110中的3D打印机驱动程序应用可接收10微米(0.01mm)3D打印机最小分辨率能力，并通过将总对象高度1100微除以10微米打印机分辨率来计算得到总对象高度1.1mm(1100微米)是该3D打印机最小高度分辨率的均匀倍数。这可得到将以零总对象高度误差来打印该1.1mm对象的、均匀的110个高度为0.01mm(10微米)的层。打印110层(每一层为0.01mm高)可花费显著大量的时间来完成。然而，将1.1mm总对象高度除以所选择的250微米层高导致4.4层——并非层的均匀倍数，所以保证了对所选全局层高的调整。

[0072] 作为最小打印机分辨率的均匀倍数的对全局层高的任何调整可被用来产生具有没有误差的总高度的对象。一种用于确定最接近所选层高250微米的全局层高的迭代技术是将总对象高度(1100微米)连贯地除以所选层高(250微米)加或减打印机的最小高度分辨率(10微米)的某一倍数，直至较高是整数层。例如，使1100除以240微米得到4.58333层；除以230微米得到4.7826层；除以220微米得到恰好5层。在这一示例中，该技术确定220微米的全局层高(等于所选值的88％)最接近所选层高且将得到其总高度如在相关联的3D模型中指定的没有误差的打印对象。类似地，对于具有1.05mm总对象高度和+0/-30微米容限的3D模型，在选择精细模式(0.200mm)的情况下，遵循用于调整层高的相同技术，可以确定该模

型可使用调整到210微米(比所选高5%)的全局层高来被切片,以使用5层来再现对象总高度而没有完成。

[0073] 用于确定具有要打印在打印机(该打印机具有可能不能被总对象高度值均匀除尽的分辨率能力)上的总对象高度和容限的3D模型的全局层高的技术可将各全局层分成一个或多个层子集,层子集可以采用子集层高的线性或曲线拟合调整来达到最佳对象高度精度。这一技术类似于参考表1讨论的用于调整和补偿层高以精确地再现局部高度特征的技术,除了用于精确地再现总对象高度的层高调整可不需要补偿局部高度特征技术所需的层高变化。

[0074] 在以上描述的示例中,正用户偏好误差或与一个或多个高度配置参数相关联的误差可优先于负用户偏好误差。这可通过使用因子X对总对象高度或打印误差加权且使用因子Y对用户偏好误差加权来实现,具有朝向正用户偏好误差的特定偏向,诸如以比用户选择更高的分辨率来打印。应当明白,本文设想了其他加权或选择方案或算法。例如,在一个方面,机器学习技术可被采用来跟踪用户选择(例如,与单个用户相关联,经由登录信息来跟踪,单个3D打印机,或多个用户和/或3D打印机)和对3D打印项目的修订。用户选择可随时间被聚集以修改可由切片程序165自动录入的默认设置。在一些实例中,机器学习可至少部分地用于修改施加到选择算法的偏置,使得某些误差范围对特定用户或特定3D打印机而言是可接受的,但对于其他用户或打印机是不可接受的。在这一场景中,因子X和Y可根据所跟踪和聚集的用户偏好/选择来被选择或修改。

[0075] 在一些情形中,与用户选择相关联的所收集的数据(诸如上述“点击拟合”UI特征)可被用作机器学习过程的训练数据。在一个示例中,用户每次选择“拟合(Fit this)”或与Z轴特征相关联的其他类似选择项时,该选择和与其相关联的数据可被添加到训练集。机器学习算法(诸如通用机器学习算法)可在这一数据上被训练和验证,使得它识别出用户打印的任何新对象中的最佳特征。在这一场景中,3D建模应用或UI可基于历史用户选择数据/训练数据自动指示或建议要保留哪些z轴特征或与较高或特定容限或精度相关联,从而减少用户配置对象的3D建模/打印所需的步骤。

[0076] 图7描绘了用于根据以上参考图4、5和/或6描述的操作规程400、500和/或600通过与3D打印机相关联的切片程序将先前参考图3描述的对象305分割成各层的示例过程700。

