UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

PERFECT CORP.,

Petitioner,

v.

ZUGARA, INC.,

Patent Owner.

PTAB Case No. IPR2025-01144

Patent No. 10,482,517

DECLARATION OF ELI SABER, PH.D. IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 10,482,517

TABLE OF CONTENTS

Page

I. INTRODUCTION AND SUMMARY OF TESTIMONY 1

A. Background and Qualifications 2

B. Materials Reviewed 8

C. Level of Ordinary Skill in the Art 8

D. Identification of Prior Art 10

1. References Used in the Petition 10

2. Other References 11

E. Summary of My Opinions 17

II. THE '517 PATENT 17

A. Overview of the '517 Patent 17

B. Prosecution of the '517 Patent 21

C. Claim Construction 22

III. UNPATENTABILITY OF THE CHALLENGED CLAIMS 22

A. Legal Standards for Invalidity 22

1. Anticipation 22

2. Obviousness 23

B. Ground 1: Lennon and Gray Render Obvious Claims 1-3, 6-7, 9-10, 12-15, and 18-19 25

1. Lennon 25

2. Gray 30

3. Motivation to Combine Lennon and Gray 33

4. Independent Claim 1 and Associated Dependent Claims 38

5. Independent Claim 13 and Associated Dependent Claims 69

C. Ground 2: YouCam 3 User's Guide and YouCam 3 Publication Video Render Obvious Claims 1-3, 6-7, 9-10, 12-15, and 18-19 72

TABLE OF CONTENTS
(continued)

Page

1. YouCam 3 User's Guide and YouCam 3 Publication Video 72
2. Motivation to Combine YouCam 3 Official Publications 74
3. Independent Claim 1 and Associated Dependent Claims 78
4. Independent Claim 13 and Associated Dependent Claims 102

IV. CONCLUSION 105

I, Eli Saber, Ph.D., declare as follows:

I. INTRODUCTION AND SUMMARY OF TESTIMONY

1. I have been retained by Petitioner Perfect Corp. ("Petitioner") to investigate and opine on certain issues relating to United States Patent No. 10,482,517 ("the '517 Patent") in Perfect Corp.'s Petition for *Inter Partes* Review of that patent. The Petition requests that the Patent Trial and Appeal Board ("PTAB" or "Board") review and cancel claims 1-3, 6-7, 9-10, 12-15, and 18-19 of the '517 Patent.

2. I am being compensated for my work on this matter by Petitioner for consulting services including time spent testifying at any hearing that may be held. I am also reimbursed for reasonable and customary expenses associated with my work in this case. I receive no other forms of compensation related to this case. My compensation does not depend on the outcome of this *inter partes* review and I have no other financial interest in this *inter partes* review.

3. This declaration is based on the information currently available to me. To the extent that additional information becomes available, I reserve the right to continue my investigation and study, which may include a review of documents and information that may be produced, as well as testimony from depositions that have not yet been taken.

A. Background and Qualifications

4. I am a Professor in the Department of Electrical and Microelectronic Engineering (EME) and at the Chester F. Carlson Center for Imaging Science at the Rochester Institute of Technology (RIT) in Rochester, New York. I also serve as the Director of the Image, Video and Computer Vision Laboratory. I joined RIT's full-time faculty in 2004. I have over thirty-four (37) years of industry and academic experience, thirty (32) of which are in the fields of Computer Vision, Digital Image/Video Processing, Pattern Recognition and Machine Learning.

5. I received a Ph.D. in Electrical Engineering from the University of Rochester in 1996. My concentration was in Signal/Image/Video Processing, Pattern Recognition, and Computer Vision. I received a Master of Science Degree in Electrical Engineering from the University of Rochester in 1992 in the same concentration as listed above, and I received a Bachelor of Science Degree in Electrical and Computer Engineering, *Summa Cum Laude,* from the State University of New York at Buffalo in 1988.

