UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GOOGLE LLC,
Petitioner

v.

CLEAR IMAGING RESEARCH LLC,
Patent Owner.

IPR2026-00181
U.S. Patent No. 9,860,450

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 9,860,450

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1002	Prosecution History of the '450 Patent ("'450FH")
1003	Prosecution History of App. No. 14/690,818
1004	RESERVED
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1007	U.S. Patent Pub. 2003/0076408 ("Dutta")
1008	Article titled "Creative Camcorder," included in Popular Electronics, March 1996 issue ("Creative Camcorder")
1009	Certified Translation and Original Application of Japanese Patent Application No. 2000-023024 ("Akifumi")
1010	U.S. Patent No. 5,881,272 ("Balmer")
1011	Certified Translation and Original Application of Japanese Patent Application No. 2000-224462 ("Hara")
1012	U.S. Patent No. 4,717,958 ("Gal")
1013	RESERVED
1014	Oshima et al., *History of World's First Commercialization of Image Stabilizers for Handheld Cameras*, 2023 8th IEEE History of Electrotechnology Conference (HISTELCON), 2023 ("Oshima1")
1015	*Camera feature search*, DP Review
1016	Kinugasa et al., *Electronic Image Stabilizer for Video Camera Use*, IEEE Transactions on Consumer Electronics, Vol. 36, No. 3, August 1990 ("Kinugasa1")
1017	U.S. Pat. No. 7,286,163
1018	US Patent Pub. 2001/0041012
1019	US Patent No. 7,274,390

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1020	Paik et al., *An Edge Detection Approach to Digital Image Stabilization Based on Tri-State Adaptive Linear Neurons*, IEEE Transactions on Consumer Electronics, Vol. 37, No. 3, August 1991 ("Paik")
1021	U.S. Patent 7,619,656
1022	U.S. Pat No. 6,263,162
1023	Kinugasa et al., *A Video Pre/Post-Processing LSI for Video Capture*, IEEE Transactions on Consumer Electronics, Vol. 42, No. 3, August 1996 ("Kinugasa2")
1024	Oshima et al., *VHS Camcorder with Electronic Image Stabilizer*, IEEE Transactions on Consumer Electronics, Vol. 35, No. 4, November 1989 ("Oshima2")
1025	Morimura et al., *A Digital Video Camera System*, IEEE Transactions on Consumer Electronics, Vol. 36, No. 4, November 1990 ("Morimura")
1026	*Clear Imaging Rsch. LLC v. Google LLC*, No. 3:25-cv-00221 (S.D. Cal. Dec. 17, 2025) (Google's Responsive Claim Constructions)
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1033	*Clear Imaging Rsch., LLC v. Lenovo Grp. Ltd.*, No. 2:25-cv-00240 (E.D. Tex.) (Docket)
1034	John R. Ragazzini & Gene F. Franklin, *Sampled-Data Control*

Exhibit	Reference
	Systems (1958)
1035	M. Brain, *How Microprocessors Work*, HowStuffWorks, https://web.archive.org/web/20030405084757/http://computer.howstuffworks.com/microprocessor2.htm
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1042	*Minolta DiMAGE A1; An Integral Lens Digital SLR*, Shutterbug (Mar. 1, 2004), https://www.shutterbug.com/content/minolta-dimage-a1-integral-lens-digital-slr
1043	CIPA DC-002-Translation-2003, *Standard Procedure for Measuring Digital Still Camera Battery Consumption*, Standard of the Camera & Imaging Products Association (Dec. 17, 2003), https://www.cipa.jp/std/documents/download_e.html?DC-002_e
1044	CIPA Standards, Camera & Imaging Products Association, https://www.cipa.jp/e/std/std-sec.html
1045	*Clear Imaging Rsch. LLC v. Google LLC*, No. 3:25-cv-00221, Dkt. 10 (S.D. Cal. Feb. 3, 2025) (Summons Returned Executed)
1046	*Clear Imaging Rsch. LLC v. Google LLC*, No. 3:25-cv-00221, Dkt. 54 (S.D. Cal. Jan. 28, 2026) (Joint Motion to Dismiss)

Exhibit	Reference
1047	Declaration of June Ann Munford Regarding Public Availability of Creative Camcorder

LISTING OF CHALLENGED CLAIMS

Claim 1	
1[pre]	A method for use in an imaging device comprising an image sensor, a processor, a memory, and one or more motion sensors, the method comprising:
[1.1]	capturing a sequence of images with the image sensor, wherein the sequence of images comprise a video, and storing the images in the memory;
[1.2]	detecting, by the one or more motion sensors, motion information for one or more images of the sequence of images, wherein the motion information represents motion of the device during capturing of the one or more images of the sequence of images, and storing the motion information in the memory synchronously with the storing of the one or more images;
[1.3]	determining, by the processor, a vertical shift value and a horizontal shift value for one or more images of the sequence of images based at least in part on the motion information;
[1.4]	modifying, by the processor, one or more images of the sequence of images based at least in part on the vertical and the horizontal shift values;
[1.5]	combining, by the processor, the modified images to obtain a final video; and
[1.6]	storing the final video in the memory.
Claim 2	
2	The method of claim 1, wherein the processor determines the vertical and horizontal shift values for one or more images for which the motion information is detected.
Claim 3	
3	The method of claim 1, wherein the processor modifies one or more images for which the vertical and horizontal shift values are determined.

Claim 4	
4	The method of claim 1, wherein the processor modifies one or more images of the sequence of images such that effect of motion of the device during capturing of the one or more images of the sequence of images is reduced in the final video.
Claim 5	
5	The method of claim 1, wherein the processor determines a vertical shift value and a horizontal shift value for each image of the sequence of images.
Claim 6	
6	The method of claim 1, wherein the motion information represents motion of the device at time of capturing of one or more images of the sequence of images.
Claim 7	
7	The method of claim 1, wherein the one or more images of the sequence of images is at least two images, and wherein the motion information represents motion of the device between capturing of consecutive images.
Claim 8	
8	The method of claim 1, wherein the vertical and horizontal shift values for an image indicate how much the image is displaced due to motion of the device during capturing of the image.
Claim 9	
9	The method of claim 1, wherein the modifying by the processor of the one or more images of the sequence of images comprises shifting a reference point in each image according to the vertical shift value and the horizontal shift value for the image in a direction that reduces the effect of motion of the device in the final video.

Claim 10	
10	The method of claim 1, wherein the method further comprises displaying the final video in a user interface.
Claim 11	
11	The method of claim 1, wherein the method further comprises modifying the sequence of images using a video compression technique.
Claim 12	
12	The method of claim 1, wherein determining a vertical shift value and a horizontal shift value for one or more images of the sequence of images is based at least in part on the focal distance of a lens of the imaging device.
Claim 13	
13	The method of claim 1, wherein the method further comprises receiving user input in a user interface, and at least one of modifying one or more images of the sequential images or combining the modified images to obtain a final video is based at least in part on the user input.
Claim 14	
14[pre]	An imaging device, comprising:
[14.1]	an image sensor configured to capture a sequence of images, wherein the sequence of images comprise a video, and store the images in a memory;
[14.2]	one or more motion sensors configured to detect motion information for one or more images of the sequence of images, wherein the motion information represents motion of the imaging device during capturing of the one or more images of the sequence of images, and store the motion information in the memory synchronously with the storing of the one or more images; and
[14.3]	a processor configured to: determine a vertical shift value and a horizontal shift value for one or more images of the sequence of images based at least in part on the motion information;

[14.4]	[a processor configured to:] …modify one or more images of the sequence of images based at least in part on the vertical and the horizontal shift values; and
[14.5]	[a processor configured to:] …combine the modified images to obtain a final video; and
[14.6]	wherein the memory is further configured to store the final video.
Claim 15	
15	The imaging device of claim 14, wherein the processor is configured to determine the vertical and horizontal shift values for one or more images of the sequence of images for which the motion information is detected.
Claim 16	
16	The imaging device of claim 14, wherein the processor is configured to modify one or more images of the sequence of images for which the vertical and horizontal shift values are determined.
Claim 17	
17	The imaging device of claim 14, wherein the processor is configured to modify one or more images of the sequence of images such that effect of motion of the device during capturing of the one or more images of the sequence of images is reduced in the final video.
Claim 18	
18	The imaging device of claim 14, wherein the processor is configured to determine a vertical shift value and a horizontal shift value for each of the images of the sequence of images.
Claim 19	
19	The imaging device of claim 14, wherein the motion information detected by the one or more motion sensors represents motion of the device at time of capturing of one or more images of the sequence of images.

Claim 20	
20	The imaging device of claim 14, wherein the one or more images of the sequence of images is at least two images, and wherein the motion information detected by the one or more motion sensors represents motion of the device between capturing of consecutive images.
Claim 21	
21	The imaging device of claim 14, wherein the processor is configured to determine a vertical shift value and a horizontal shift value for an image such that the vertical shift value and the horizontal shift value indicate how much the image is displaced due to motion of the device during capturing of the image.
Claim 22	
22	The imaging device of claim 14, wherein the processor is configured to modify one or more images of the sequence of images by shifting a reference point in each image according to the vertical shift value and the horizontal shift value for the image in a direction that reduces the effect of motion of the device in the final video.
Claim 23	
23	The imaging device of claim 14, wherein the device further comprises a display configured to display the final video.
Claim 24	
24	The imaging device of claim 14, wherein the processor is further configured to modify the sequence of images using a video compression technique.
Claim 25	
25	The imaging device of claim 14, wherein the processor is configured to determine a vertical shift value and a horizontal shift value for one or more images of the sequence of images based at least in part on the focal distance of a lens of the imaging device.

Claim 26	
26	The imaging device of claim 14, wherein the device further comprises a display configured to receive user input, and the device is configured to modify one or more images of the sequential images and to obtain a final video based at least in part on the user input.
Claim 27	
27	The imaging device of claim 14, wherein the processor is two or more processors.
Claim 28	
28[pre]	A method for use in an imaging device comprising an image sensor, a processor, a memory, and one or more motion sensors, the method comprising:
[28.1]	capturing a sequence of images with the image sensor, wherein the sequence of images comprise a video;
[28.2]	detecting, by the one or more motion sensors, motion information for one or more images of the sequence of images, wherein the motion information represents motion of the device during capturing of the one or more images of the sequence of images;
[28.3]	determining, by the processor, a vertical shift value and a horizontal shift value for one or more images of the sequence of images based at least in part on the motion information;
[28.4]	modifying, by the processor, one or more images of the sequence of images based at least in part on the vertical and the horizontal shift values;
[28.5]	combining, by the processor, the modified images, and applying a video compression technique to obtain a final video; and
[28.6]	storing the final video in the memory.
Claim 29	
29[pre]	An imaging device, comprising:

[29.1]	an image sensor configured to capture a sequence of images, wherein the sequence of images comprise a video;
[29.2]	one or more motion sensors configured to detect motion information for one or more images of the sequence of images, wherein the motion information represents motion of the imaging device during capturing of the one or more images of the sequence of images;
[29.3]	a processor configured to: determine a vertical shift value and a horizontal shift value for one or more images of the sequence of images based at least in part on the motion information;
[29.4]	[a processor configured to:] …modify one or more images of the sequence of images based at least in part on the vertical and the horizontal shift values; and
[29.5]	[a processor configured to:] …combine the modified images, and apply a video compression technique to obtain a final video; and
[29.6]	a memory configured to store the final video.
Claim 30	
30	The imaging device of claim 29, wherein the one or more images of the sequence of images is at least two images, and wherein the motion information detected by the one or more motion sensors represents motion of the device between capturing of consecutive images.
Claim 31	
31	The imaging device of claim 29, wherein the processor is configured to determine a vertical shift value and a horizontal shift value for one or more images of the sequence of images based at least in part on the focal distance of a lens of the imaging device.

Claim 32	
32	The imaging device of claim 29, wherein the device further comprises a display configured to receive user input, and the device is configured to modify one or more images of the sequential images and to obtain a final video based at least in part on the user input.

Google LLC ("Google" or "Petitioner") petitions for *Inter Partes* Review ("IPR") of claims 1-32 ("Challenged Claims") of U.S. Patent No. 9,860,450 ("'450 Patent" or "'450Pat"; EX-1001).

I. GROUNDS FOR STANDING

Google certifies the '450Pat is available for IPR, and Google is not barred/estopped from requesting review. This petition is being filed within one year of service of a complaint against Google on January 31, 2025. EX-1045.

II. IDENTIFICATION OF CHALLENGE

A. Prior Art

Google's grounds rely upon the prior art below based on an assumed priority date of March 25, 2004.[1] These references are analogous to the '450Pat and each other because they are in the same field of endeavor (e.g., image processing). Wolfe, ¶21. Further, they are reasonably pertinent to the problems the inventor was attempting to solve (e.g., like the '450Pat, Dutta/Akifumi/Creative Camcorder relate to stabilizing images/videos, and Balmer discloses a multi-processor architecture that would improve processing performance when stabilizing images/videos). *Id.*

[1] Google does not concede the '450Pat is entitled to a March 25, 2004 priority date.

Prior Art	Date	Basis[2]
Dutta (EX-1007)	Filed: 10/18/2001 Published: 4/24/2003	102(a)/(e)
Akifumi (EX-1009)	Published: 1/21/2000	102(b)
Creative Camcorder (EX-1008)	Published: 3/1996[3]	102(b)
Balmer (EX-1010)	Issued: 3/9/1999	102(b)

B. Grounds for Challenge

Google requests cancellation of the Challenged Claims on these grounds.

Ground (all §103)	Claim(s)	Prior Art
1A	1-26, 28-32	Dutta-Akifumi
1B	13, 26, 32	Dutta-Akifumi-Creative Camcorder
1C	27	Dutta-Akifumi-Balmer

[2] Citations are to the pre-AIA statute; if the post-AIA statute applies, the analysis would be identical.

[3] EX-1047, ¶¶7-10 (stating that Creative Camcorder was made available to the public shortly after its initial publication in March 1996).

III. THE ’450PAT

A. Overview

The ’450Pat is titled “method and apparatus to correct digital video to counteract effect of camera shake.” ’450Pat, Title. The ’450Pat discloses that prior art cameras could compensate for detected movement using a movable lens, which the ’450Pat seeks to avoid. *Id.*, 2:18-31; *see also* Wolfe, ¶¶48-74 (discussing technology background and citing EX-1008-1012, EX-1014-1025, and EX-1040-1044).

The specification describes four principal embodiments related to correcting images. Wolfe, ¶¶75-80. “The first two embodiments…correct blur in an image based on determining a transfer function that represents the motion of an imager while an image is being captured, and then correcting for the blur by making use of the ‘inverse’ transfer function.” ’450Pat, 9:36-41. The first embodiment uses motion sensors to determine the transfer function (*id.*, 6:25-8:14, 9:41-43, Fig. 4), while in the second embodiment there are no motion sensors and the transfer function is instead determined using blind estimation techniques (*id.*, 8:16-9:35, 9:43-45, Fig. 5).

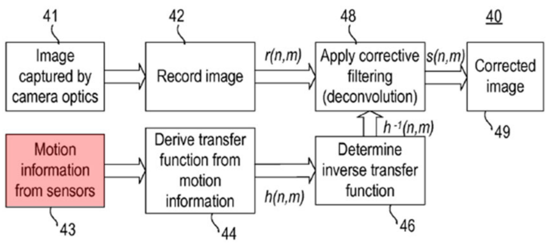

Figure 4

’450Pat, Fig. 4.[4]

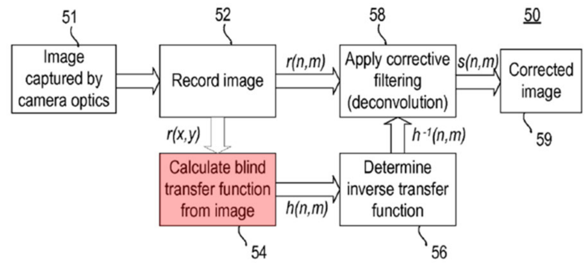

Figure 5

’450Pat, Fig. 5.

The third embodiment captures multiple images and uses a motion sensor to determine how to align/combine the images’ pixel values to form a single image. *Id.*, 9:49-10:54. The fourth embodiment relates to adjusting the position of the image sensor. *Id.*, 11:7-32.

Although the embodiments do not refer to video, the abstract—which was not present in the original priority documents—describes applying the alleged invention to video.[5] *Id.*, Abstract; *see also id.*, 11:54-62 (“[N]o distinction has been made between an imager that captures images one at a time, such as a digital camera, and one that captures sequence of images, such as digital or analog video recorders. A

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[4] All color annotations added.

[5] This title and abstract were not part of the original priority documents. On 11/30/2015, Applicant amended the title/abstract to refer to video during prosecution of the ’450Pat’s grandparent application (App. 14/690,818; U.S. 9,338,356). EX-1003, 96-107.

digital video recorder or similar device operates substantially the same way as a digital camera, with the addition of video compression techniques.”).

B. Prosecution History

The application leading to the issuance of the ’450Pat was filed 2/13/2017 and claimed priority, through continuation applications, to a provisional application filed 3/25/2004. ’450Pat, fields (22), (60), (63); *see also* Wolfe, ¶¶81-94.

The application included 29 claims, of which claims 1 and 15 were independent. Original claim 1 corresponds to issued claim 1, and original claim 15 corresponds to issued claim 14. Original claims 1/15 were substantially similar to issued claims 1/14, except that the original claims did not recite storing the captured images in memory (as [1.1]/[14.1] require) and storing motion information in the memory synchronously with the storing of the images (as [1.2]/[14.2] require). *See* ’450FH, 20 (original claim 1), 22-23 (original claim 15); *see also* Wolfe, ¶95 (listing issued claims 1-32).

Notably, the original claim set included two claims depending from claim 1 reciting modifying the sequence of images using a video compression technique (claim 11) and storing motion information in memory synchronously with a stored image (claim 12). ’450FH, 21-22; *see also id.*, 24 (original claims 25/26 depending from claim 15 and including substantially similar limitations as claims 11/12).

The Examiner initially issued a restriction requirement, stating that the claims related to "patentably distinct species of Figs. 4 and 5." '450FH, 124-27. It is unclear why the Examiner issued a restriction requirement given that the claims recited "motion sensors." *See* '450Pat, 6:25-8:14 (disclosing that Figure 4 embodiment uses motion sensors); 8:18-26 (disclosing regarding Figure 5 that "there are no motion sensors"). Regardless, in response, the Applicant "elect[ed] Figure 4." '450FH, 139-40.