[0077] 过程700可在705处基于总对象高度320和一个或多个高度配置参数,例如根据操作402和404、操作502-510和/或规程600,选择用于打印3D对象305a的全局层高来开始。层高710可被选择成等于总对象高度320的倍数,且符合一个或多个高度配置参数(例如,最小和最大层分辨率或步长,指定层高,以及3D对象305的某些z维特征的容限值,诸如阶梯部720、725和730以及斜部735和740)。操作705可导致将对象305d切片成具有厚度710的数个层。经切片对象305d随后在操作715处被打印以产生对象305e。厚度或层高710可被选择成总对象高度320的倍数,并且如此可导致没有总对象高度误差。层高710还可被选择成时任何z维误差最小化,诸如过程300中存在的误差,诸如误差325a、352c和325f。另外,层高710可导致3D对象305的斜部的经降低的误差,使得误差325g和325h少于与过程300相关联的误差325b和325e。

[0078] 图8解说了用于根据图4、5和/或6的操作规程通过与3D打印机相关联的切片程序将物体分割成各层的示例过程800。

[0079] 过程800可在805处基于总对象高度320和一个或多个高度配置参数，例如根据操作402和404、操作502-514和/或规程600，选择用于打印3D对象305的全局层高来开始。层高710可被选择成等于总对象高度320的倍数，且符合一个或多个高度配置参数(例如，最小和最大层分辨率或步长，指定层高，以及3D对象305的某些z维特征的容限值，诸如阶梯部720、725和730)。在一些情形中，在使用单个和全局层高710时存在的与斜部735和740相关联的误差(如图7中解说为误差325g和325h)可能是不可接受的或不在指定误差范围内。在这一情形中，局部层高优化可被使用(也通过805来指示)以选择第二层高810(例如，在所解说的示例中是层高710的一半)，以降低部分735和740中存在的误差，例如根据操作508和510。以此方式，在820处打印经切片3D对象305f时，与对象305g的斜部735和740相关联的误差325i和325j可被降低。

[0080] 图9A和9B解说了可使用所描述的技术以更大精度来被建模和/或打印的3D对象900a和900b的特定z轴特征的示例。参考解说3D对象900a的俯视图的图9A，3D对象600通过平面905被切片成4层910、915、920和935。顶层935包括具有特定高度940的文本(TEXT)，诸如浮雕文本，这可小于层910和915的全局层高925。为了精确地建模和/或3D打印浮雕文本935，层920的高度930可根据上述技术被调整(例如，在这一情形中，被降低)，以使具有特定最小高度分辨率的3D打印机能够精确地打印具有高度940的浮雕文本935。对于用于切片3D模型的传统技术，诸如3D模型900a，诸如在对象的顶部上的浮雕特征等特征在固定层高办法中可能完全丢失，诸如在该特征的高度940小于全局或固定层高925的一半的情况下。在一个示例中，在顶层或底层具有精细特征(诸如文本浮雕)时，所描述的技术可包括调整特定层和/或一个或多个附近层(诸如层920)的层高，以时特定特征高度的精度最大化。在一些情形中，其他层的高度可保持恒定，从而保留对象的各侧面上的可感知均匀性，且还通过不必单独地调整每一层高而改进速度。这一技术也可被应用于中间层，通过将一层拆分成两层或通过同等地调整两层。

[0081] 图9B解说了3D对象900b的另一示例仰透视图。如图所示的3D对象900b通过平面905被切片成五层975、945、950、955和960，例如以反向打印。底层975包括具有特定高度/深度980的负文本(TEXT)，这可小于层945、950、955和960的全局层高965。为了精确地建模和/或3D打印负浮雕文本975，包含文本975的层的高度980可根据上述技术被调整(例如，在这一情形中，被降低)，以使具有特定最小高度分辨率的3D打印机能够精确地打印具有高度980的浮雕文本975。