6. Before becoming a full-time professor, I worked for Xerox Corporation from 1988 to 2004. During my 16 years at Xerox, I was—generally speaking—responsible for: a) delivering color management solutions, image processing innovations, architectures, and algorithms for high-end color printing systems, b) xerographic sub-systems for a variety of color products, and c) control systems for toner

production facilities. Among other roles, as an Advanced Development Scientist and Manager, I established the Advanced Design Laboratory—an Imaging/Xerographics lab—and provided technical and managerial leadership for the Electrical, Imaging and Xerographics Department. As a Product Development Scientist and Manager, I led the research and development of color management algorithms and image quality metrics for various product platforms. I also led the Image Science, Analysis, and Evaluation area, with twelve to fifteen direct reports and a budget of approximately $2 million.

7. From 1997 until 2004, I was an adjunct faculty member at the Electrical Engineering Department of the Rochester Institute of Technology and at the Electrical & Computer Engineering Department at the University of Rochester. I was responsible for teaching undergraduate and graduate coursework in signal, image, video processing, pattern recognition, and communications and performing research in multimedia applications, pattern recognition, image understanding and color engineering.

8. Since joining RIT full time, I have been responsible for teaching several undergraduate and graduate courses in Digital Signal Processing, Digital Image Processing, Digital Video Processing, Advanced Neural Networks and Deep Learning, Pattern Recognition, Engineering Analysis, Random Signal & Noise, Advanced

Engineering Mathematics, Matrix Methods, Communications, Modern Control Theory, and Linear Systems.

9. I proposed, developed, and introduced the "Digital Video Processing" and the "Advanced Neural Network and Deep Learning: Part 1" courses; and reestablished the Pattern Recognition course at the Electrical Engineering Department at RIT. These graduate courses were instrumental in providing MS/PhD students with the proper foundation and knowledge in all aspects of the subject areas in order to perform in-depth research in the field and continue to advance the state of the art.

10. The Digital Video Processing course is designed to provide a thorough and comprehensive coverage of the field. Topics covered include the mathematical representation of digital video including motion and time-varying image formation models, spatio-temporal sampling/reconstruction, sampling structure conversions, motion estimation using optical flow, block-based, pel-recursive, Bayesian and point correspondence type methodologies, segmentation, motion tracking, filtering, restoration, super-resolution and compression.

11. The Pattern Recognition course, on the other hand, covers pertinent concepts in Bayes decision theory, linear and nonlinear classifiers, artificial neural networks, feature selection/generation/extraction and various types of clustering algorithms and techniques.

12. The "Advanced Neural Networks and Deep Learning: Theory, Mathematics and Algorithms" is intended to provide an in-depth comprehensive study of the theory, mathematics and algorithms for advanced neural networks and their usage in deep learning. It is primarily targeted for upper graduate students that are planning to pursue advanced studies/research in the field. The course begins with an in-depth study of the mathematical methodologies for neural networks and optimization (zero-, first- and second-order) techniques. It then progresses to provide a thorough study of shallow and deep neural networks architectures and algorithms, activation functions, regression, two- and multi-class classification, unsupervised learning, feature engineering/selection, backpropagation along with applications to a variety of engineering problems.

13. I am currently working to develop a follow-on course (Part 2) to the Advanced Neural Networks and Deep Learning course described above. This course is intended to cover convolutional and recurrent style neural networks, principles of feature engineering, kernel methods, tree-based learners, attention mechanisms/transformers, reinforcement learning and generative adversarial networks. This course is targeted to debut in Fall 2026.

14. I am also currently working to revamp the graduate course titled: "Image and Video Compression." The updated version of this course will start by providing a brief history of video coding and video coding standards and then

progress to discussing video basics, formats and fundamentals of video compression. It will then progress to cover JPEG, JPEG 2000, H.261, MPEG-1, MPEG-2, H.263, MPEG-4 visual, H.264 and H.265 and if time permits, AV-1 and H.266. The course is intended to debut in Fall 2027.