The Examiner then issued a non-final office action rejecting every claim over Dutta except for dependent claims 11/12 and 25/26. *Id.*, 146-50. The Examiner's analysis focused on original claim 15 and its dependent claims, finding that Dutta disclosed all limitations except for the limitations of claims 25/26. *Id.*, 146-50. The Examiner also rejected claim 1 and its dependent claims—except for claims 11/12—for the same reasons. *Id.*, 150. The Examiner objected to claims 11/12 and 25/26, but the Examiner indicated they would be "allowable if rewritten in independent form." *Id.*, 150.

The Applicant then conducted a telephonic interview with the Examiner (*id.*, 166) and filed an amendment canceling claims 12/26 and amending claims 1/15 to require storing the captured images in memory (as issued [1.1]/[14.1] require) and storing motion information in the memory synchronously with the storing of the images (as issued [1.2]/[14.2] require). *Id.*, 183-89, 193 (explaining that Applicant "amended independent claims 1 and 15 to incorporate the allowable subject matter of claims 12 and 26, respectively").

The Applicant also added independent claims 30 and 31 (corresponding to issued claims 28 and 29), which recite video compression. *Id.*, 190-91; *see also id.*, 193 (explaining that Applicant "added new independent claims 30 and 31[,] which include the subject matter indicated to be allowable in claims 11 and 25, respectively). Further, the Applicant added claims 32-34 (corresponding to issued claims 30-32), which recited similar subject matter to claims depending from claim 15 that the Examiner had previously rejected. *Id.*, 192.

The Examiner subsequently allowed all pending claims without providing reasons for allowance. *Id.*, 207 ("Claims 1-11, 13-25[,] and 27-34 are allowed.").

Thus, although the Examiner concluded during prosecution that Dutta disclosed substantially all limitations of the Challenged Claims, the Examiner apparently concluded that Dutta did not disclose: (1) storing images/motion information synchronously in memory; and (2) applying a video compression technique to obtain a final video.

As this Petition demonstrates, the Examiner committed material error by overlooking Dutta's teachings, both on their own and in combination with the prior art in the grounds below. Indeed, regarding issued independent claims 1/14, Dutta (and the Dutta-Akifumi combination) plainly teaches synchronous storage of motion information and images in memory—the only allegedly novel/nonobvious aspect of these claims. Further, regarding issued independent claims 28/29, the Examiner committed material error by apparently concluding that the video compression limitations were novel/nonobvious. Indeed, compressing videos was well known—as the ’450Pat admits (*see* ’450Pat, 11:54-62)—and the Dutta-Akifumi combination plainly teaches video compression.

These errors tainted the Examiner’s analysis of the remaining Challenged Claims, which were allowed solely because they depend from the independent claims.

C. No Prior IPR or District Court Has Ruled on Invalidity of the ’450Pat

In 2020, Samsung filed a petition for IPR of all ’450Pat claims. *Samsung Elecs. Co. v. Clear Imaging Rsch., LLC*, IPR2020-01394, Paper 2 (July 31, 2020). On February 12, 2021, the Board exercised discretion to deny institution under *Fintiv* and did not substantively address the merits. *Id.*, Paper 13, 23 (Feb. 12, 2021) (“Based on the limited record before us, we find that the merits do not outweigh the other *Fintiv* factors.”). Thus, the Board has not previously reached the merits in a prior ’450Pat IPR.

In 2019, Clear Imaging Research LLC (“PO”) sued Samsung in district court, alleging infringement of the ’450Pat (among others). EX-1028 (showing complaint filed Oct. 1, 2019). A *Markman* hearing was held on October 14, 2020 before Magistrate Judge Roy Payne, and a subsequent *Markman* order held all ’450Pat terms at issue had their plain and ordinary meaning without the need for further construction. EX-1029; EX-1030. The case settled before trial, and Judge Gilstrap did not rule on any dispositive motions before the case was dismissed on May 18, 2021. EX-1028, Dkts. 306-09.

Following this, PO waited over two years to again assert the ’450Pat, first against Apple Inc. EX-1031 (showing complaint filed April 14, 2023). Before an answer was filed, that case was dismissed with prejudice on August 15, 2023 following settlement. *Id.*, Dkts. 15-16.

PO then waited until 2025 to file litigations against Google and Lenovo. EX-1032 (Google litigation); EX-1033 (Lenovo litigation); *see also* Wolfe, ¶¶96-101.

On January 28, 2026, the parties in the Google litigation filed a joint motion to dismiss with prejudice PO’s claims for infringement of the ’450Pat as well as dismiss Google’s counterclaims for declaratory judgment of non-infringement and invalidity of the ’450Pat without prejudice. EX-1046.

D. Level of Ordinary Skill in the Art

A person of ordinary skill in the art (“POSITA”) at the time of the ’450Pat’s alleged invention would have had at least a Bachelor’s Degree in an academic area emphasizing electrical engineering, computer science, or a similar discipline, and two years of experience related to imaging technologies. Wolfe, ¶¶22-24. More education could replace work experience, and vice-versa. *Id.*

E. Claim Construction

1. Means-Plus-Function

A District Court determined that the "processor…configured to…" terms in claims 14, 25, 29, and 31 "are not governed by § 112, ¶ 6 and…have their plain and ordinary meanings without the need for further construction." EX-1029, 13-17; EX-1030, 1. That Court also determined that "a display configured to receive user input" in claims 26 and 32 "is not governed by § 112, ¶ 6" and "has its plain and ordinary meaning without the need for further construction." EX-1029, 20-22; EX-1030, 1.

No Challenged Claims use the term "means," and there is a rebuttable presumption they are not means-plus-function. *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1348 (Fed. Cir. 2015). If the Office finds the presumption is overcome, Google addresses means-plus-function constructions below.

(a) "a processor configured to..."/"…by the processor…" (claims 1-9, 11-22, 24-32)

If the Office finds the presumption is overcome, Google contends that the functions are as recited in the claims, and the only disclosed corresponding structure is an integrated circuit or processor(s), or the combination of the two. '450Pat, 12:2-5; Wolfe, ¶107.

Google previously proposed in litigation that the "processor" terms are means-plus-function terms, the corresponding structure identified above is insufficient for failure to disclose an algorithm, and the "processor" terms are thus indefinite. EX-1026; EX-1027. However, because PO's claims of infringement of the '450Pat will be dismissed with prejudice from the litigation, Google is not continuing to propose in the litigation that the "processor" terms are means-plus-function terms and indefinite. Thus, *Revvo* does not apply. *Revvo Techs., Inc. v. Cerebrum Sensor Techs., Inc.*, IPR2025-00632, Paper 20, 4-5 (Nov. 3, 2025) (precedential) (addressing situation where petitioners were "continu[ing] to propose different claim constructions" in two forums and explaining that petitioners "should explain sufficiently why the different positions are warranted…"); *see also TikTok, Inc. v. Shopsee, Inc.*, IPR2025-01485, Paper 13, 2-3 (Jan. 16, 2026) (denying institution where petitioner "stipulated that it will continue to pursue different constructions and abandon the inconsistent construction in district court if the IPR is instituted").

Regardless, if the Office determines that *Revvo* applies, Google's means-plus-function construction in this Petition identifies function and the only disclosed corresponding structure in the '450Pat. Further, this Petition asserts that a POSITA would have understood that the asserted prior art satisfies the limitations (i.e., by performing the claimed functions with an integrated circuit or processor(s), or the combination of the two). Wolfe, ¶108. Thus, Google sufficiently explains its position in this Petition and its previous different position in the litigation. *Tesla, Inc. v. Intellectual Ventures II LLC*, IPR2025-00340, Paper 18, 3-4 (Nov. 5, 2025) (informative) ("Petitioner's explanation [for its different positions] may have risen to a sufficient level, for example, if Petitioner had shown that, notwithstanding the alleged indefiniteness of the claim term, an ordinarily skilled artisan would understand that the asserted art satisfies the claim limitation (such as if the limitation prescribed a range and only the outer bounds of the range were unclear)."); *see also Intel Corp. v. Qualcomm Inc.*, 21 F.4th 801, 813 (Fed. Cir. 2021) ("The indefiniteness of a limitation (here, a means-plus-function limitation) precludes a patentability determination only when the indefiniteness renders it logically impossible for the Board to reach such a decision.").

(b) "display"/"user interface" (claims 10, 13, 23, 26 and 32)

If the Office finds the presumption is overcome, the only disclosed corresponding structure is a viewfinder/display. '450Pat, 11:3-6; Wolfe, ¶109.

2. Other Claim Constructions

If the Office does not find the presumption against applying means-plus-function is overcome for the "processor" or "display"/"user interface" terms, this Petition also applies the terms' ordinary meanings as understood by POSITAs. 37

C.F.R. §42.100(b). In other words, the same disclosures in the prior art identified herein disclose the "processor" and "display"/"user interface" terms under both the means-plus-function constructions and the terms' ordinary meanings. Wolfe, ¶¶108, 110.

For all other terms, no express constructions are necessary in this IPR. Wolfe, ¶111. Google has applied the terms' ordinary meanings as understood by POSITAs. 37 C.F.R. §42.100(b). If the '450Pat specification/'450FH informs certain terms' ordinary meanings, Google addresses this below. Google reserves the right to respond to PO/Board constructions.

IV. GROUND 1

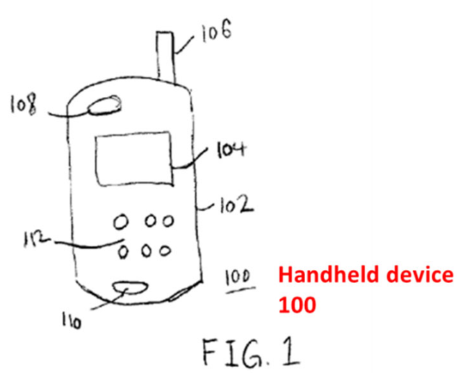
A. 1A: Dutta-Akifumi Renders Obvious Claims 1-26 and 28-32

1. Dutta (EX-1007)

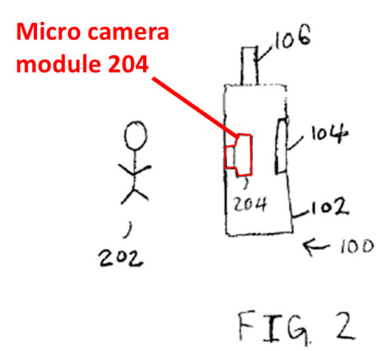
Dutta discloses "[a] method and handheld device for scanning an object and creating a complete image of the object, even under low light conditions." Dutta, Abstract; *see also* Wolfe, ¶¶112-37. "The handheld device is moved so that the camera module takes a plurality of images of an object." Dutta, Abstract. "A motion sensor assembly in the handheld device detects motion of the handheld device[,] and movement information from the motion sensor assembly is used to modify each of the plurality of images to remove distortions therein caused by movement of the camera module." *Id.* Then, "[t]he plurality of images are combined to generate a reconstructed image of the object." *Id.* "[T]he final image may then be viewed locally or remotely or further processed." *Id.*, ¶6.

As the Examiner found and the '450Pat admits, a POSITA would have readily recognized that Dutta's disclosures regarding motion correcting images were applicable to forming a video (which is a sequence of images). *See* '450FH, 146-50 (Examiner determining that Dutta disclosed video-related limitations); '450Pat, 11:54-62 ("[N]o distinction has been made between an imager that captures images one at a time, such as a digital camera, and one that captures sequence of images, such as digital or analog video recorders. A digital video recorder or similar device operates substantially the same way as a digital camera, with the addition of video compression techniques."); Wolfe, ¶113.

Figure 1 illustrates the handheld device 100, which may be a mobile phone or a dedicated imaging device, and Figure 2 illustrates the device's micro camera module 204. Dutta, ¶¶15-16, 30.



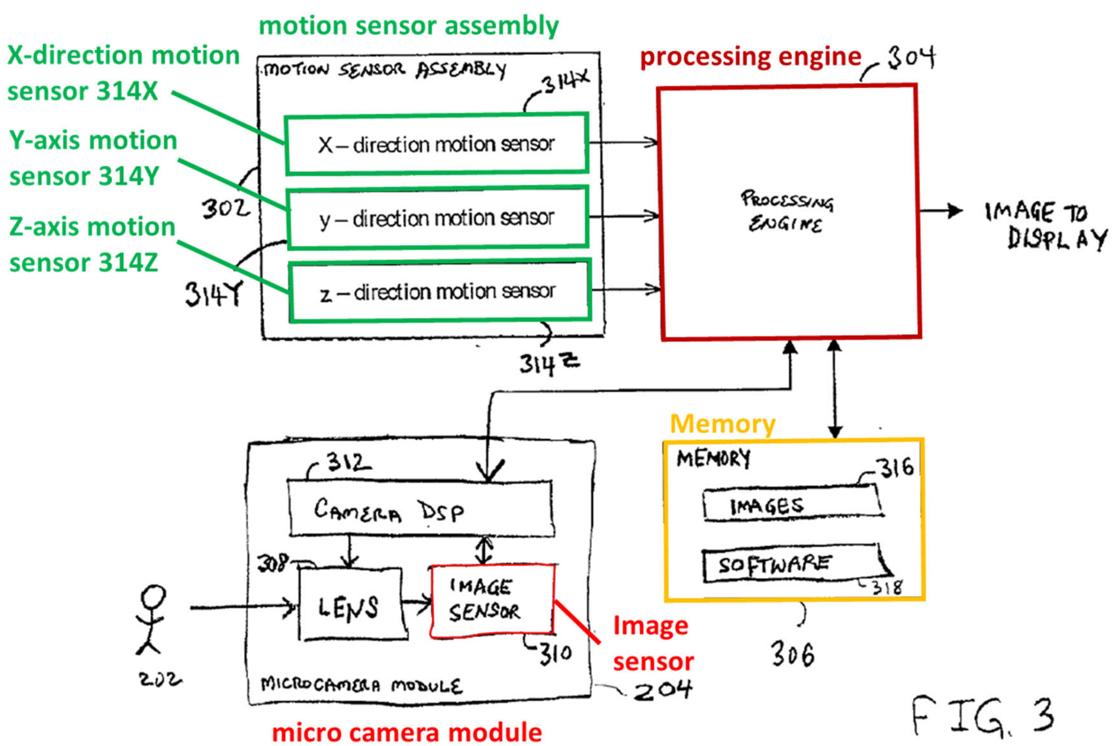
Dutta, Fig. 1.



Dutta, Fig. 2.

The handheld device "is configured to transmit information in the form of text, voice images, audio, video[,] and the like" and includes a keyboard 112 and a display 104. Dutta, ¶15. The "keyboard 112 comprises one or more buttons or switches to facilitate the operation of the handheld device 100." *Id.* The buttons may "power on and off the handheld device 100" and "activate specific features of the handheld device 100." *Id.* The "display 104 is configured to display any form of textual, image[,] and video information." *Id.* "Micro camera module 204 is configured to focus onto and capture an image of an object 202." *Id.*, ¶16.

Figure 3 is a block diagram of the handheld device 100 and illustrates additional components in more detail. *Id.*, ¶17.



Dutta, Fig. 3.

In addition to the micro camera module 204, the device includes “a motion sensor assembly 302, a processing engine 304, and a memory 306.” *Id.*, ¶17. “The micro camera module 204 has components that comprise a miniature electronic camera, including, for example, an optical lens assembly 308, an image sensor 310, and a camera digital signal processor (DSP) 312.” *Id.* “The image sensor 310 defines or captures a focused image of an object 202 transmitted from the lens assembly 308 and generates an appropriate electrical signal corresponding to the captured image.” *Id.*, ¶18. The image sensor 310 may be, for example, “a CCD (charge-coupled device)” or a “CMOS-based IC (integrated circuit).” *Id.* “The camera DSP 312…generates an electronic signal in response [to a] signal from the image sensor 310 and transmits this signal through the processing engine 304, and[,] after appropriate processing in the processing engine 304, to the display 104[,] which displays a visible image of the object.” *Id.*

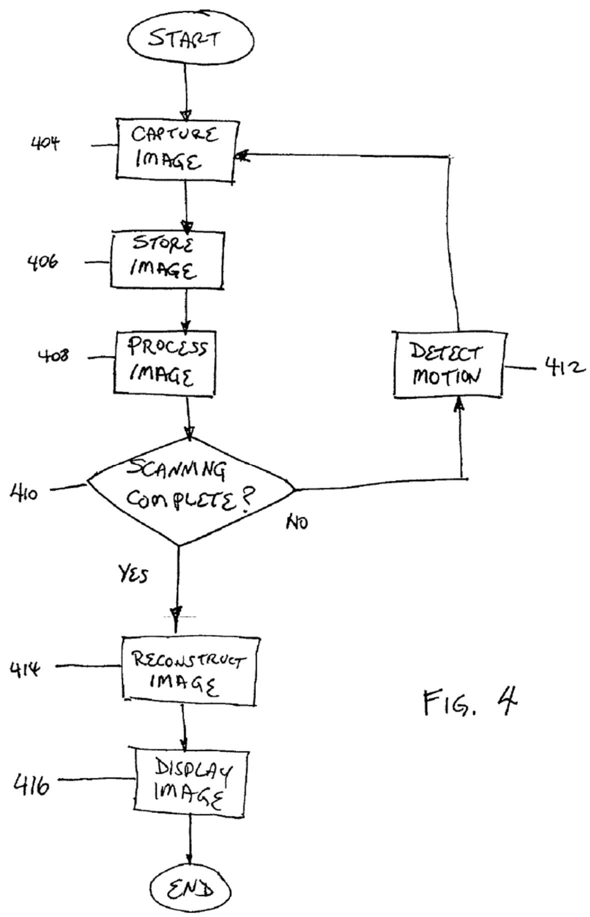
“The motion sensor assembly 302 senses movement of the handheld device 100.” *Id.*, ¶20. “The motion sensor assembly 302 comprises one or more motion sensors that preferably sense movement of the handheld device 100 in at least two, and preferably three, substantially perpendicular directions.” *Id.* “Any type of motion sensor maybe used, such as MEMS (micro-electro mechanical systems) sensors, electronic motion sensors, and the like.” *Id.*; *see also id.* (disclosing that there are "two types of motion sensors, accelerometers which detect and measure linear acceleration, and gyroscopes, which detect and measure angular rotation"). In the preferred embodiment illustrated in Figure 3, "the motion sensor assembly 302 is a three-axis linear motion sensor comprising a X-direction motion sensor 314X, a Y-axis motion sensor 314Y, and a Z-axis motion sensor 314Z." *Id.* This allows the motion sensor assembly 302 "to measure motion of the handheld device 100 in three dimensions." *Id.*

"The processing engine 304 coordinates the actions of the micro camera module 204, access to the memory 306, and processes the images obtained in accordance with measurements taken by the motion sensors 314X, 314Y, 314Z for ultimate display by the display (which may be integral to the handheld device or remote therefrom), for storage in a local or remote database, or for transmittal elsewhere, all of which are discussed in more detail below." *Id.*, ¶21. "A suitable processing engine would include some kind of central processing unit capable of processing data and software programs." *Id.*

"The memory 306 stores images 316 captured by the camera module 204 and/or calibration images, and contains appropriate software 318 required for the operation of the various components of the device and for processing the images in response to the measurements obtained by the motion sensor assembly 302." *Id.*,

¶22. "The images 316 comprise images generated from the camera DSP 312 and used to generate a scanned or brightened image." *Id.*

Dutta's Figure 4 "shows the basic process steps." *Id.*, ¶23.