[0082] 在一些实施例中，一种用于打印三维(3D)对象的系统包括：计算设备，该计算设备被配置成：接收与3D对象相关联的至少一个高度配置参数和总对象高度；以及将该3D对象分割成多个可成型层，其中该多个可成型层包括第一高度。分割3D对象进一步包括：

[0083] 基于接收到的至少一个高度配置参数和所述总对象高度来选择与所述多个可成型层相对应的所述第一高度，其中所述第一高度被选择成优化所述至少一个高度配置参数或所述总对象高度中的至少一者的精度；以及

[0084] 与所述计算设备处于通信中的3D打印机，并且所述3D打印机包括：

[0085] 配置成按各可成型层来沉积材料以形成所述3D对象的挤压器；以及

[0086] 耦合到所述挤压器并配置成在至少垂直方向上移动所述挤压器以根据所述第一高度沉积所述材料的所述多个可成型层的移动装置。

[0087] 在一些实施例中，所述至少一个高度配置参数包括3D打印机分辨率选择或层高。

[0088] 在一些实施例中，所述至少一个高度配置参数包括与所述多个可成型层的子集相对应的容限。

[0089] 在一些实施例中，所述计算设备被进一步配置成：

[0090] 基于接收到的至少一个高度配置参数和所述总对象高度来选择与所述多个可成型层的至少所述子集相对应的第二高度，其中所述第二高度被选择成优化所述至少一个高度配置参数和所述总对象高度中的至少一者的精度。

[0091] 在一些实施例中，一种用于在生成包括多个可成型层的3维(3D)对象时改进尺寸精度的方法，并且所述方法包括：

[0092] 接收至少一个高度配置参数和总对象高度；

[0093] 基于接收到的至少一个高度配置参数和所述总对象高度来选择与所述多个可成型层的至少一子集相对应的第一高度，其中所述第一高度被选择成优化所述至少一个高度配置参数或所述总对象高度中的至少一者的精度；以及

[0094] 将所述第一高度传达给3D打印机以生成所述3D对象。

[0095] 在一些实施例中，所述至少一个高度配置参数包括所述多个可成型层的全局高度，并且其中所述多个可成型层的至少所述子集包括所述多个可成型层。

[0096] 在一些实施例中，选择所述第一高度进一步包括至少部分地基于所述至少一个高度配置参数或所述总对象高度来选择所述多个可成型层中的对应于所述第一高度的数个可成型层。

[0097] 在一些实施例中，所述至少一个高度配置参数包括所述多个可成型层的一子集的容限，并且选择所述第一高度进一步包括基于所述容限来选择与所述多个可成型层的所述子集相对应或与全部所述多个可成型层相对应的第一高度。

[0098] 在一些实施例中，该方法还包括：标识所述多个可成型层中的与容限相关联的一个或多个可成型层，并且选择所述第一高度进一步包括基于所述容限选择所述多个可成型层中的与所述第一高度相对应的数个可成型层或所述第一高度中的至少一者。

[0099] 在一些实施例中，标识所述一个或多个可成型层包括接收对至少一个第一容限和与所述至少一个第一容限相对应的至少一个可成型层的选择。

[0100] 在一些实施例中，所述至少一个高度配置参数包括所述多个可成型层的一子集的容限，并且所述方法包括基于所述容限选择与所述多个可成型层的所述子集相对应的第二高度。

[0101] 在一些实施例中，所述至少一个高度配置参数包括对象高度分辨率，并且其中优化与至少一个可成型层相对应的所述第一高度进一步包括以下中的至少一者：

[0102] 选择所述第一高度以满足或超出所述对象高度分辨率；或者

[0103] 选择所述多个可成型层中的对应于所述第一高度的数个可成型层以满足或超出所述对象高度分辨率。

[0104] 在一些实施例中，优化进一步包括：

[0105] 确定所述3D对象的对象高度精度误差；

[0106] 确定高度配置参数精度误差；以及

[0107] 以下至少一者：基于所述对象高度精度误差与所述高度配置参数精度误差的比较