15. My current research focuses on machine learning for object tracking/remote sensing applications; image/video processing for multimedia, military & biomedical applications; and computer vision and three-dimensional scene reconstruction. As a principal investigator (PI) or co-principal investigator, I have acquired almost $6 million in research funding since joining RIT and have managed multiple government grants from the Department of Defense as well as several corporate grants from Hewlett-Packard, Lenel, and Data Physics. I am currently managing (as PI) a multiyear government grant from the Department of Defense titled "Target Detection/Tracking and Activity Recognition from Multimodal Data." In this project, we propose to develop operational target detection/tracking techniques and activity recognition/understanding methods that can leverage multimodal data in a fusion framework using deep learning algorithms while providing accurate and near real-time performance.

16. In 2012, I was awarded the Prestigious Trustees Scholarship, the highest award at RIT with regard to research recognition.

17. I am the author or co-author of 40 peer-reviewed journal publications.

18. I have also authored or co-authored 103 conference and workshop publications and a book entitled Advanced Linear Algebra for Engineers with MATLAB, published by CRC Press in February 2009, and am a named inventor on multiple U.S. and foreign patents.

19. I am a senior member of the Institute of Electrical and Electronic Engineers and a member of the IEEE Signal Processing Society, the Electrical Engineering Honor Society, and Eta Kappa Nu.

20. With respect to the technologies relevant to the '517 Patent, I have extensive experience in developing computer vision and digital image/video processing algorithms and techniques for motion estimation, segmentation, registration, classification, identification, pattern recognition, shape recognition/matching, stereo imaging, facial recognition, biomedical image processing, compression, surveillance systems, 3D scene reconstruction, machine learning, deep learning for a variety of applications including object recognition and tracking, video analysis, video surveillance, change detection, biomedical, color engineering, grayscale and color document processing.

21. A complete statement of my industrial and academic records including a listing of the above publications and patents is included with my *curriculum vitae* in Ex. 1003.

B. Materials Reviewed

22. My opinions expressed in this declaration are based on documents and materials identified in this declaration, including the '517 Patent, the prosecution history for the '517 Patent, the prior art references and background materials discussed in this declaration, and the other references specifically identified in this declaration. I have considered these materials in their entirety, even if only portions are discussed here.

23. I have also relied on my own experience and expertise in image/video capture and processing.

C. Level of Ordinary Skill in the Art

24. I am not an attorney and offer no legal opinions. I have been informed about certain aspects of the law for purposes of my analyses and opinions.[1]

[1] I understand that the patent laws were amended by the America Invents Act (AIA), but that the earlier statutory requirements still apply to pre-AIA patents. I have been informed that the '517 Patent is a pre-AIA patent, so the pre-AIA requirements control. Unless otherwise stated, my understanding of the law about patent invalidity as set forth in this declaration relates to the pre-AIA requirements.

25. I understand that in analyzing questions of invalidity and infringement, the perspective of a person having ordinary skill in the art ("POSA") is often implicated, and the Court may need assistance in determining that level of skill.

26. I understand that the claims and written description of a patent must be understood from the perspective of a POSA. I have been informed that the following factors may affect the level of skill of a POSA: (1) the educational level of the inventor; (2) the type of problems encountered in the art; (3) the prior-art solutions to those problems; (4) the rapidity with which innovations are made; (5) the sophistication of the technology; and (6) the educational level of active workers in the field. A person of ordinary skill in the art is also a person of ordinary creativity in the art.

27. Based on my experience in video processing, data compression, and computer vision, as well as my reading of the '517 patent, a POSA with respect to the subject matter of the '517 patent at the time of the alleged invention would have a bachelor's degree in electrical engineering, computer engineering, computer science, or a similar field and one year of experience developing software. A POSA would be well familiar with computer vision, digital image/video processing, and computer networking technologies. This level of skill is somewhat flexible. A person with less education but more relevant practical experience could also meet this standard, for example.