Dutta, Fig. 4.

In step 404, "after the device has been activated, an image of an object is obtained by focusing the lens and capturing an image with the image sensor." *Id.*, ¶23. In step 406, "[t]he scanned image of the object is stored in memory for further processing and/or display." *Id.* "The stored image is then processed in accordance with instructions received from the processing engine." *Id.* If this is the first image, "there may be no processing." *Id.* However, in step 408, "[i]f the image is a second or subsequent image, the image is processed…in accordance with information gathered by the device including detected motion and/or brightness of the obtained image." *Id.* "For example, the detected motion of the handheld device is used to correct the position, orientation[,] and size of the image." *Id.* In step 410, "[i]t is then determined whether the processing of the object is complete." *Id.* This "determination may be made automatically, such as by taking another image and determining whether the image contains any objects, or manually, such as ascertaining whether the user has entered an instruction with the keyboard that no new images are to be taken." *Id.* In step 412, "[i]f additional images are to be taken, motion of the handheld device is measured…, and this information is transmitted to the processing engine for subsequent image processing." *Id.* Then, in step 404, "[a]n additional image is…obtained…, and the process continues until all image acquisition is done." *Id.* In step 414, "[i]f no more images are to be acquired, an entire image of the object is reconstructed based upon the previously acquired and processed images." *Id.*

Once the image is reconstructed, in step 416, it "is then displayed on the display of the handheld device, transmitted to a separate display connected to the handheld device (either through a local wire connection to a local display or through a connection through a network or through the internet to a remote display), or transmitted wirelessly to a local or remote display device or storage medium." *Id.* Dutta also discloses that "[a]lternatively, or in addition, the reconstructed image may be stored locally or remotely as an image or converted from an image into text, etc., by an optical character recognition (OCR) program." *Id.*

Dutta discloses that "[a]lthough the various steps are described as occurring one after the other, alternatively, and preferably, many of the steps can be performed simultaneously in parallel with respect to capturing and/or processing successive images of the object." *Id.*, ¶24.

Dutta's Figure 5 discloses an example of the invention where "the object 202 comprises a line of alphabet letters 502." *Id.*, ¶25. "[T]he object 202 may alternatively comprise a three-dimensional object." *Id.*; *see also id.*, ¶¶26-27 (describing Figure 5 steps).

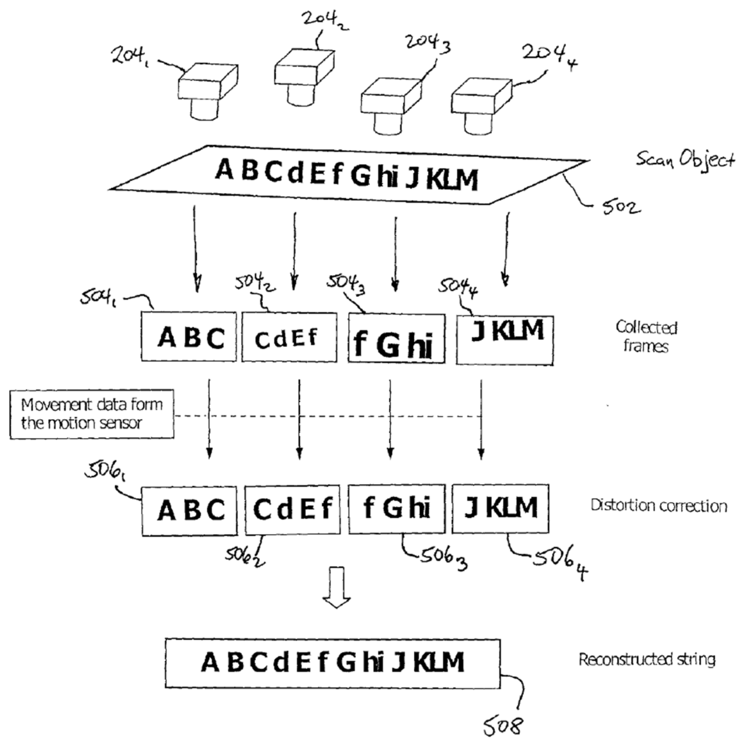


FIG. 5

Dutta, Fig. 5.

Dutta's Figure 6 discloses another example of the invention where "the object 202 comprises a three-dimensional object, in this case a person." *Id.*, ¶28; *see also id.* (describing Figure 6 steps).

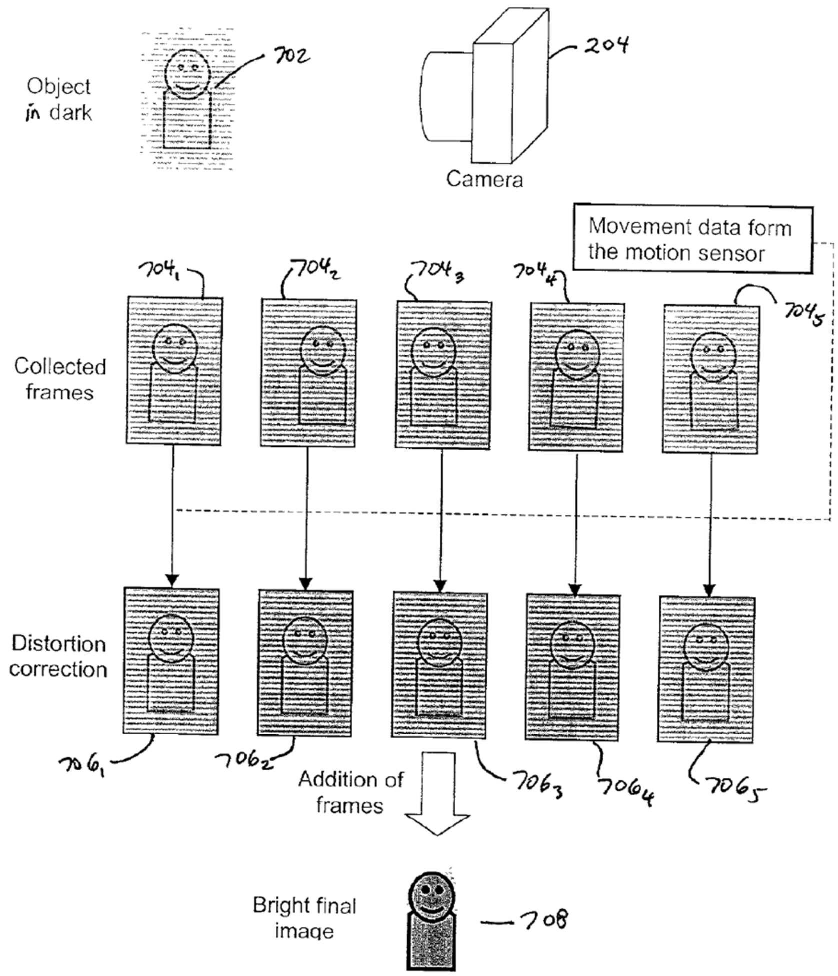


FIG. 6

Dutta, Fig. 6.

Dutta further discloses that "[s]ubstitutions of elements from one described embodiment to another are also fully intended and contemplated." *Id.*, ¶31.

2. Akifumi (EX-1009)

Akifumi "relates to an image inputting device that uses a solid-state imaging element, and, in particular, relates to shaking correction." Akifumi, ¶1; *see also* Wolfe, ¶¶138-68.

Akifumi discloses that prior art image inputting devices include "electronic camera systems that record still images" and "video cameras that record video." *Id.*, ¶2. Further, "[v]ideo cameras that have shaking correction functions in order to avoid image degradation caused by shaking have become technologically feasible." *Id.* Akifumi explains that known techniques for shaking detection/correction include electronic correction techniques (acceleration sensor/comparing imaging element output to the previous frame) and optical correction techniques. *Id.*, ¶¶3-4. As to electronic techniques, Akifumi explains that if an imaging element is used that has more pixels than the normal effective pixel count, corrections can be applied by either varying the position read out from the imaging element itself or, if the image signal is temporarily stored in frame memory, varying the position read out from the frame memory. *Id.*, ¶3.

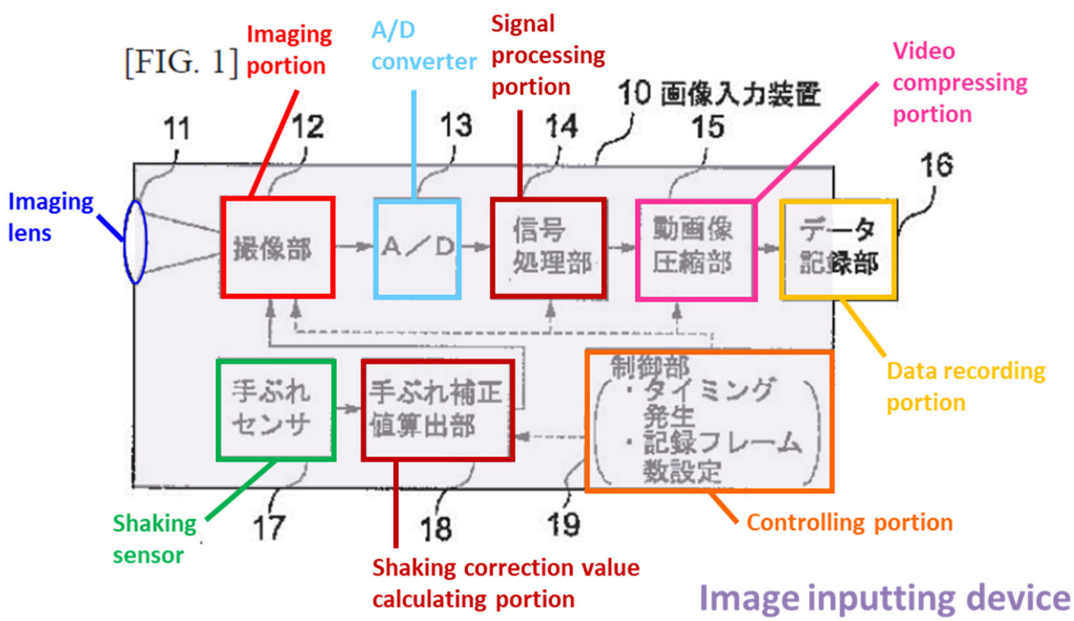
Akifumi then explains that there have been technological developments in recent years for reducing data volumes through digitizing/compressing images, including for video applications, and that there may be applications where the recording frame rate is lower than the frame rate at which the image signal is outputted. *Id.*, ¶¶5-13. In these situations, "it is not necessary to carry out the shaking correction on all of the frames in the image signal that is outputted from the imaging element." *Id.*, ¶10.

To address this, Akifumi's invention proposes that "the interval for calculating the shaking correction value is varied depending on the recording frame rate." *Id.*, ¶16. For example, if the recording frame rate and the input frame rate are both 30 frames per second, "then the shaking correction value is calculated over an interval of 1/30 seconds, and the shaking correction value is outputted to the shaking correcting portion 30 times per second." *Id.,* ¶22. If, however, "the recording frame rate were less than the inputting frame rate for the image signal," e.g., "10 frames per second, then the shaking correction value would be calculated over 1/10 seconds, and the shaking correction value would be outputted to the shaking correcting portion 10 times per second." *Id.* "This enables effective shaking control, regardless of the recording frame rate." *Id.*

Akifumi describes thirteen "embodiments" of the invention with respect to Figures 1-23. *Id.*, ¶¶27-85. Akifumi uses the same numbering to describe components that are common to multiple embodiments, such that a POSITA would have understood that teachings regarding a component in the context of one embodiment were applicable to other embodiments including that component. Wolfe, ¶¶145-46. Further, a POSITA would have understood that teachings of the "embodiments" were intended to be combined according to design needs. *Id.*, ¶147.

<u>First Embodiment (Figs. 1-5) (Akifumi, ¶¶27-40)</u>: Figure 1 illustrates "the structure of an image inputting device..." *Id.*, ¶27. The "image inputting device 10

comprises: an imaging lens 11, an imaging portion 12 that is structured using a solid-state imaging element; an A/D converter 13; a signal processing portion 14; a video compressing portion 15; a data recording portion 16; a shaking sensor 17; a shaking correction value calculating portion 18; and a controlling portion 19." *Id.*



Akifumi, Fig. 1.

"The shaking sensor 17 is a sensor for detecting shaking of the user who is holding the image inputting device 10, and is structured from, for example, acceleration sensors that can detect acceleration in the vertical direction and in the horizontal direction due to shaking. The shaking detection output from the shaking sensor 17 is inputted into the shaking correction value calculating portion 18, where the required shaking correction value is calculated. This shaking correction value is calculated and outputted in accordance with the setting for the recording frame rate when video data is recorded by the data recording portion 16." *Id.*, ¶32.

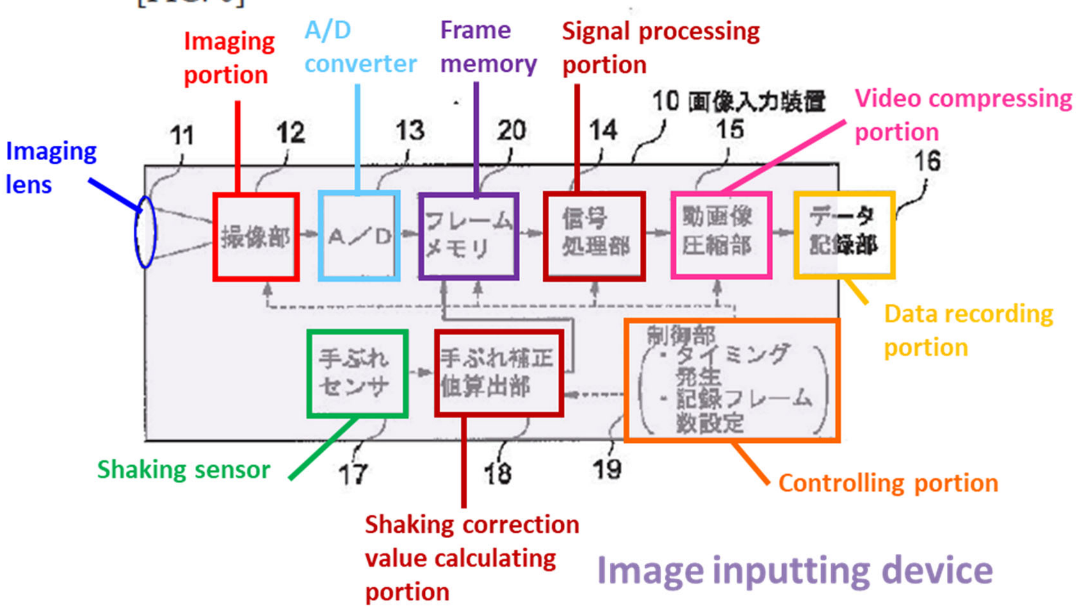
Based on the correction value, Akifumi performs a shake correction by changing the position "read out" from imaging element 12 or—when the image is temporarily stored in frame memory 20 as in the second and fifth embodiments described below—from frame memory. *Id.*, ¶¶34, 41-43.

Akifumi also describes examples of the invention when the recording frame rate (a) matches the image output frame rate (30 frames per second) (such that all frames are recorded); (b) is 1/3 the output frame rate; and (c) is 1/6 the output frame rate. *Id.*, ¶31, Figs. 2(a), (b), (c). Akifumi further describes an example of the structure of a CCD imaging element (*id.*, ¶33, Fig. 3) and shake correction timing details when the recording frame rate is 30 frames per second and 10 frames per second. *Id.*, ¶¶35-40, Figs. 4(a)/(b)/(c), Figs. 5(a)/(b)/(c).

A key aspect of Akifumi's invention is that it still provides the flexibility to perform motion correction on all images. *See, e.g.*, Akifumi, ¶37 ("In this case, the frame rate of the image signal that is outputted from the imaging portion 12 and the recording frame rate in the data recording portion 16 are identical, and thus shaking correction is carried out on the entire image signal that is outputted from the imaging portion 12."); Wolfe, ¶153.