28. I am a person of at least ordinary skill in the art and was so on the earliest date to which the '517 patent claims priority (i.e., August 12, 2009). As shown by my qualifications and my *curriculum vitae* in Ex. 1003, I am aware of the knowledge and skill possessed by a POSA at the time of the alleged invention claimed by the '517 patent. In performing my analysis, I have applied the standard set forth above.

D. Identification of Prior Art

1. References Used in the Petition

29. I am informed that U.S. Patent No. 6,624,843 ("Lennon" (Ex. 1004)), which was filed on December 8, 2000, and issued on September 23, 2003, is prior art under pre-AIA 35 U.S.C. § 102(b).

30. I am informed that U.S. Patent No. 8,438,081 ("Gray" (Ex. 1005)), which was filed on October 7, 2009, and issued on May 7, 2013, is prior art under pre-AIA 35 U.S.C. § 102(e). I am informed that Gray claims priority to Prov. Appl. No. 61/195,821 ("'821 Appl." (Ex. 1008)), filed on October 9, 2008, and to Prov. Appl. No. 61/119,649 ("'649 Appl." (Ex. 1009)), filed on December 3, 2008, and I am informed that, for the purposes of this petition, Gray is entitled to the filing dates of its provisional applications.

31. I am informed that YouCam 3 User's Guide ("User's Guide" (Ex. 1006)), which was published and made available to the public by Cyberlink Corp.

on its public website no later than June 19, 2009, is prior art under pre-AIA 35 U.S.C. § 102(a).

32. I am informed that YouCam 3 Publication Video ("Publication Video" (Ex. 1007)), which was published by Cyberlink Corp. on YouTube.com no later than June 19, 2009, is prior art under pre-AIA 35 U.S.C. § 102(a).

2. Other References

33. I am informed that Ex. 1008 is a copy of the '821 Appl., which is the first U.S. provisional application to which Gray claims priority.

34. I am informed that Ex. 1009 is a copy of the '649 Appl., which is the second U.S. provisional application to which Gray claims priority.

35. Ex. 1010 is what I understand to be a copy of the prosecution history of the '517 Patent.

36. Ex. 1011 is what I understand to be a copy of a claim chart that is used by the Patent Owner in a patent litigation case against the company Estee Lauder where the '517 Patent was involved.

37. Ex. 1016 ("Tekalp") is an excerpted copy of a book by A. Murat Tekalp, titled *Digital Video Processing*. Ex. 1016 would have been very familiar to a POSA. I have used (and still use) this book as the primary textbook when I have taught (and still teach) the Digital Video Processing course which I introduced to the Electrical Engineering department at the Rochester Institute of Technology. The book

provides an extensive coverage of the topic starting from the fundamentals and then progressing to 2D/3D motion estimations techniques followed by filtering and then image/video compression. The copyright notice printed on Ex. 1016 indicated that it was published in 1995 by Prentice-Hall, Inc. Prentice-Hall was known to a POSA as a well-established publisher in the field. A POSA reading Ex. 1016 would have understood from those copyright notations that Exhibit 1016 was published and made available to the public in 1995.

38. Ex. 1017 ("Ballard") is an excerpted copy of a book by Dana H. Ballard and Christopher M. Brown, titled *Computer Vision*. Ex. 1017 would have been familiar to a POSA. I have used this book as a secondary textbook when teaching the Digital Image Processing course at the Electrical Engineering department of the Rochester Institute of Technology (RIT) due to its extensive coverage of computer vision techniques related to image processing. The copyright notice printed on Ex. 1017 indicated that it was published in 1982 by Prentice-Hall, Inc. Prentice-Hall was known to a POSA as a well-established publisher in the field. A POSA reading Ex. 1017 would have understood from those copyright notations that Exhibit 1017 was published and made available to the public in 1982.

39. Ex. 1018 ("Hartley") is an excerpted copy of a book by Richard Hartley and Andrew Zisserman, titled *Multiple View Geometry in Computer Vision*. Ex. 1018 would have been familiar to a POSA. I have used this book as a reference

when working with my graduate students on computer vision research projects that require extensive understanding of the underlying techniques and mathematical algorithms related to computer vision. The book is also introduced as a reference book for graduate students that are enrolled in the Digital Video Processing course given its extensive coverage of projective geometry (one, two, three, …, N-views) and its underlying mathematical fundamentals. The copyright notice printed on Ex. 1018 indicated that it was published in 2003 by Cambridge University Press. Cambridge University Press was known to a POSA as a well-established publisher in the field. A POSA reading Ex. 1018 would have understood from those copyright notations that Exhibit 1018 was published and made available to the public in 2003.

40. Ex. 1019 ("Richardson 2002") is an excerpted copy of a book by Iain E. G. Richardson, titled *Video Codec Design: Developing Image and Video Compression Systems*. Ex. 1018 would have been familiar to a POSA. This book is provided as a reference to graduate students enrolled in the Digital Video Processing course due to its complementing coverage of image and video compression techniques. The copyright notice printed on Ex. 1018 indicated that it was published in 2002 by John Wiley & Sons, Ltd. John Wiley was known to a POSA as a well-established publisher in the field. A POSA reading Ex. 1019 would have understood from those copyright notations that Exhibit 1019 was published and made available to the public in 2002.

41. Ex. 1020 ("Richardson 2003") is an excerpted copy of a book by Iain E. G. Richardson, titled *H.264 and MPEG-4 Video Compression*. Ex. 1020 would have been familiar to a POSA. This book is also made available to graduate students enrolled in the Digital Video Processing course as well as the Image and Video Compression course that is offered at RIT. The copyright notice printed on Ex. 1020 indicated that it was published in 2003 by John Wiley & Sons, Ltd. John Wiley was known to a POSA as a well-established publisher in the field. A POSA reading Ex. 1020 would have understood from those copyright notations that Exhibit 1020 was published and made available to the public in 2003.

42. Ex. 1021 ("Shapiro") is an excerpted copy of a book by Linda Shapiro and George Stockman, titled *Computer Vision*. Ex. 1021 would have been familiar to a POSA. This book is made available as a reference to graduate students that are enrolled in the Digital Image Processing course due to its complementary nature of the subject matter. The copyright notice printed on Ex. 1021 indicated that it was published in 2001 by Prentice-Hall, Inc. Prentice-Hall was known to a POSA as a well-established publisher in the field. A POSA reading Ex. 1021 would have understood from those copyright notations that Exhibit 1021 was published and made available to the public in 2001.

43. Ex. 1022 ("Gonzalez") is an excerpted copy of a book by Rafael C. Gonzalez and Richard E. Woods, titled *Digital Image Processing*. Ex. 1022 would

have been familiar to a POSA. This book is utilized as the primary textbook in the Digital Image Processing course that I have taught on multiple occasions at the Electrical Engineering Department at RIT. The copyright notice printed on Ex. 1022 indicated that it was published in 2002 by Prentice-Hall, Inc. Prentice-Hall was known to a POSA as a well-established publisher in the field. A POSA reading Ex. 1022 would have understood from those copyright notations that Exhibit 1022 was published and made available to the public in 2002.

44. Ex. 1023 ("Yilmaz") is a publication by Alper Yilmaz, et al., titled "Object Tracking: A Survey," published in the journal *ACM Computing Surveys*, which was a well-recognized journal that would have been known to a POSA at the time of the invention of the '517 Patent. The ACM (the Association for Computing Machinery) was known to POSAs as a well-established, highly-regarded publisher of scientific journals. The copyright notice on Ex. 1023 lists a 2006 copyright date, and the journal citation printed on each page indicates that the article was published as part of the volume 38, issue 4, of *ACM Computing Surveys*, which was published in 2006. A POSA reading Exhibit 1023 would have understood from those notations that the article had been published and made available to the public by 2006.