Second Embodiment (Figs. 6-7) (Akifumi, ¶¶41-46): Figure 6 illustrates an image inputting device using "identical reference symbols" for identical parts identified in Figure 1. *Id.*, ¶41. In this embodiment, "frame memory 20 is added between the A/D converter 13 and the signal processing portion 14…" *Id.* Unlike the first embodiment, "the image signal for all pixels is written to the frame memory 20…, and a system is used where the position for reading out is varied depending on the shaking correction value from the shaking correction value calculating portion 18." *Id.*

[FIG. 6]



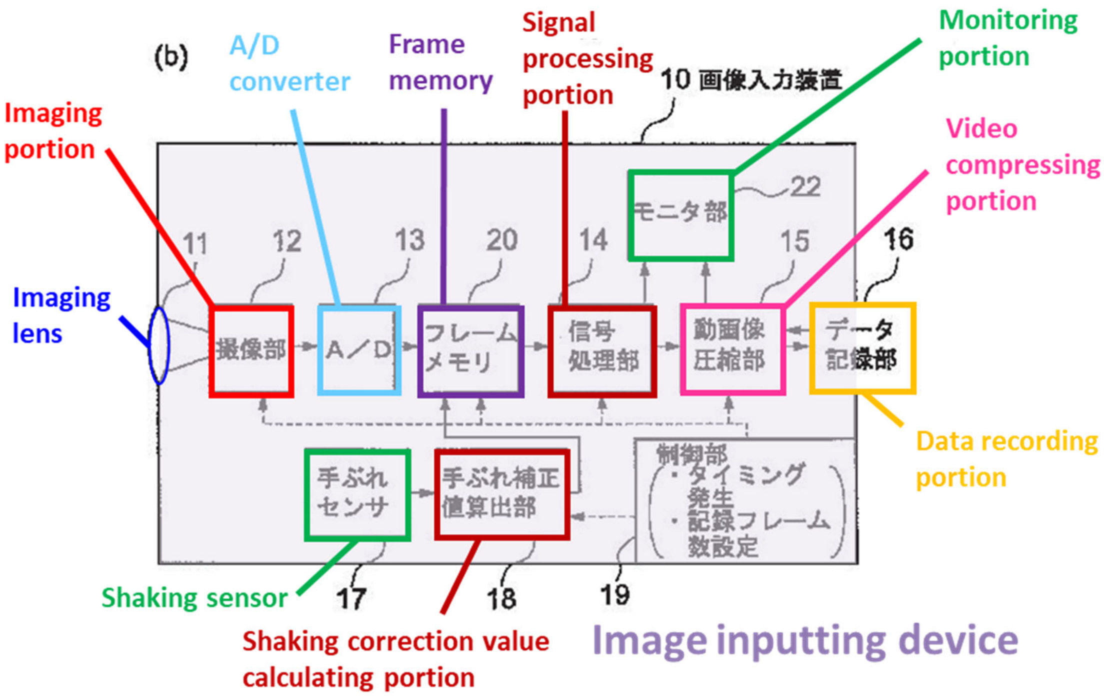
Akifumi, Fig. 6.

Akifumi further describes shaking correction operation/timing when frame memory is used and the imaging element is either a CCD or MOS imaging element. *Id.*, ¶¶42-47, Figs. 7(a)-(h).

<u>Third Embodiment (Figs. 8-9) (*id.*, ¶¶47-54)</u>: Figures 8-9 describe details of the invention related to a MOS imaging element and electronic shutter functionality. *Id.*, ¶¶47-54.

<u>Fourth Embodiment (Fig. 10) (*id.*, ¶¶55-58)</u>: Figures 10(a)-(b) illustrate another embodiment having a structure that replaces controlling portion 19 with "controlling portion 21," which has a timing generating and recording resolution setting function. *Id.*, ¶55. The user is therefore able to select the recording pixel count, which automatically sets the recording frame rate without the user "having to think about the recording frame rate." *Id.*, ¶57.

<u>Fifth Embodiment (Figs. 11(a)-(b)) (*id.*, ¶59)</u>: Figures 11(a)-(b) illustrate an alternative embodiment "where a monitoring portion 22 is provided in the image inputting device 10." *Id.* "That is, the image data that is recorded by the data recording portion 16 is decompressed by the video decompressing function (local decoding function) of the video compressing portion 15, and played back on built-in monitoring portion." *Id.* Figure 11(b) includes frame memory 20, whereas Figure 11(a) does not. *Id.* Figure 11(b) is below.



Akifumi, Fig. 11(b).

<u>Sixth Embodiment (Figs. 12(a)-b)) (*id.*, ¶¶60-62)</u>: Figures 12(a)-(b) replace video compressing portion 15 with still image/video compressing portion 23. *Id.*, ¶¶60-62.

<u>Seventh Embodiment (Figs. 13(a)-(b)) (*id.*, ¶¶63-64)</u>: Figures 13(a)-(b) disclose an image inputting device that is substantially similar to the earlier embodiments, except that it also includes an interface 25 and external connection cable 26 to connect to a personal computer. *Id.*, ¶¶63-64.

<u>Eighth Embodiment (Fig. 14) (*id.*, ¶¶65-68)</u>: Figure 14 discloses using motion vectors generated by video compressing 15 (or still image/video compressing portion 23) to improve shake correction accuracy. *Id.*, ¶65.

Ninth Embodiment (Fig. 15) (*id.*, ¶69): This embodiment discloses a shaking correction value calculating portion that, in addition to the structure of Figure 14, references "zoom lens data and focus data, or supplementary data such as data on the distance to the imaging subject" to calculate the shake correction value, "thereby further improving the accuracy of the shaking correction." *Id.*

Tenth Embodiment (Figs. 16-17) (*id.*, ¶¶70-75): This embodiment discloses details for applying the invention to a MOS imaging element when the shaking correction value is inputted into the imaging element. *Id.*, ¶¶70-71. This involves, *inter alia*, shaking correction values that include "vertical direction and horizontal direction shift magnitudes." *Id.*, ¶72.

Eleventh/Twelfth/Thirteenth Embodiments (Figs. 18-23) (*id.*, ¶¶76-85): These embodiments disclose additional details of the invention when a MOS imaging element is used. *Id.*, ¶¶76-85.

3. Motivation to Combine Dutta and Akifumi

A POSITA would have been motivated to combine Dutta-Akifumi as proposed in the grounds below for multiple reasons. Wolfe, ¶¶169-80.

First, both references relate to capturing multiple images and correcting the images by compensating for camera motion. *See, e.g.,* Dutta, Abstract, ¶6, ¶¶17-22 (describing Fig. 3), ¶¶23-24 (describing Fig. 4), ¶¶25-27 (describing Fig. 5), ¶¶28-29 (describing Fig. 6); Akifumi, ¶15; Wolfe, ¶170.

Second, a POSITA would have been motivated to capture/correct images with Dutta's handheld device and combine those images into a stabilized video that is compressed and stored/displayed (as Akifumi teaches). Indeed, as the Examiner found and the '450Pat admits, a POSITA would have readily recognized that Dutta's disclosures regarding motion correcting sequential images were applicable to forming a video (which is a sequence of images). *See* '450FH, 146-150 (Examiner finding that Dutta disclosed video-related limitations); '450Pat, 11:54-62 ("[N]o distinction has been made between an imager that captures images one at a time, such as a digital camera, and one that captures sequence of images, such as digital or analog video recorders. A digital video recorder or similar device operates substantially the same way as a digital camera, with the addition of video compression techniques."); Wolfe, ¶¶171-72.

Further, Dutta's handheld device could transmit and display videos. Dutta, ¶15 ("The handheld device 100 is configured to transmit information in the form of text, voice, images, audio, <u>video</u>[6] and the like…The display 104 is configured to display any form of textual, image and <u>video</u> information."). And Akifumi contemplates that motion correction/video compression techniques were applicable to mobile devices, such as Dutta's handheld device. Akifumi, ¶6 ("When one

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[6] Emphases added unless otherwise noted.

considers application to mobile image inputting devices that are to record video using these video compression protocols, there is a problem in that the shaking is detected as a motion vector for all blocks that structure the image."), ¶7 (disclosing that when videos are compressed, motion correction is important because "when used in a mobile image inputting device, the degradation in image quality caused by shaking becomes a major issue"); Wolfe, ¶¶173-74.

A POSITA would therefore have recognized that Dutta's handheld device would be improved by capturing/compressing stabilized videos, e.g., because this would advantageously allow users the ability to capture videos with a mobile handheld device they could carry with them frequently, thereby making it possible to capture videos more spontaneously than would otherwise be possible with dedicated, larger video cameras. Wolfe, ¶175. Moreover, because Dutta does not detail how to shift an image with motion sensor data, a POSITA would have been motivated to look to Akifumi for implementation details (which are discussed in the grounds below). *Id.*, ¶176. And a POSITA would have recognized that applying compression techniques as disclosed in Akifumi would have been advantageous for videos captured/stored on Dutta's mobile handheld device because it would reduce the video's size for storage on a mobile device with a limited storage capacity. *Id.*, ¶177; *see also, e.g.*, Hara, ¶106 (explaining that images stored "without data compression…would require an extremely large memory capacity, which would cause the digital camera to be more expensive"); Hara, ¶106 ("Consequently, preferably the image data is compressed as necessary for storage.").

Third, a POSITA would have recognized that the combination of Dutta-Akifumi would have amounted to applying known techniques disclosed in Akifumi (correcting images for camera motion, combining the images into a stabilized video, applying compression, and storing/displaying the videos) to a known device (Dutta's handheld device) ready for improvement to yield predictable results (a handheld device that obtains stabilized/compressed videos). Wolfe, ¶178.

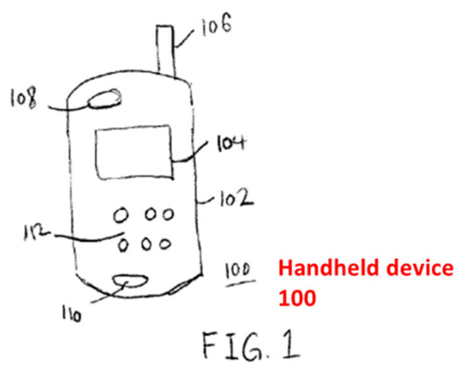
Fourth, a POSITA would have had a reasonable expectation of success in combining Dutta with Akifumi to capture/correct images and combine them to form stabilized/compressed videos. Indeed, the '450Pat admits that digital cameras and video recorders "operate[] substantially the same way." '450Pat, 11:57-62. Thus, adapting Dutta to incorporate Akifumi's teachings regarding correcting images for camera motion, combining the images into a stabilized video, applying compression, and storing/displaying the videos would have been well within a POSITA's skill level. Wolfe, ¶¶179-80.

4. Independent Claims 1/14/28/29

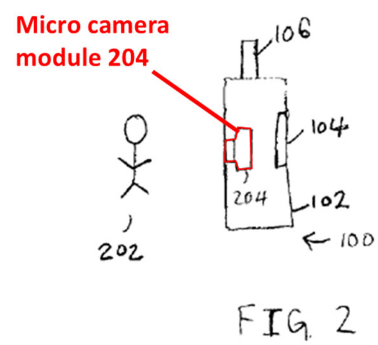
(a) 1[pre]/14[pre]/28[pre]/29[pre]

If limiting, Dutta-Akifumi teaches 1[pre]/14[pre]/28[pre]/29[pre]. Wolfe, ¶¶181-201.

Dutta discloses a handheld device 100 "configured to transmit information in the form of text, voice images, audio, video[,] and the like." Dutta, ¶15. The handheld device may be, e.g., a mobile phone or a dedicated "device which has no function other than to capture images of objects." *Id.*, ¶30. The handheld device includes a micro camera module 204 "configured to focus onto and capture an image of an object." *Id.*, ¶16.

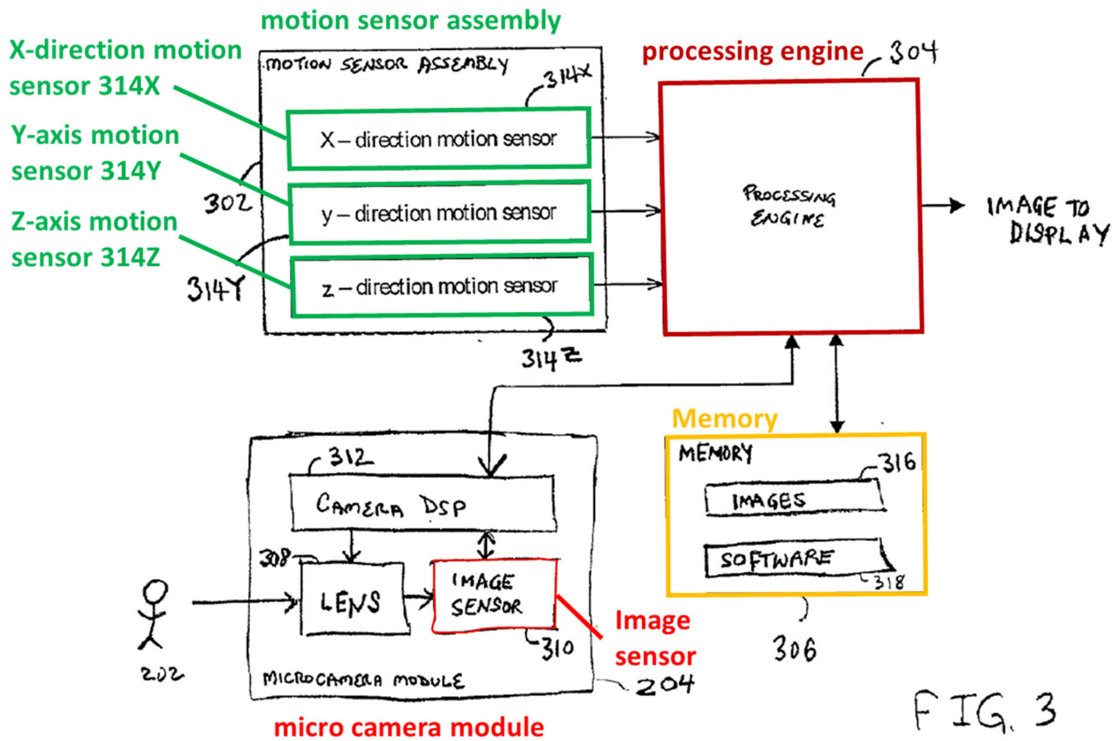


Dutta, Fig. 1.



Dutta, Fig. 2.

Figure 3 shows a block diagram of the handheld device in more detail. Dutta, ¶17.



Dutta, Fig. 3.

As shown, the micro camera module 204 comprises a "miniature electronic camera, including, for example, an optical lens assembly 308, an image sensor 310, and a camera digital signal processor (DSP) 312." *Id.*, ¶17. The handheld device also includes a "motion sensor assembly 302, a processing engine 304, and a memory 306." *Id.*

The image sensor "defines or captures a focused image of an object 202…" *Id.*, ¶18. The image sensor may be a "CCD (charge-coupled device)" or "a CMOS-based IC (integrated circuit)." *Id.* The camera DSP 312 receives signals from the image sensor and transmits the signal through the processing engine 304, and ultimately to the display 104 of the handheld device. *Id.*

The motion sensor assembly 302 includes "one or more motion sensors that preferably sense movement of the handheld device 100 in at least two, and preferably three, substantially perpendicular directions." *Id.*, ¶20. The motion sensor may be of any type. *Id.* (disclosing that in general there are two types of motion sensors, "accelerometers[,] which detect and measure linear acceleration, and gyroscopes, which detect and measure angular rotation"). "The particular type of motion sensor most suitable will typically depend upon the particular use of the handheld device of the present invention." *Id.* In the embodiment shown above, the "motion sensor assembly 302 is a three-axis linear motion sensor comprising a X-direction motion sensor 314X, a Y-axis motion sensor 314Y, and a Z-axis motion sensor 314Z." *Id.*

The processing engine 304 "coordinates the actions of the micro camera module 204, access to the memory 306, and processes the images obtained in accordance with measurements taken by the motion sensors 314X, 314Y, 314Z for ultimate display by the display…, for storage in a local or remote database, or for transmittal elsewhere." *Id.*, ¶21. A suitable processing engine would include a "central processing unit [CPU] capable of processing data and software programs." *Id.*

"The memory 306 stores images 316 captured by the camera module 204 and/or calibration images, and contains appropriate software 318 required for the operation of the various components of the device and for processing the images in response to the measurements obtained by the motion sensor assembly 302." *Id.*, ¶22.

Dutta discloses a process for capturing a sequence of images of an object in Figure 4 (*id.*, ¶¶23-24), with specific examples when the object is a line of alphabet letters and when the object is a three-dimensional object (such as a person) in Figures 5 and 6, respectively. *Id.*, ¶¶25-27 (Fig. 5), ¶28 (Fig. 6).

Because Dutta's processing engine includes a CPU that receives the motion sensor outputs (*see, e.g., id.*, Fig. 3) and processes an image to correct for motion of the handheld device (*id.*, ¶¶21-29, Figs. 4-6), a POSITA would have understood that the processing engine performs operations on the motion sensor outputs to obtain data for correcting the images. Wolfe, ¶195. Further, a POSITA would have understood that a digital CPU such as the processing engine's CPU would temporarily store information in memory—for example in registers or another equivalent memory element[7]—to perform operations. Wolfe, ¶196 (citing EX-1034-1039); EX-1035, 1-3 (explaining that a microprocessor latches—i.e., temporarily stores—values in registers and the microprocessor's arithmetic/logic unit (ALU) uses the latched values to perform mathematical operations); EX-1036, 11 (disclosing regarding a von Neumann Architecture that "[t]he *registers* are fast memory modules from/to which data can be read/written to support streaming computation, as shown in Figure 1.8") (italics in original); EX-1037, 2 ("The clock determines the order of events within a gate, and defines when signals can be converted to data to be read or written to processor components (e.g., registers or memory)"), 4-6 (illustrating registers); EX-1038 (defining "register" as "[a] set of bits of high-speed memory within a microprocessor or other electronic device, used to hold data for a particular purpose"); EX-1039 (defining "register" as "[a] memory location within a microprocessor, used to store values and external memory

[7] Even if the processing engine were analog or hybrid (i.e., partly analog and partly digital), the motion sensor outputs would be stored in order to use them for motion correction. Wolfe, ¶196 n.9. If analog, the processing engine would store the outputs in sample-and-hold circuits. *Id.* (citing EX-1034, 34-35). If hybrid, the processing engine would store the motion sensor outputs in either a sample-and-hold circuit or registers/equivalent memory elements. *Id.*

addresses while the microprocessor performs logical and arithmetic operations on them"). Thus, to perform operations on the motion sensor outputs and obtain data for correcting the images, a POSITA would have understood that Dutta's processing engine's CPU includes memory elements that would temporarily store the motion sensor outputs. Wolfe, ¶196. For the same reasons, to perform operations on the images to correct them, a POSITA would have understood that the image data would temporarily be stored in the memory elements of Dutta's processing engine's CPU. *Id.*

In addition, although not expressly disclosed in Dutta, a POSITA would have been motivated to store the motion sensor outputs temporarily in memory 306 so that the outputs would not be lost before the processing engine completed its calculations and the data was no longer needed. *Id.*, ¶197. A POSITA would have understood that this would have the advantage of making the motion correction process more reliable. *Id.* Further, temporary storage of motion sensor data was well known in the art, and memory 306 was suitable for this purpose. *Id.*, ¶198; *see also, e.g.*, Hara, ¶¶102-04 (disclosing that "[e]ach time an image is captured by [an] imaging element 110," the device stores camera shake detection results "at the time at which the image was captured"); Hara, Fig. 16 (disclosing a "Shake Detection Result Storing Portion"); Dutta, ¶22 (disclosing that that the purpose of the memory 306 is not only to store images, but also to store other information the processing engine would need access to, such as software "required for the operation of the various components of the device and for processing the images in response to the measurements obtained by the motion sensor assembly 302").