45. Ex. 1024 ("Yang") is a publication by Ming-Hsuan Yang, et al., titled "Detecting Faces in Images: A Survey," published in the journal *IEEE Transactions on Pattern Analysis and Machine Intelligence*, which was a well-recognized journal

that would have been known to a POSA at the time of the invention of the '517 Patent. The IEEE (the Institute of Electrical and Electronics Engineers) was known to POSAs as a well-established, highly-regarded publisher of scientific journals. The copyright notice on Ex. 1024 lists a 2002 copyright date, and the journal citation printed on each page indicates that the article was published as part of the volume 24, issue 1, of *IEEE Transactions on Pattern Analysis and Machine Intelligence*, which was published in 2002. A POSA reading Exhibit 1024 would have understood from those notations that the article had been published and made available to the public by 2002.

46. Ex. 1025 ("Kang") is a publication by Sing Bing Kang, et al., titled "Image-Based Rendering," published in the journal *Foundations and Trends in Computer Graphics and Vision*, which was a journal that would have been known to a POSA at the time of the invention of the '517 Patent. The Now Publishers was known to POSAs as a publisher of scientific journals. The copyright notice on Ex. 1025 bears a 2007 copyright notice but identifies that the article was first published as part of the volume 2, issue 3, of *Foundations and Trends in Computer Graphics and Vision*, which was published in 2006. A POSA reading Exhibit 1025 would have understood from those notations that the article had been published and made available to the public by 2006.

E. Summary of My Opinions

47. Ground 1: It is my opinion that challenged claims 1-3, 6-7, 9-10, 12, 13-15, and 18-19 of the '517 Patent are invalid as obvious based on Lennon and Gray.

48. Ground 2: It is my opinion that challenged claims 1-3, 6-7, 9-10, 12, 13-15, and 18-19 of the '517 Patent are invalid as obvious based on YouCam 3 User's Guide and YouCam 3 Publication Video.

II. THE '517 PATENT

A. Overview of the '517 Patent

49. I reviewed the '517 Patent, entitled "Providing a Simulation of Wearing Items Such as Garments And/or Accessories," issued on November 19, 2019, and assigned to Zugara, Inc. The '517 Patent generally relates to a system that allows a user to simulate wearing wearable items by providing a composite image of a live video feed of the user wearing at least one virtual wearable item. The patent purports to address limitations in prior online retail environments by enabling consumers to visualize virtual clothing or accessories superimposed on their image in real-time. Ex. 1001, 1:20-41. The '517 Patent's virtual-try-on system ("VTO") thus allows a user in an online setting to "try on" the wearable item before purchasing it and physically trying it on for the first time once shipped to the user. *Id.* Specifically, '517 Patent's system operates by "captur[ing] still images and/or a live video feed of a

user" (*id.* at 2:24-42), "track[ing] motion of the user" (*id.* at 3:31-42), their position, allowing the user to select a virtual garment (*id.* at 3:43-57), and showing a composite images and/or video of the selected garment in a manner that is "visually overlaid on the user." (*id.* at 4:26-47). Figure 3 shows an example of the resulting composite image with selected garment visually overlaid on the user.

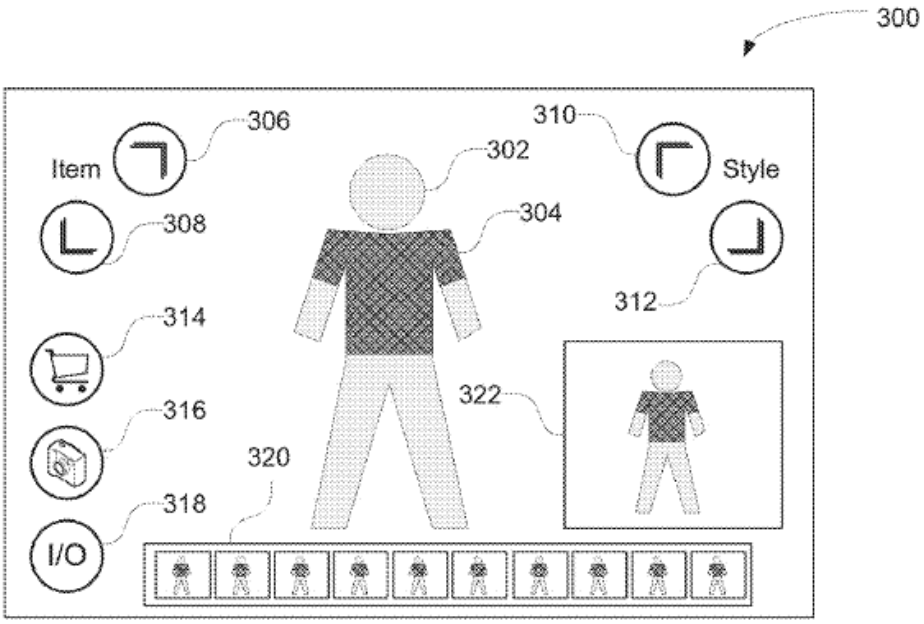


FIG. 3

50. However, the '517 Patent implements the invention through a series of conventional and generically described "modules" lacking any technical details. Figure 1 of the '517 Patent illustrates the invention, and the use of these generic modules:

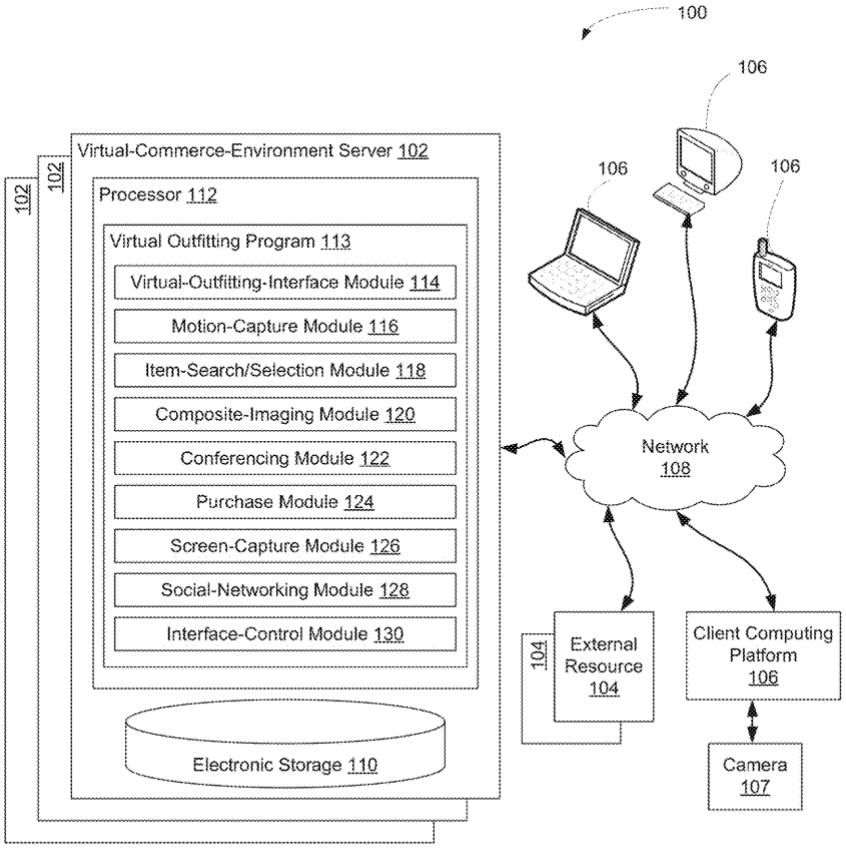


FIG. 1

51. Similarly lacking in technical details is Figure 4, which is the only flowchart (or method) disclosed in the '517 Patent "for allowing a user to simulate wearing real-wearable items." *Id.* at 7:58-60. As can be seen below, the steps provided in Figure 4 are generic in nature and lack technical specificity.