Thus, this would have amounted to applying a known technique (temporary data storage) to a known device (Dutta's handheld device) ready for improvement to yield predictable results (temporary storage of the motion sensor outputs in memory 306). Wolfe, ¶199.

To the extent not expressly disclosed in Dutta, Akifumi discloses an imaging device that applies image correction in the video context. Akifumi, ¶¶27-85; Wolfe, ¶200.

Thus, Dutta-Akifumi teaches the claimed *imaging device*[8] and a method for using it. Wolfe, ¶201. Specifically, Dutta-Akifumi teaches a handheld device 100 such as a mobile phone or dedicated imaging device (*imaging device*) and a *method* for using the device. *Id.* Further, Dutta-Akifumi teaches that the *imaging device* includes an image sensor 310 (*image sensor*); a processing engine 304 that includes a CPU (*processor*); memory 306 for storing both images and motion sensor outputs and memory elements within processing engine 304 that store motion sensor outputs and images to be corrected (collectively, the claimed *memory*); and a motion sensor

[8] Italics indicate claim language.

assembly 302 that includes motion sensors 314X/Y/Z (*one or more motion sensors*). *Id.*

(b) [1.1]/[14.1]/[28.1]/[29.1]

Dutta-Akifumi teaches [1.1]/[14.1]/[28.1]/[29.1]. Wolfe, ¶¶202-06.

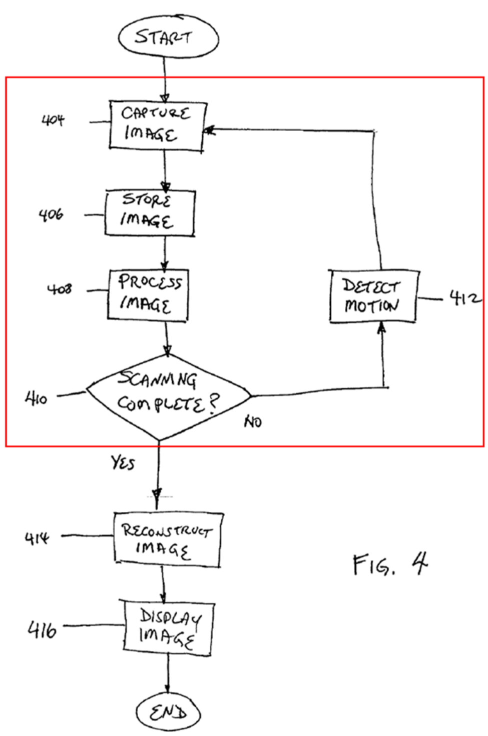
Dutta discloses that image sensor 310 captures multiple images and that each image is stored in memory 306 for processing. Dutta, ¶18 ("The image sensor 310 defines or captures a focused image of an object 202 transmitted from the lens assembly 308 and generates an appropriate electrical signal corresponding to the captured image."), ¶22 ("The memory 306 stores images 316 captured by the camera module 204 and/or calibration images."), ¶23 (disclosing regarding Figure 4 that images or objects are obtained in step 404, stored in memory in step 406, processed in step 408, and—unless it is determined in step 410 that scanning is complete—motion is then detected in step 412 and the process is repeated), ¶26 (disclosing regarding Figure 5 that handheld device "takes a plurality of pictures of the object 502" and generates "four images 504_1, 504_2, 504_3, 504_4"),[9] ¶28 (disclosing regarding Figure 6 that "handheld device 308 focuses on the object 702 and takes a plurality

[9] A POSITA would have understood the images are stored in memory in this embodiment because it is a specific example of the Figure 4 embodiment (which stores each image in memory). Dutta, ¶23; Wolfe, ¶203 n.11.

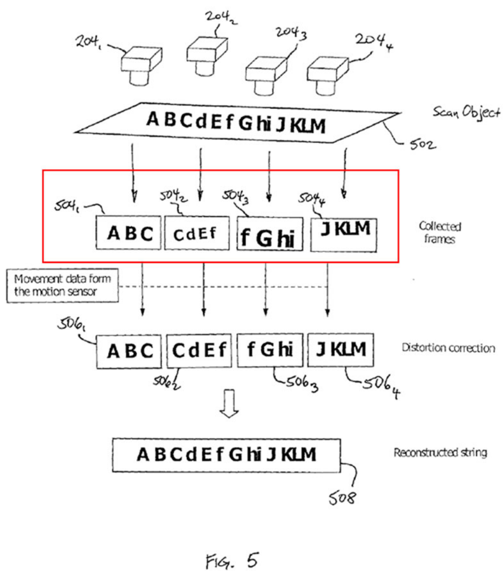
of images, 704_2, 704_3, 704_4 and 704_5, each of which are stored in memory"), Figs. 3-6.

As explained regarding 1[pre], Dutta-Akifumi also teaches that the image data would temporarily be stored in the memory elements of Dutta's processing engine 304's CPU in order to correct the images. §IV.A.4(a) (citing Dutta, Figs. 3-6, ¶¶21-29; EX-1034, 34-35; EX-1035, 1-3; EX-1036, 11; EX-1037, 2, 4-6; EX-1038 (defining "register"); EX-1039 (defining "register"); Hara, ¶¶102-04, Fig. 16); Wolfe, ¶203.

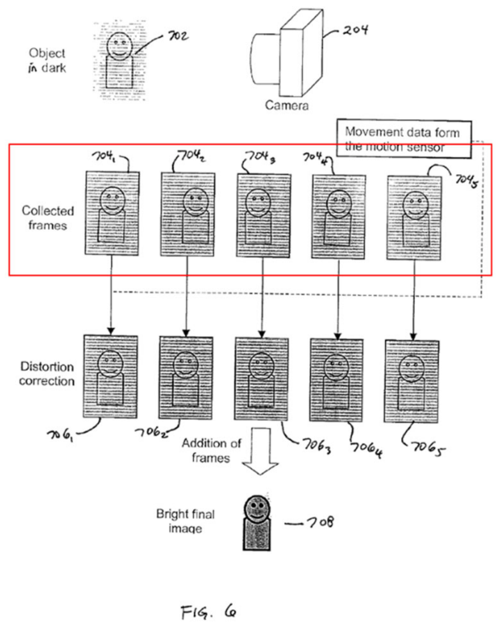
The communication path between memory 306 and the processing engine 304 is illustrated, for example, in Figure 3. Wolfe, ¶203.



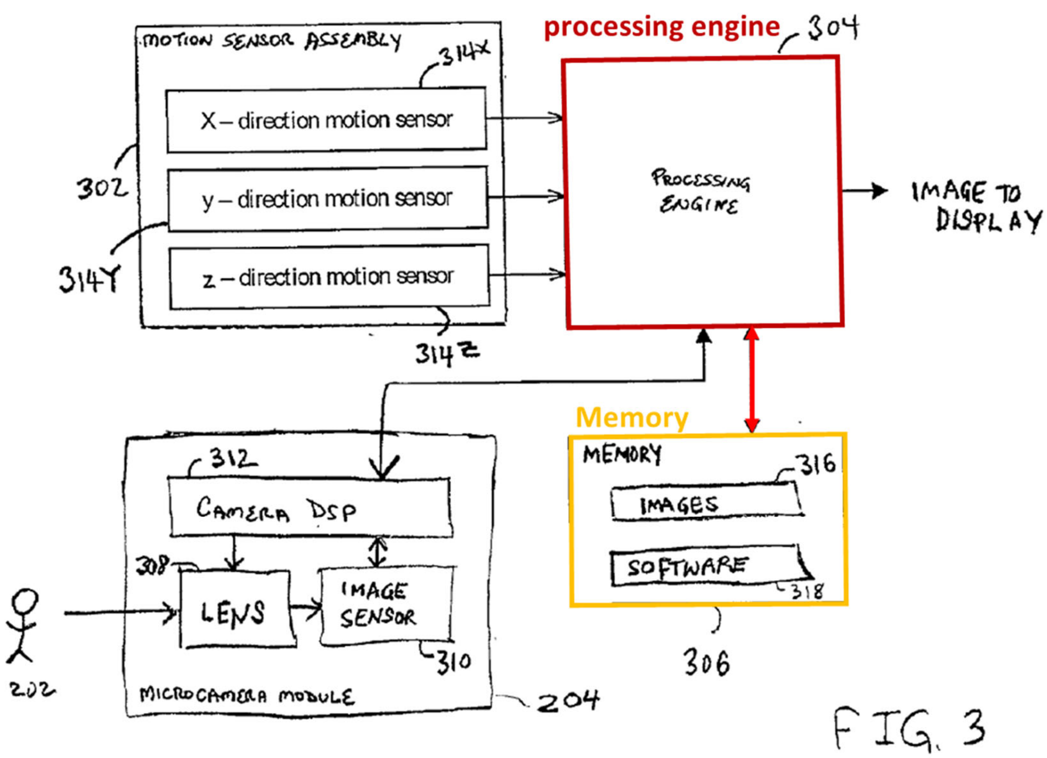
Dutta, Fig. 4.



Dutta, Fig. 5.

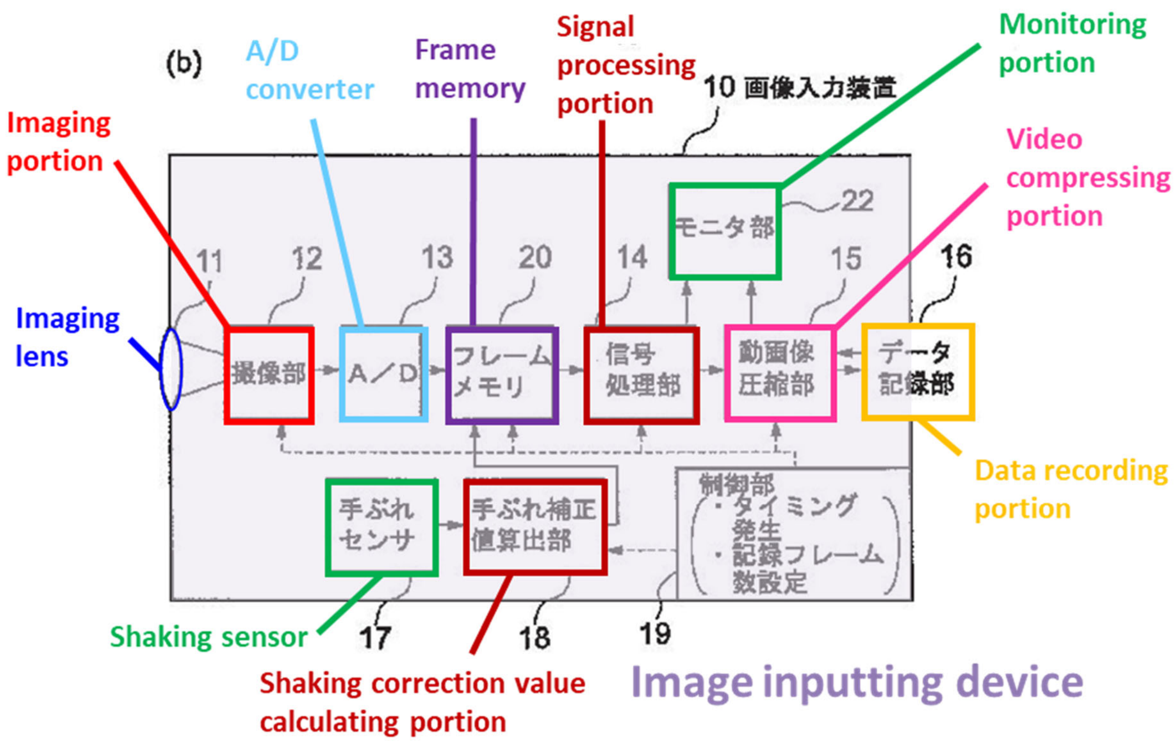


Dutta, Fig. 6.



Dutta, Fig. 3.

A POSITA would have understood in view of Akifumi that a sequence of images may be captured for purposes of assembling them into a video. *See, e.g.*, Akifumi, ¶59 (disclosing an image inputting device that captures images as video frames and performs motion correction); *see also* '450FH, 146-150 (Examiner finding that Dutta disclosed video-related limitations); '450Pat, 11:54-62; Wolfe, ¶204.



Akifumi, Fig. 11(b).

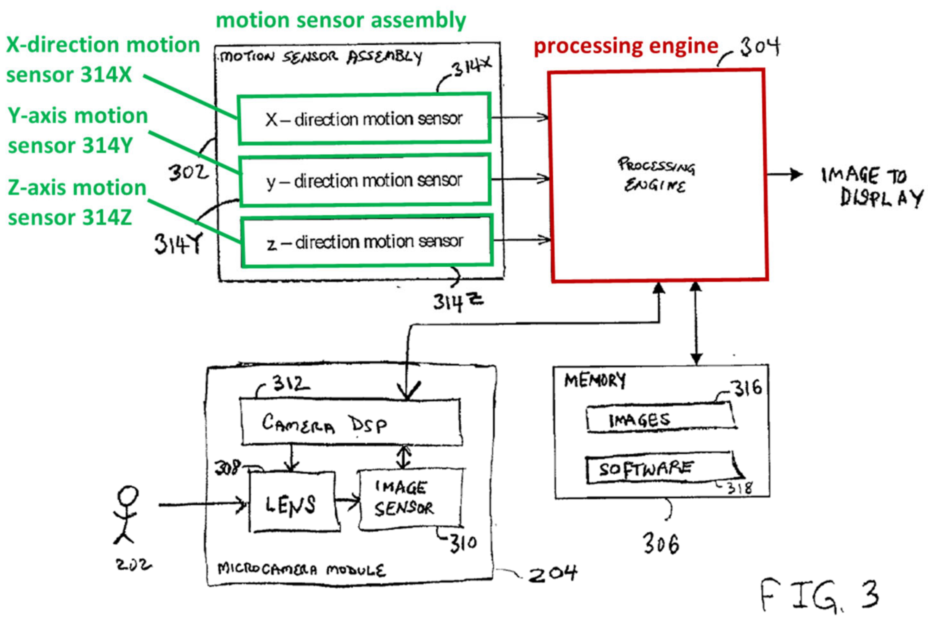
A POSITA would have been motivated to combine Dutta-Akifumi to capture the sequence of images for purposes of assembling them into a video for the reasons described in §IV.A.3. Wolfe, ¶205.

Accordingly, Dutta-Akifumi teaches capturing multiple images with Dutta's image sensor 310, e.g., as disclosed in Dutta's Figures 4, 5, and 6 (*capturing a sequence of images with the image sensor/an image sensor configured to capture a sequence of images*). Wolfe, ¶206. Further, Dutta-Akifumi teaches that the captured *sequence of images comprise a video*. *Id.* Finally, Dutta-Akifumi teaches that capturing the sequence of images with the image sensor 310 causes the images to be stored in memory 306 for subsequent processing, and further that the images would temporarily be stored in the processing engine 304's CPU's memory elements when performing corrections with values calculated from motion information (*storing the images in the memory/an image sensor configured to…store the images in a memory*). *Id.*

(c) [1.2]/[14.2]/[28.2]/[29.2]

Dutta-Akifumi teaches [1.2]/[14.2]/[28.2]/[29.2]. Wolfe, ¶¶207-22.

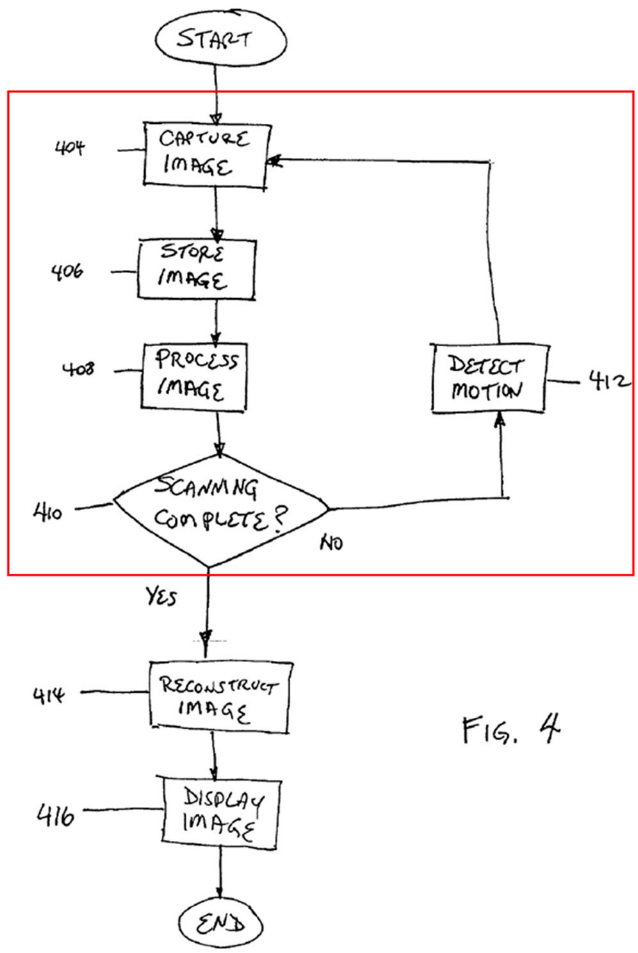
Dutta discloses that the motion sensor assembly includes motion sensors 314X/Y/Z. Dutta, ¶20. As illustrated in Figure 3, the outputs of these sensors are inputs to the processing engine 304. Wolfe, ¶209.



Dutta, Fig. 3.

The processing engine "processes the images obtained in accordance with measurements taken by the motion sensors 314X, 314Y, 314Z..." Dutta, ¶21.

Similarly, when illustrating the process in Figure 4, Dutta explains that each "scanned image of [an] object is stored in memory for further processing and/or display, step 406." *Id.*, ¶23. If a captured image is the second or a subsequent image, in step 408, "the image is processed…in accordance with information gathered by the device including detected motion and/or brightness of the obtained image." *Id.* "For example, the detected motion of the handheld device is used to correct the position, orientation[,] and size of the image." *Id.* "If additional images are to be taken, motion of the handheld device is measured, [in] step 412, and this information is transmitted to the processing engine for subsequent image processing. An additional image is then obtained, [in] step 404, and the process continues until all image acquisition is done." *Id.* Dutta also explains that "many of the steps can be performed simultaneously in parallel with respect to capturing and/or processing successive images of the object." *Id.*, ¶24.



Dutta, Fig. 4.

Dutta also discloses regarding the Figure 6 embodiment "tak[ing] a plurality of images, 704_2, 704_3, 704_4 and 704_5, each of which are stored in memory." *Id.*, ¶28. "Each of these images are processed to correct for motion of the handheld device that is detected by the motion sensors to generate[] an equal number of distortion corrected images, 704_1, 704_2, 704_3, 704_4, and 704_5." *Id.*[10]; *see also id.*, ¶¶25-27 (describing Figure 5 embodiment, which a POSITA would have understood also stores images in memory because it is a specific example of the embodiment shown in Figure 4 (which stores each image in memory) (*see* Dutta, ¶23)). Wolfe, ¶217.

As explained regarding 1[pre] and [1.1], Dutta-Akifumi teaches memory 306 and memory elements within processing engine 304's CPU, both of which would store images to be corrected and motion sensor outputs. §§IV.A.4(a)-IV.A.4(b) (citing Dutta, Figs. 3-6, ¶¶21-29; EX-1034, 34-35; EX-1035, 1-3; EX-1036, 11; EX-1037, 2, 4-6; EX-1038 (defining "register"); EX-1039 (defining "register"); Hara, ¶¶102-04, Fig. 16); Wolfe, ¶218.

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[10] The motion sensors are gyroscopes that detect rotation in this embodiment. Dutta, ¶28. However, Dutta discloses that the motion sensors can be of any type, such that a linear sensor could also be used in this embodiment. *Id.*, ¶20 (explaining that in general there are two types of sensors, "accelerometers[,] which detect and measure linear acceleration, and gyroscopes, which detect and measure angular rotation"); *id.*, ¶31 ("Substitutions of elements from one described embodiment to another are also fully intended and contemplated."); Wolfe, ¶217 n.12.

A POSITA also would have understood or found it obvious that Dutta's motion sensor outputs would be received and stored in both memory 306 and the processing engine's memory elements at substantially the same time the image to be corrected was captured/stored in memory 306/the memory elements—i.e., the motion sensor outputs would be received/stored either just before capturing/storing the image (Dutta, ¶23) or "in parallel" with capturing/storing the image (*id.*, ¶24). Indeed, Dutta explains that "many of the steps can be performed simultaneously in parallel with respect to capturing and/or processing successive images of the object," including capturing motion data for an image (step 412), capturing and storing the image (steps 404, 406), and processing the image (step 408). Dutta, ¶24; Wolfe, ¶219. Storing the motion sensor outputs in memory 306 at substantially the same time as an image to be corrected is captured and stored in memory 306 would advantageously avoid losing the motion information before the image was corrected. Wolfe, ¶220. Further, storing motion sensor outputs related to device motion when an image was captured in processing engine 304's memory elements at substantially the same time the image was stored in the memory elements is what would allow processing engine 304 to "process[] the images obtained in accordance with measurements taken by the motion sensors 314X, 314Y, 314Z." Dutta, ¶21, ¶23 (regarding Figure 4, describing processing the image in step 408 "in accordance with information gathered by the device including detected motion"), ¶27 (regarding

Figure 5, explaining that "[m]ovement data from the motion sensor assembly 302" is used to correct the images), ¶28 (describing processing the images captured in Figure 6 "to correct for motion of the handheld device that is detected by the motion sensors"); Wolfe, ¶220.

Accordingly, Dutta-Akifumi teaches motion sensors (e.g., 314X/Y/Z) that detect the motion of the handheld device just before/in parallel with the capture of a second and subsequent images in a sequence of images (*detecting, by the one or more motion sensors, motion information for one or more images of the sequence of images, wherein the motion information represents motion of the device during capturing of the one or more images of the sequence of images/one or more motion sensors configured to detect motion information for one or more images of the sequence of images, wherein the motion information represents motion of the imaging device during capturing of the one or more images of the sequence of images*). Wolfe, ¶221.

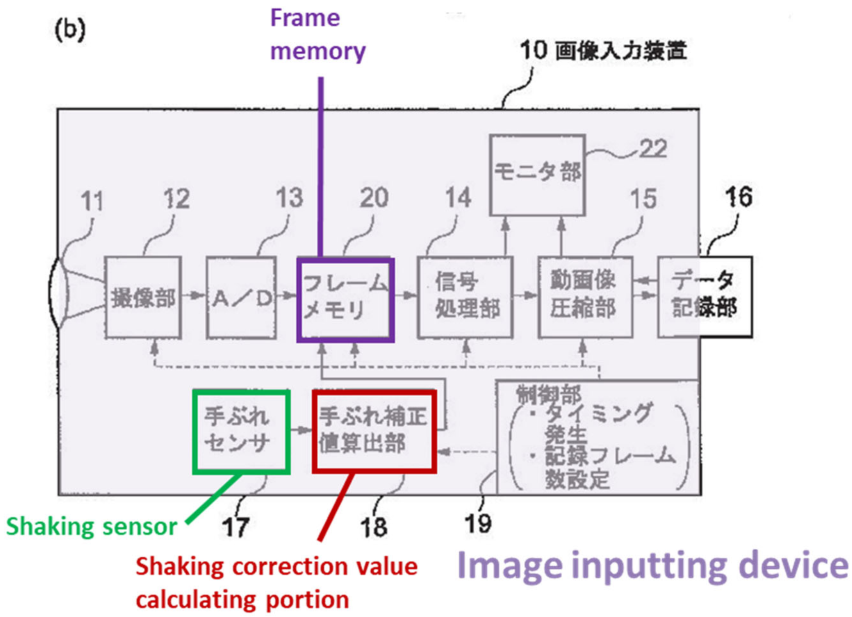
Dutta-Akifumi further teaches that the motion sensors send their outputs (*motion information*) to the processing engine 304 when an image to be corrected is captured, causing the outputs to be stored in memory 306 and in the processing engine 304's CPU's memory elements for further processing (both of which are *memory*) at substantially the same time as the captured image to be motion corrected is stored in memory 306 and in the processing engine 304's CPU's memory elements for correction (both memory 306 and the processing engine 304's CPU's memory elements are *memory*) (*storing the motion information in the memory synchronously with the storing of the one or more images/one or more motion sensors configured to…store the motion information in the memory synchronously with the storing of the one or more images*). Wolfe, ¶222.

(d) [1.3]/[14.3]/[28.3]/[29.3]

Dutta-Akifumi teaches [1.3]/[14.3]/[28.3]/[29.3]. Wolfe, ¶¶223-33.

Dutta discloses that the processing engine corrects images based on the motion sensor outputs. Dutta, ¶¶21, 23, 28. However, Dutta does not disclose details regarding how the images are corrected. For the reasons described in §IV.A.3, a POSITA would have been motivated to look to Akifumi for details regarding how to use motion sensor outputs to correct an image. Wolfe, ¶225.

Akifumi discloses a shaking correction value calculating portion that receives an output from a motion sensor to correct an image that is temporarily stored in frame memory. Akifumi, Fig. 11(b).



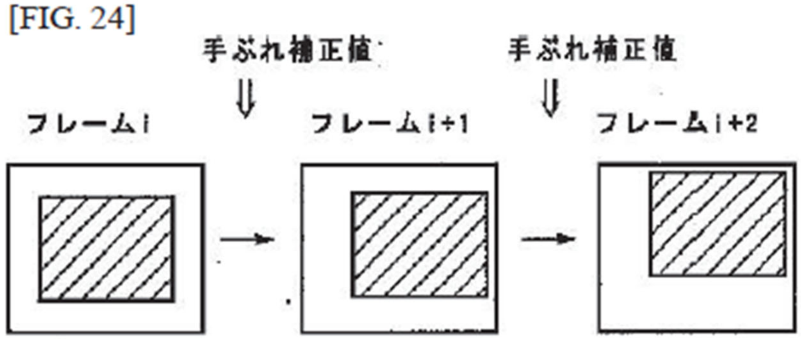
Akifumi, Fig. 11(b).

Specifically, when an image is temporarily stored in frame memory (similar to Dutta's storage of an image in memory 306), Akifumi explains that "the position for reading out is varied depending on the shaking correction value from the shaking correction value calculating portion 18." Akifumi, ¶41 (disclosing how the shaking correction value is used with respect to Fig. 6, which a POSITA would have understood also applied to Fig. 11(b) because Fig. 11(b) includes the same structure as Fig. 6 other than adding a monitoring portion 22); *see also id.*, ¶¶3, 4, 8, 16, 24, p.12 [Brief Description of the Drawings], Fig. 24 (explaining that correction of images stored in memory involves changing the position read out from memory); Wolfe, ¶¶226-27.

By disclosing that the "position for reading out is varied" based on the shaking correction value, a POSITA would have understood that Akifumi discloses that the shaking correction value has vertical/horizontal components causing vertical/horizontal shifts in the "read out" position from frame memory. Wolfe, ¶228. Indeed, when Akifumi explains its invention in the context of shifting captured images in the imaging portion (i.e., in an alternative embodiment that does not temporarily store uncorrected images in frame memory), Akifumi discloses that the shake correction value includes "vertical direction and horizontal direction shift magnitudes." Akifumi, ¶72. A POSITA would have understood that these teachings regarding vertical/horizontal shift magnitudes also apply when shifting an image temporarily stored in memory because pixels comprising an image are stored in memory in a two-dimensional (i.e., rows/columns) plane; thus, changing the "read out" position in memory would also involve a shift in the "read out" position in two dimensions (i.e., the vertical/horizontal directions). Wolfe, ¶¶229-30; *see, e.g.*, Gal, 4:50-66 (disclosing a "memory plane" that has "a matrix of memory elements arran[g]ed in vertical columns and horizontal rows corresponding to the matrix of light sensing elements" in an image sensor, and further disclosing memory address register (MAR)-Y and MAR-X values—i.e., shift values in the vertical and horizontal directions—that "control the input of the information stream…into the proper places in the memory plane" to "compensate for the positional displacements sensed").

Indeed, Akifumi's Figure 24—which discloses the "basic principles of electronic shaking correction"—reinforces this conclusion. Akifumi, [Brief Description of the Drawings], p.12.

[FIG. 24]



[UPPER LEFT] Shaking Correction
[UPPER RIGHT] Shaking Correction
[LOWER LEFT] Frame i
[LOWER MIDDLE] Frame i +1
[LOWER RIGHT] Frame i +2

Akifumi, Fig. 24.

As Figure 24 illustrates, when performing electronic shaking correction, the "position read out from the imaging signal, or the position read out from the temporary storage in frame memory, is changed with each frame depending on the shaking correction value, to carry out shaking correction." *Id.*, ¶4. As illustrated, changing the position "read out" from memory would involve shifting the image (represented by the rectangle with diagonal lines) in vertical and horizontal directions in the memory plane. Wolfe, ¶¶231-32.

Accordingly, Dutta-Akifumi teaches processing engine 304 correcting each image after the first using motion sensor inputs (e.g., 314X/Y/Z) to calculate vertical/horizontal values (*vertical/horizontal shift values*) that can be used to change the "read out" position of the image from memory in the vertical/horizontal directions (*determining, by the processor, a vertical shift value and a horizontal shift value for one or more images of the sequence of images based at least in part on the motion information/a processor configured to: determine a vertical shift value and a horizontal shift value for one or more images of the sequence of images based at least in part on the motion information*). Wolfe, ¶233.

(e) [1.4]/[14.4]/[28.4]/[29.4]

Dutta-Akifumi teaches [1.4]/[14.4]/[28.4]/[29.4]. Wolfe, ¶¶234-37.

Dutta discloses that the processing engine corrects images based on the motion sensor outputs. Dutta, ¶¶21, 23, 28. As described regarding [1.3]/[14.3]/[28.3]/[29.3] (§IV.A.4(d)), Dutta-Akifumi teaches that the processing engine performs this correction using vertical/horizontal shift values calculated with the motion sensor outputs to change the "read out" position of the image in the vertical/horizontal directions. Akifumi, ¶¶41, 72, Fig. 6, Fig. 11(b); Wolfe, ¶236.

Accordingly, Dutta-Akifumi teaches that the processing engine 304 corrects images in a sequence using vertical/horizontal values that change the "read out" position of the image in the vertical/horizontal directions (*modifying, by the* *processor, one or more images of the sequence of images based at least in part on the vertical and the horizontal shift values*/*[a processor configured to:]…modify one or more images of the sequence of images based at least in part on the vertical and the horizontal shift values*). Wolfe, ¶237.

(f) [1.5]/[14.5]/[28.5]/[29.5]

Dutta-Akifumi teaches [1.5]/[14.5]/[28.5]/[29.5]. Wolfe, ¶¶238-46.

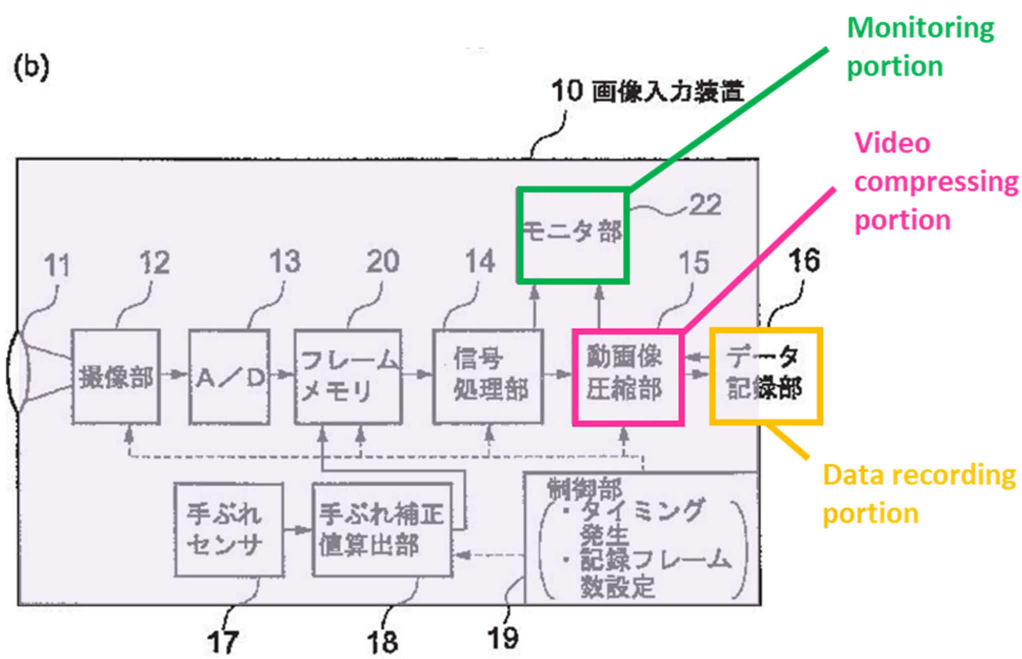
Dutta discloses that the handheld device "is configured to transmit information in the form of text, voice, images, audio, video and the like." Dutta, ¶15. Further, "[t]he display 104 is configured to display any form of textual, image and video information." *Id.* Dutta discloses that corrected images are combined into a final image. *Id.*, ¶23 (describing Figure 4), ¶27 (describing Figure 5), ¶28 (describing Figure 6). Although a POSITA would have readily recognized that motion corrected images can be combined into a video, Dutta does not explicitly disclose that its motion corrected images are combined into a video. Wolfe, ¶¶240-41.

In view of Akifumi, a POSITA would have been motivated to use processing engine 304 to combine motion corrected images into a final video and apply video compression so that the resulting video could be stored/played back on Dutta's handheld device. §IV.A.3; Wolfe, ¶242.

Akifumi discloses that its camera includes a video compressing portion 15 and a data recording portion 16 that stores the compressed image data. Akifumi, ¶28

(“In the video compressing portion 15, the data volume is reduced through MPEG or another digital video compressing technique, and the compressed image data produced thereby is recorded to a suitable recording medium by the data recording portion 16”).

Akifumi further discloses that “the image data that is recorded by the data recording portion 16 is decompressed by the video decompressing function (local decoding function) of the video compressing portion 15, and played back on a built-in monitoring portion 22.” *Id.*, ¶59.



Akifumi, Fig. 11(b).

In other words, as the images are motion corrected, Akifumi discloses that they are assembled into a final video that is then compressed in video compressing portion 15 (e.g., with MPEG) and recorded in data recording portion 16 for playback. Wolfe, ¶¶243-45.

Accordingly, Dutta-Akifumi teaches that motion corrected images are frames of a video that are collected/assembled by processing engine 304 and compressed into a final video for storage in memory (*combining, by the processor, the modified images to obtain a final video/[a processor configured to:]…combine the modified images to obtain a final video/combining, by the processor, the modified images, and applying a video compression technique to obtain a final video/[a processor configured to:]…combine the modified images, and apply a video compression technique to obtain a final video*). Wolfe, ¶246.

(g) [1.6]/[14.6]/[28.6]/[29.6]

Dutta-Akifumi renders [1.6]/[14.6]/[28.6]/[29.6] obvious. Wolfe, ¶¶247-51.

Dutta discloses that the results of image processing, including a final reconstructed image, may be stored locally, e.g., in memory 306. Dutta, ¶¶21-22; *see also id.*, ¶23 ("Alternatively, or in addition, the reconstructed image may be stored locally or remotely as an image or converted from an image into text, etc., by an optical character recognition (OCR) program."), ¶27 ("The reconstructed image may be displayed, stored, or transmitted, as discussed above."); Wolfe ¶248.

Akifumi discloses that a compressed, final video is recorded in data recording portion 16 for subsequent playback on the device. *See* [1.5] (§IV.A.4(f)); Akifumi, ¶¶28, 59; Wolfe ¶249.

In view of Akifumi, a POSITA would have been motivated to store a compressed, final video in memory 306 on Dutta's handheld device. §IV.A.3; Wolfe, ¶250.

Accordingly, Dutta-Akifumi teaches that a compressed, final video is stored in local memory 306 on Dutta's handheld device (*storing the final video in the memory/wherein the memory is further configured to store the final video/a memory configured to store the final video*). Wolfe, ¶251.

5. Claims 2/15

Dutta-Akifumi teaches claims 2 and 15's additional limitations. Wolfe, ¶¶252-53.

As described regarding [1.2]/[14.2]/[1.3]/[14.3] (§§IV.A.4(c), IV.A.4(d)), for each image after the first, Dutta's processing engine 304 detects and stores motion sensor outputs (*motion information*) for images to be corrected (Dutta, ¶¶20-21, 24, 28, Fig. 4), and Dutta-Akifumi teaches that the processing engine uses the motion sensor outputs to calculate *vertical and horizontal shift values* that can be used to change the "read out" position from memory in the vertical/horizontal directions (*the processor determines the vertical and horizontal shift values for one or more images* *for which the motion information is detected/the processor is configured to determine the vertical and horizontal shift values for one or more images of the sequence of images for which the motion information is detected*). Akifumi, ¶¶41, 72, Fig. 11(b); Wolfe, ¶253.

6. Claims 3/16

Dutta-Akifumi teaches claims 3 and 16's additional limitations. Wolfe, ¶¶254-55.

As described regarding [1.4]/[14.4] (§IV.A.4(e)), Dutta's processing engine 304 *modifies* each image after the first by applying Akifumi's teachings to use *vertical/horizontal shift values* that change the "read out" position of the image from memory in the vertical/horizontal directions (*the processor modifies one or more images for which the vertical and horizontal shift values are determined/the processor is configured to modify one or more images of the sequence of images for which the vertical and horizontal shift values are determined*). Dutta, ¶¶21, 23, 28; Akifumi, ¶¶41, 72, Fig. 6, Fig. 11(b); Wolfe, ¶255.

7. Claims 4/17

Dutta-Akifumi teaches claims 4 and 17's additional limitations. Wolfe, ¶¶256-58.

As described regarding [1.3]/[14.3]/[1.4]/[14.4] and claims 3/16 (§§IV.A.4(d), IV.A.4(e), IV.A.6), Dutta-Akifumi teaches that the processing engine

304 corrects (i.e., modifies) each image after the first based on movement of the handheld device just before/at the time the image is captured, and further, that this correction is based on a "shaking correction value." Dutta, ¶¶6, 21, 23, 27-29; Akifumi, ¶¶41, 72, Fig. 11(b).

Accordingly, Dutta-Akifumi teaches that the processing engine 304 performs "shaking correction" on images captured with Dutta's handheld device so that the effect of motion is reduced when the images are assembled into the final video (*the processor modifies one or more images of the sequence of images such that effect of motion of the device during capturing of the one or more images of the sequence of images is reduced in the final video/the processor is configured to modify one or more images of the sequence of images such that effect of motion of the device during capturing of the one or more images of the sequence of images is reduced in the final video*). Wolfe, ¶258.

8. Claims 5/18

Dutta-Akifumi teaches claims 5 and 18's additional limitations. Wolfe, ¶¶259-62.

As described regarding [1.3]/[14.3] (§IV.A.4(d)), Dutta-Akifumi teaches processing engine 304 correcting each image after the first using motion sensor outputs (e.g., 314X/Y/Z) to calculate *vertical/horizontal shift values* that are then used to change the "read out" position of the image in the vertical/horizontal directions (*the processor determines a vertical shift value and a horizontal shift value for each image of the sequence of images/the processor is configured to determine a vertical shift value and a horizontal shift value for each of the images of the sequence of images*). Wolfe, ¶260.

If shift values must also be calculated for the first image (even though there would be no reference camera position measured at the time a previous image was captured), a POSITA would have understood that Dutta-Akifumi's device would still receive motion sensor data when the first image is captured, and thus would calculate the vertical/horizontal shift value to be 0. *Id.*, ¶261. At a minimum, this would have been obvious to a POSITA because it would simplify the implementation to process the first image the same way that subsequent images are processed (i.e., calculate a 0 shift for the first image). *Id.*, ¶262. Further, this would have amounted to choosing from two predictable solutions (either perform the same shift value processing for all images or skip the first image when calculating shift values) with a reasonable expectation of success. *Id.*

9. Claims 6/19

Dutta-Akifumi teaches claims 6 and 19's additional limitations. Wolfe, ¶¶263-64.

As described regarding [1.2]/[14.2] (§IV.A.4(c)), Dutta-Akifumi teaches motion sensors (e.g., 314X/Y/Z) that detect the motion of the handheld device just before/in parallel with the capture of a second/subsequent images in a sequence of images (*the motion information represents motion of the device at time of capturing of one or more images of the sequence of images/the motion information detected by the one or more motion sensors represents motion of the device at time of capturing of one or more images of the sequence of images*). Dutta, ¶¶20-24, Fig. 4; Wolfe, ¶264.

10. Claims 7/20/30

Dutta-Akifumi teaches claims 7, 20, and 30's additional limitations. Wolfe, ¶¶265-68.

As described regarding [1.1]/[14.1]/[29.1] (§IV.A.4(b)), Dutta's handheld device captures a sequence of images, which includes at least two images. *E.g.,* Dutta, ¶23 (disclosing regarding Figure 4 that images or objects are obtained in step 404, stored in memory in step 406, processed in step 408, and—unless it is determined in step 410 that scanning is complete—motion is then detected in step 412 and the process is repeated), ¶28 (disclosing regarding Figure 6 that "handheld device 308 focuses on the object 702 and takes a plurality of images, 704_2, 704_3, 704_4 and 704_5, each of which are stored in memory"), ¶¶25-27 (describing Figure 5 embodiment capturing a sequence of images); Wolfe, ¶266.

Dutta further discloses that the motion sensors measure device motion between capturing one image and the next image. *See, e.g.*, *id.*, ¶28 (disclosing regarding Figure 6 that "[m]ovement of the camera module <u>between the taking of images is measured</u> and the images are appropriately corrected to ensure that each of the images are aligned properly with one another before they are combined"), Fig. 4 (illustrating that motion information is detected in step 412 after a previous image was captured and just before/in parallel with capturing the next image), ¶¶25-27 (describing capturing multiple images in Figure 5 embodiment and using "movement data" from the motion sensor assembly 302 to correct the images); Wolfe, ¶267.

Accordingly, Dutta-Akifumi teaches capturing at least two images (*the one or more images of the sequence of images is at least two images*) and, when capturing each image after the first, the motion sensors measure device motion relative to the device's position when the previous image was captured (*the motion information* [*detected by the one or more motion sensors*] *represents motion of the device between capturing of consecutive images*). Wolfe, ¶268.

11. Claims 8/21

Dutta-Akifumi teaches claims 8 and 21's additional limitations. Wolfe, ¶¶269-70.

As discussed regarding [1.3]/[14.3] (§IV.A.4(d)), Dutta-Akifumi teaches that processing engine 304 determines *vertical/horizontal shift values* for each image after the first that are used to change the "read out" position of the image in the vertical/horizontal directions. The magnitudes of these *vertical/horizontal shift values* are based on the device's motion as detected by the motion sensors and indicate how much the image has been displaced/how much correction is needed (*the vertical and horizontal shift values for an image indicate how much the image is displaced due to motion of the device during capturing of the image/the processor is configured to determine a vertical shift value and a horizontal shift value for an image such that the vertical shift value and the horizontal shift value indicate how much the image is displaced due to motion of the device during capturing of the image*). Wolfe, ¶270.

12. Claims 9/22

Dutta-Akifumi teaches claims 9 and 22's additional limitations. Wolfe, ¶¶271-73.

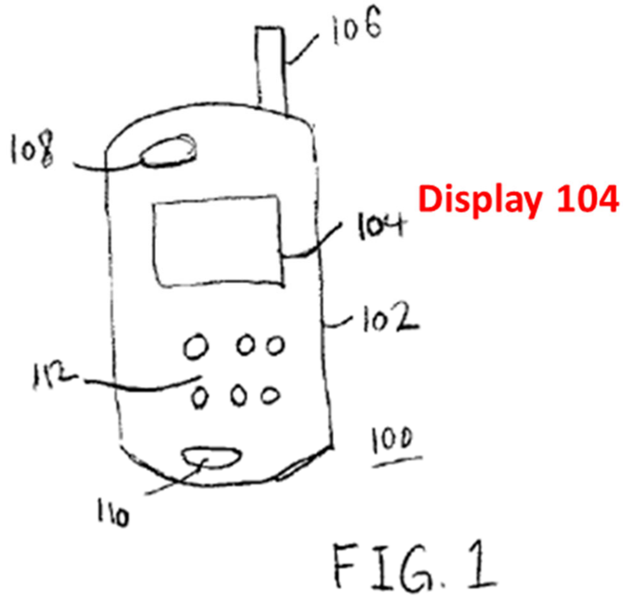
As described regarding [1.3]/[14.3] (§IV.A.4(d)), Dutta-Akifumi teaches that the processing engine 304 performs correction using v*ertical/horizontal shift values* calculated with the motion sensor outputs to change the "read out" position of the image in the vertical/horizontal directions. Dutta, ¶¶21, 23, 28; Akifumi, ¶¶41, 72, Fig. 6, Fig. 11(b). In other words, the "read out" position is the reference point for the shift. Wolfe, ¶272.

Accordingly, Dutta-Akifumi teaches that processing engine uses the "read out" position in memory as a reference point and shifts that "read out" position in a direction that corrects for the motion (*the modifying by the processor of the one or more images of the sequence of images comprises shifting a reference point in each image according to the vertical shift value and the horizontal shift value for the image in a direction that reduces the effect of motion of the device in the final video/the processor is configured to modify one or more images of the sequence of images by shifting a reference point in each image according to the vertical shift value and the horizontal shift value for the image in a direction that reduces the effect of motion of the device in the final video*). Wolfe, ¶273.

13. Claims 10/23

Dutta-Akifumi teaches claims 10 and 23's additional limitations. Wolfe, ¶¶274-80.

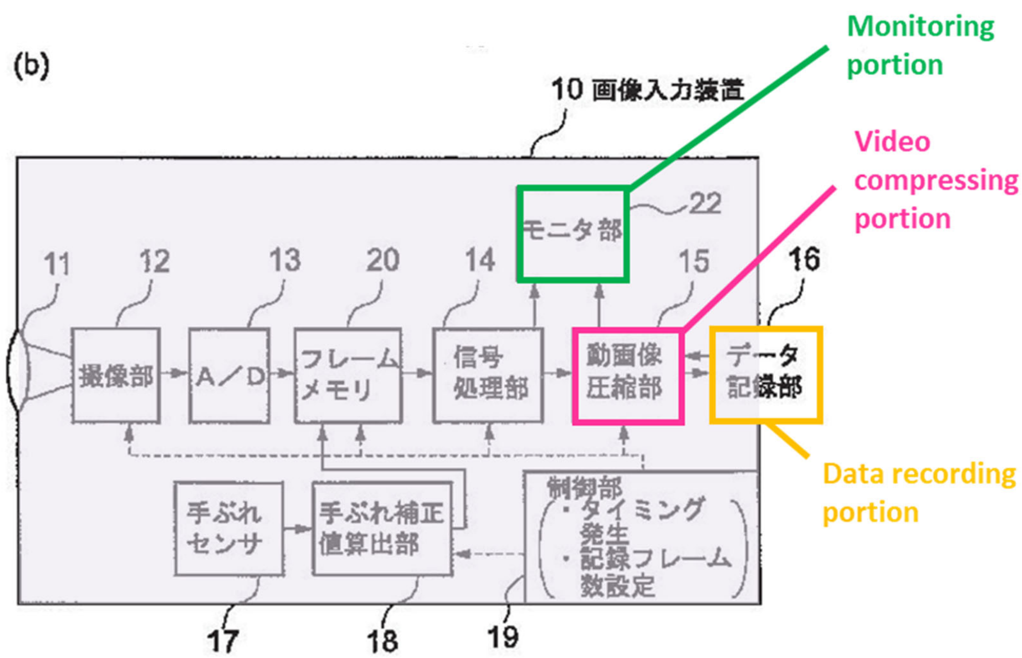
Dutta discloses that handheld device includes a display 104 that may be used to display "any form of textual, image[,] and video information." Dutta, ¶15.



Dutta, Fig. 1.

The display may be used to display the image that is output from Dutta's image correcting process. *Id.*, ¶¶18, 21, 23, 27, 29, Fig. 4.

Akifumi discloses that "the image data that is recorded by the data recording portion 16 is decompressed by the video decompressing function (local decoding function) of the video compressing portion 15, and played back on a built-in monitoring portion 22." Akifumi, ¶59. Akifumi also discloses that "[t]his monitoring portion 22 may also be used as a monitor that displays an image of the imaging subject when capturing an image by the imaging portion 12." *Id.*



Akifumi, Fig. 11(b).

In view of their combined teachings, Dutta-Akifumi teaches that the final video is displayed in Dutta's handheld device's display, which in view of Akifumi, may also be a viewfinder to display previews when capturing images (*displaying the final video in a user interface/a display configured to display the final video*). Wolfe, ¶279.

If the "user interface"/"display" must also function as a viewfinder to display previews, a POSITA would have been motivated to display previews of images in the combination's viewfinder when capturing video because this would allow users to verify a desired subject is in view. *Id.*, ¶280.

14. Claims 11/24

As described regarding [28.5]/[29.5] (§IV.A.4(f)), Dutta-Akifumi teaches claims 11 and 24's additional limitations. Wolfe, ¶¶281-83.

Akifumi discloses that as the images are motion corrected, they are assembled into a final video that is then compressed in video compressing portion 15 (e.g., with MPEG) and recorded in data recording portion 16 for playback. Akifumi, ¶¶28, 59, Fig. 11(b). In view of Akifumi (*see* §IV.A.3), a POSITA would have been motivated to implement compression in Dutta's processing engine 304 such that the processing engine applies video compression to the captured images (*modifying the sequence of images using a video compression technique/the processor is further configured to modify the sequence of images using a video compression technique*). Wolfe, ¶283.

15. Claims 12/25/31

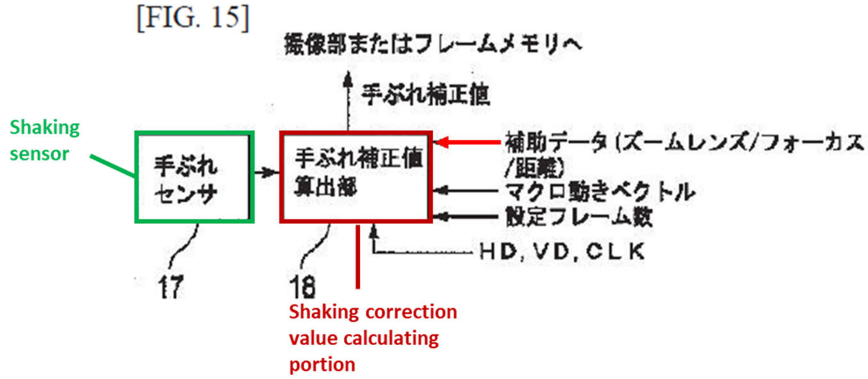
Dutta-Akifumi teaches claims 12, 25, and 31's additional limitations. Wolfe, ¶¶284-89.

Akifumi discloses that "when a shaking sensor is used in shaking detection, the amount of shaking correction will be different depending on the state of the lens, that is, will be different depending on the *focal distance* in a system wherein a zoom lens is installed, even given the same output from the shaking sensor." Akifumi, ¶13. Thus, shaking correction accuracy can be improved "using…in calculating the shaking correction value, the zoom lens setting (*focal distance*) if a zoom lens is used." *Id.*, ¶25.

Akifumi proposes an embodiment of the imaging inputting device (Fig. 15) that references "zoom lens data and focus data, or supplementary data such as data on the distance to the imaging subject" to calculate the shake correction value, "thereby further improving the accuracy of the shaking correction." *Id.*, ¶69.

The correction data input into shaking correction value calculating portion corresponds to the red arrow below.

[FIG. 15]



Akifumi, Fig. 15.

Accordingly, in view of Akifumi, a POSITA would have been motivated to modify Dutta to incorporate a zoom lens and for Dutta's processing engine to take the focal distance of the lens as an input when calculating the vertical/horizontal values (*vertical/horizontal shift values*) used to change the "read out" position for the corrected images (*determining a vertical shift value and a horizontal shift value for one or more images of the sequence of images is based at least in part on the* *focal distance of a lens of the imaging device/the processor is configured to determine a vertical shift value and a horizontal shift value for one or more images of the sequence of images based at least in part on the focal distance of a lens of the imaging device*). Wolfe, ¶288. Indeed, including a zoom lens would have the benefit of allowing the user to frame objects more precisely without moving the device, thereby improving the user experience. *Id.*, ¶289. Further, as Akifumi explains, accounting for the focal distance of the lens improves the accuracy of shaking correction and would result in a more stable final video. *Id.* This would have amounted to applying a known technique (implementing a zoom lens and using focal distance in determining shift values) to a known device (Dutta-Akifumi's device) and would have yielded predictable results (a handheld device with a zoom lens that determines the shift values based on both motion and focal distance). *Id.* Further, regardless of whether a zoom lens was used, a POSITA would have understood in view of Akifumi that taking the focal distance of the lens as an input when calculating the vertical/horizontal shift values would be advantageous because a POSITA would have understood that even a fixed focal distance would impact the amount of shake correction needed and should be accounted for. *Id.* (citing Akifumi, ¶¶13, 25, 69, Fig. 15 and EX-1021, 1:45-49); Wolfe, ¶¶62-64 (explaining that it was well-known that the impact of camera motion/shake/jitter on image/video stability is directly impacted by the focal length of the lens (relative to a given image sensor size)).

16. Claims 13/26/32

Dutta-Akifumi teaches claims 13, 26, and 32's additional limitations. Wolfe, ¶¶290-95.

Dutta discloses that the handheld device includes a display 104 and a keyboard 112. Dutta, ¶15. "For example, the keyboard 112 comprises buttons to power on and off the handheld device 100, to activate specific features of the handheld device 100, and to dial telephone numbers." *Id.*

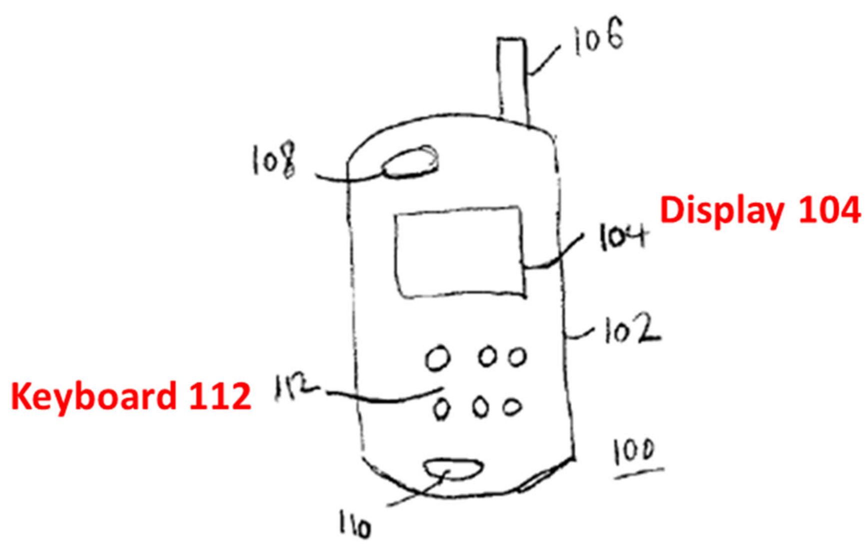
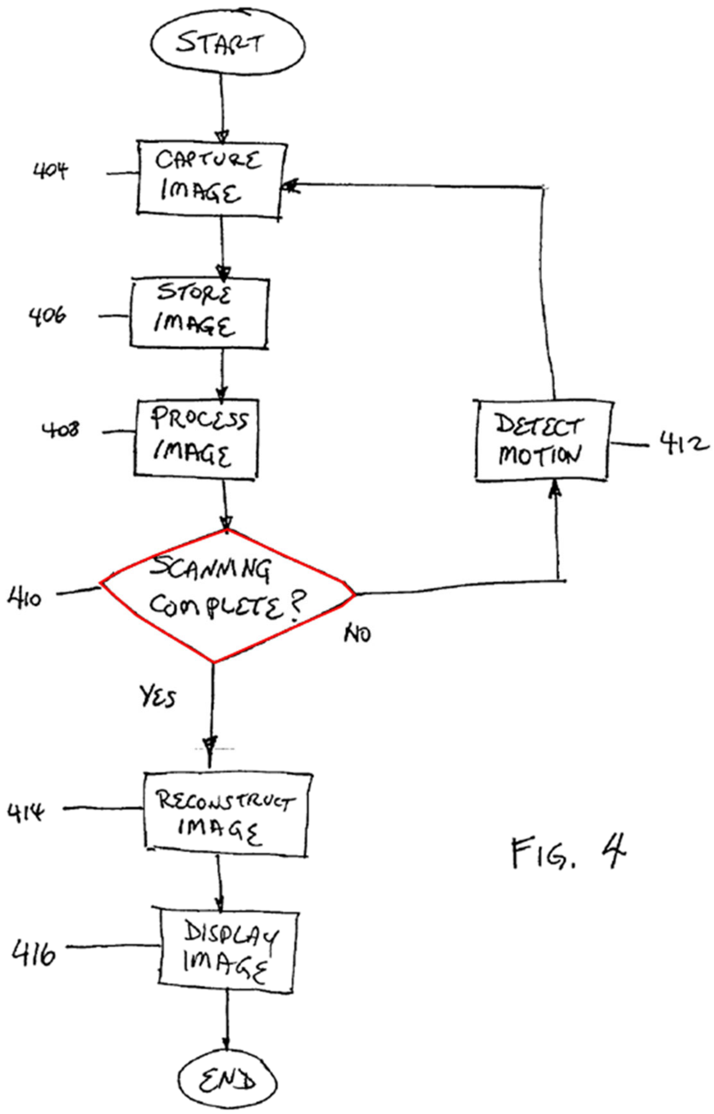


FIG. 1

Dutta, Fig. 1.

Dutta further discloses in step 410 of Figure 4 that determining whether capturing/correcting images of an object is complete can be done "manually, such as ascertaining whether the user has entered an instruction with the keyboard that no new images are to be taken." *Id.*, ¶23.



Dutta, Fig. 4.

Akifumi discloses that a user can set the recording frame rate either directly or by setting the pixel count, which determines whether all or only a subset of the captured images are motion corrected. Akifumi, ¶19 ("means for setting, a frame rate, that is, a number of frames to be recorded per-unit-time by the recording means, through an instruction from the user, may be provided"), ¶30 (disclosing that controlling portion 19 of Fig. 1—which is also present, e.g., in Figures 6 and 11(a)/(b)—has "a function wherein the setting for the recording frame rate (the number of frames recorded) can be set based on an instruction from a user"), ¶57 (disclosing that in an alternative embodiment shown in Figs. 10(a)/(b) that instead includes controlling portion 21, "the user is able to set the recording frame rate through selecting the size of the image to be recorded (the recording pixel count), without having to think about the recording frame rate").

A POSITA would have been motivated to combine Dutta and Akifumi to allow the user to provide input that indirectly controls which captured images will be modified/combined into a final video to give users more control over the image capture process and battery consumption. Wolfe, ¶¶60-61 (citing Creative Camcorder, 11; Hara, ¶¶55, 109; EX-1043, 4; and EX-1044 to confirm that a POSITA would have recognized that a user would want to conserve battery life where possible); Wolfe, ¶294. Further, this would have amounted to applying a known technique (providing the user the ability to indirectly control the images that are modified/combined through user input) to a known device (Dutta-Akifumi's device) and would have yielded predictable results (a handheld device that accounts for user input that indirectly controls the images that are modified/combined). Wolfe, ¶294.

Accordingly, Dutta-Akifumi teaches a handheld device that includes a keyboard and allows the user to interact with a display (*display/user interface*) to provide input that impacts whether images will continue to be captured/corrected/combined and further allows the user to set the recording frame rate, which allows the user to control—indirectly—which captured images will be modified/combined into a final video (*receiving user input in a user interface, and at least one of modifying one or more images of the sequential images or combining the modified images to obtain a final video is based at least in part on the user input/a display configured to receive user input, and the device is configured to modify one or more images of the sequential images and to obtain a final video based at least in part on the user input*). Wolfe, ¶295.

B. 1B: Dutta-Akifumi-Creative Camcorder Renders Obvious Claims 13, 26, and 32

1. Creative Camcorder (EX-1008)

Creative Camcorder describes Canon's ES2000 video camera. Creative Camcorder, 10; Wolfe, ¶¶296-97.

Creative Camcorder, 10.

Creative Camcorder discloses that "ES2000 offers an image-stabilization system" that "compensate[s] for different kinds of motion." Creative Camcorder, 10. Creative Camcorder further discloses using a "0.55-inch color LCD" viewfinder, which "provides several important pieces of information and includes a zoom meter as well as icons to indicate the exposure and focusing modes, and whether…image-stabilization [is] on and off." *Id.*, 11.

2. Motivation to Combine Dutta, Akifumi, and Creative Camcorder

A POSITA would have been motivated to combine Dutta, Akifumi, and Creative Camcorder for multiple reasons. Wolfe, ¶¶298-301.

First, these references relate to image/video processing and describe techniques for correcting/compensating for camera motion/shake during image capture. *See, e.g.*, Dutta, Abstract, ¶6, ¶¶17-22 (describing Fig. 3), ¶¶23-24 (describing Fig. 4), ¶¶25-27 (describing Fig. 5), ¶¶28-29 (describing Fig. 6); Akifumi, ¶15; Creative Camcorder, 10-11; Wolfe, ¶299.

Second, this combination would have improved Dutta-Akifumi's device by enabling control over whether to use image stabilization. Wolfe, ¶300. Indeed, enabling the user to turn on/off image stabilization would have allowed finer control over power consumption/battery usage, allowing users to capture unstabilized video if desired. *Id.*, ¶¶60-61 (citing Creative Camcorder, 11; Hara, ¶¶55, 109; EX-1043, 4; and EX-1044 to confirm that a POSITA would have recognized that a user would want to conserve battery life where possible); Wolfe, ¶300.

Third, the combination would have amounted to applying known techniques/features disclosed in Creative Camcorder (viewfinder, touch controls) to Dutta-Akifumi's imaging device, which would have yielded predictable results (e.g., enabling users to turn on/off image stabilization). Wolfe, ¶301. A POSITA would also have had a reasonable expectation of success in making the combination because it would merely have required a setting that allowed the user to turn on/off the stabilization that was controlled by user input features already present in the device. *Id.*

3. Claims 13/26/32

Dutta-Akifumi-Creative Camcorder teaches claims 13, 26, and 32's additional limitations. Wolfe, ¶¶302-04.

Creative Camcorder discloses an ES2000 video camera with a viewfinder that provides information regarding zoom, exposure/focus, and whether image stabilization is on/off. Creative Camcorder, 10-11. Thus, a POSITA would have understood the user provides input to the display via buttons or the joystick on the device in order to turn on/off image stabilization. Wolfe, ¶303.

Thus, for the reasons described in §IV.B.2, a POSITA would have been motivated to combine Dutta, Akifumi, and Creative Camcorder such that the handheld *imaging device* included an option for the user to provide input to a display to turn image stabilization on/off, which controls whether images forming a video are modified/stabilized (*receiving user input in a user interface, and at least one of modifying one or more images of the sequential images or combining the modified images to obtain a final video is based at least in part on the user input/a display configured to receive user input, and the device is configured to modify one or more images of the sequential images and to obtain a final video based at least in part on the user input*). Wolfe, ¶304.

C. 1C: Dutta-Akifumi-Balmer Renders Obvious Claim 27

1. Balmer (EX-1010)

Balmer discloses a multi-processing system that handles image processing and graphics and allows for any number of synchronous processors. Balmer, 3:36-42, 60:49-52; Wolfe, ¶¶305-09. Balmer enables "additional computing power and faster calculation times." Balmer, 2:26-27. A POSITA would have known that additional processing power would help execute parallel tasks, improve usability for large-scale applications, and add redundancy if a processor failed. Wolfe, ¶306.

Figure 1 shows the image processing system.

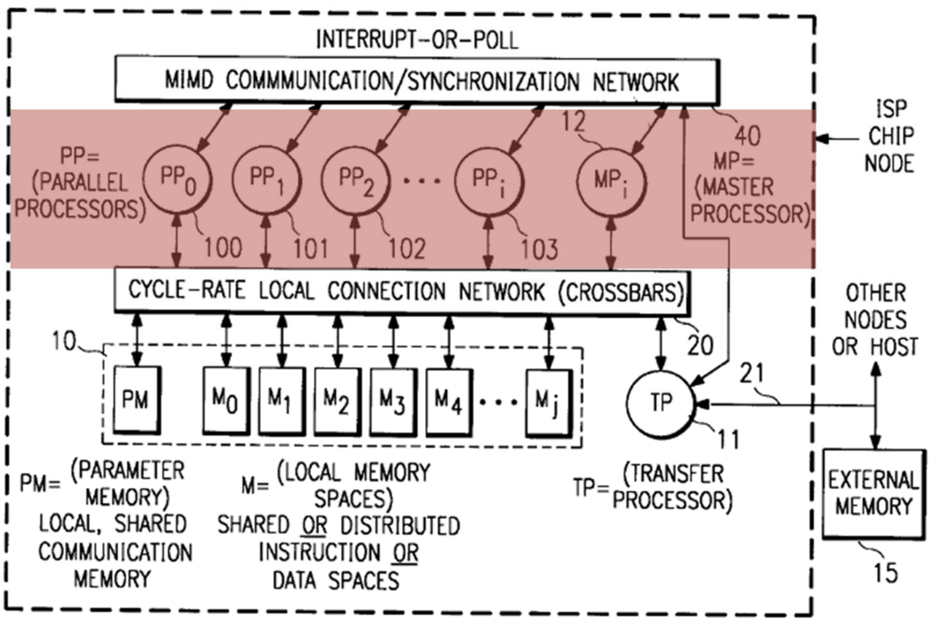
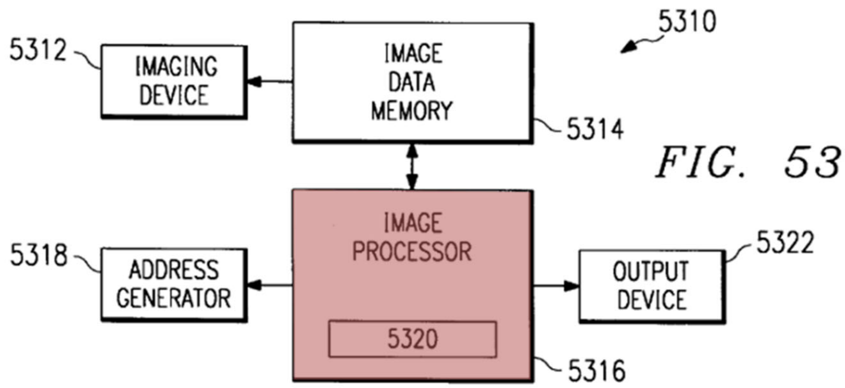


FIG. 1

Balmer, Fig. 1; *see also* Figs. 2-3.

Figure 53 shows imaging system 5310, which processes image data and includes processor 5316. *Id.*, 30:2-14.



Balmer, Fig. 53.

Imaging system 5310 includes an imaging device 5312, "such as a video camera" that "capture[s] images," where image processor 5320 "performs signal processing functions including statistical processes on the" captured images. *Id.*, 30:2-14, 58:17-42, Fig. 58.

2. Motivation to Combine Dutta, Akifumi, and Balmer

A POSITA would have been motivated to implement the processing engine in the Dutta-Akifumi combination as multiple processors in view of Balmer. A POSITA would have been motivated to make this combination for several reasons. Wolfe, ¶¶310-14.

First, Balmer, like Dutta and Akifumi, analyzes and processes image/video data. *See, e.g.*, Dutta, Abstract, ¶6, ¶¶17-22 (describing Fig. 3), ¶¶23-24 (describing Fig. 4), ¶¶25-27 (describing Fig. 5), ¶¶28-29 (describing Fig. 6); Akifumi, ¶15; Balmer, Abstract, 30:2-7; Wolfe, ¶311.

Second, a POSITA would have looked to Balmer to implement a multi-processor architecture in the Dutta-Akifumi *imaging device* because such an architecture would result in a device that can perform the video processing more efficiently and faster. Balmer, 2:30-37 ("[I]maging systems are prime candidates for multi-processing."); Wolfe, ¶312.

Third, a POSITA would have recognized that an *imaging device* with a multi-processor architecture would have been more powerful, and that this would have improved the processing performance for computationally intensive video processing tasks. Wolfe, ¶313.

Fourth, this would have amounted to applying a known technique (multiple processors for processing image data) to a known device (Dutta-Akifumi's handheld *imaging device*) to achieve predictable results (an *imaging device* with multiple processors configured to process image data and produce stabilized videos). *Id.*, ¶314. The results would have been predictable and a POSITA would have had a reasonable expectation of success in making the combination because, as Balmer confirms, it was well-known to perform image processing tasks, including for video applications, on multiple processors (e.g., separate processor chips or a single chip with multiple processors) to enable parallel (and thus, faster) processing. Wolfe, ¶56 (explaining that parallel processors were well-known in the prior art and citing EX-

1018, ¶¶17, 20, 21; EX-1019, 1:9-22, 1:54-67, 2:1-5, 4:6-18; and Balmer, 2:30-37, 3:36-42, 30:2-14, 58:17-42, 60:49-52, 62:22-27, Figs. 1-2, 10, 53, 58); Wolfe, ¶314.

3. Claim 27

Dutta-Akifumi-Balmer teaches claim 27's additional limitations. Wolfe, ¶¶315-317.

Balmer discloses a multi-processor system for processing video data. Balmer, 3:36-42, 30:2-14, 58:17-42, 60:49-52, 62:22-27, Figs. 1-2, 10, 53, 58; Wolfe, ¶316.

Given Balmer, a POSITA would have been motivated to implement Dutta's processing engine as multiple processors (*wherein the processor is two or more processors*) for the reasons described in §IV.C.2. Wolfe, ¶317.

V. CONCLUSION

Google requests cancellation of all Challenged Claims.

VI. MANDATORY NOTICES UNDER 37 C.F.R. §42.8(A)(1)

A. Real Party-In-Interest

Google LLC is the real party-in-interest.[11]

[11] Google LLC is a subsidiary of XXVI Holdings Inc.; a subsidiary of Alphabet Inc. XXVI Holdings Inc. and Alphabet Inc. are not real parties-in-interest here.

B. Related Matters

To the best of Google's knowledge, the '450Pat is or has been involved in the following cases:

- *Clear Imaging Rsch., LLC v. Lenovo Grp. Ltd.*, No. 2:25-cv-00240 (E.D. Tex. 2025)
- *Clear Imaging Rsch., LLC v. Google LLC,* No. 3:25-cv-00221 (S.D. Cal. 2025)
- *Clear Imaging Rsch., LLC v. Apple Inc.*, No. 3:23-cv-00673 (S.D. Cal. 2023)
- *Samsung Elecs. Co. v. Clear Imaging Rsch., LLC*, IPR2020-01394 (2020).
- *Clear Imaging Rsch., LLC v. Samsung Elecs. Co.*, No. 2:19-cv-00326 (E.D. Tex. 2019)

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D. Service Information

Petitioner consents to electronic service. All services and communications to the attorneys listed above may be sent to: Google-Clear-IPR@perkinscoie.com.

E. Power of Attorney

A power of attorney is filed herewith according to 37 C.F.R. §42.10(b).

Respectfully submitted,
/ *Jessica Kaiser* /

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Attorney for Petitioner

Date: January 29, 2026

CERTIFICATE OF WORD COUNT UNDER 37 C.F.R. §42.24(d)

Petitioner hereby certifies under 37 C.F.R. §42.24(a) that the number of words in this petition for *inter partes* review of U.S. Patent No. 9,860,450, in accordance with and reliance on the word count provided by the word-processing system used to prepare this petition, is 13,993. Pursuant to 37 C.F.R. §42.24(a), this word count excludes the table of contents, table of authorities, mandatory notices under §42.8, certificate of service, certificate of word count, appendix of exhibits, and any claim listing. This word count was prepared using Microsoft Word.

Respectfully submitted,
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CERTIFICATE OF SERVICE

The undersigned hereby certifies that true copies of the Petition for *inter partes* review of U.S. Patent No. 9,860,450 and supporting materials (Exhibits and Power of Attorney) were served via overnight delivery on the Patent Owner at the correspondence address of record as listed on the PTO's Patent Center:

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