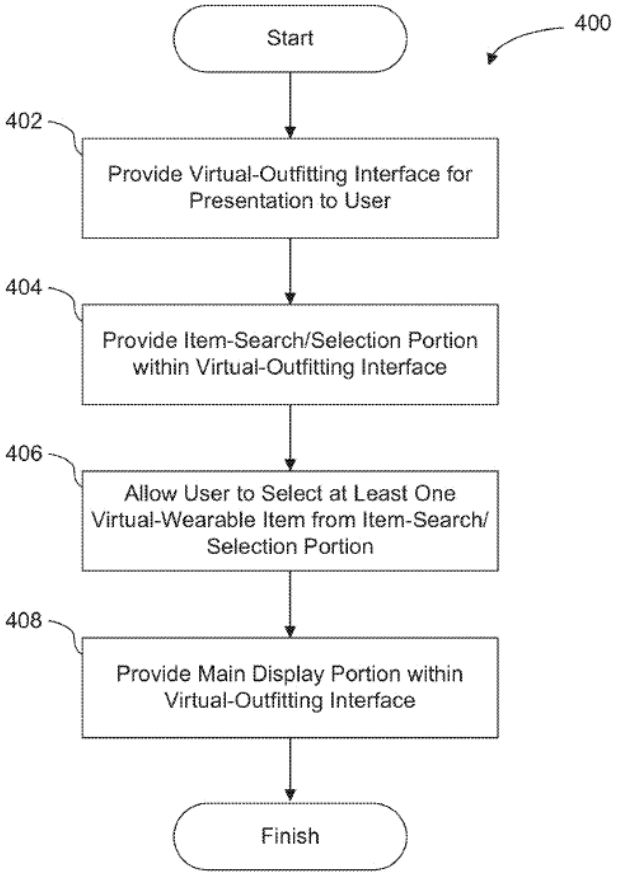


FIG. 4

52. One of the many disclosed modules is the "Social-Networking Module" 128, which generically, at a high level, describes the ability of the user to share the composite image results and otherwise interact with others (e.g., friends and family), including on social networking platforms, as part of the VTO experience. *Id.* at 6:45-56, 14:46-64. The '517 Patent reflects the broader trend during the early to late 2000s toward the integration of computer vision, augmented reality, and social networking for commercial applications. My review of the '517 Patent's specification shows that the authors relied on widely understood technologies for the

implementation, and yet, the combination of these well-known technological elements in the '517 patent would have been well within the skill of a POSA.

B. Prosecution of the '517 Patent

53. I was provided with a copy of the Prosecution History of the '517 Patent, which is Ex. 1010. The '517 Patent was filed as Application No. 14/936,444 on November 9, 2015. Ex. 1010 at 188. In the file history, I have noted a Non-Final Office Action mailed on November 28, 2017, in which the Examiner rejected all pending claims (claims 21–40) under 35 U.S.C. § 101. *Id.* at 150-51. The Examiner concluded that the claims were directed to the abstract idea of gathering and analyzing information to simulate wearing items, and that this was implemented using conventional computer functions insufficient to confer patent eligibility. *Id.* However, I was informed by counsel that a § 101 rejection is not a rejection based on lack novelty or nonobviousness.

54. In a response dated May 29, 2018, the Applicant contested the § 101 rejection. *Id.* at 138-40. However, in a Final Office Action dated July 7, 2018, the Examiner maintained the § 101 rejection. *Id.* at 115. In response to the Final Office Action, the Applicant submitted amendments to all but one claim and added four new claims. *Id.* at 89-94. After that, the Examiner issued a Notice of Allowability. *Id.* at 49-54.

55. From my review of the prosecution history of the '517 Patent, the Examiner never issued any prior art-based rejections during prosecution.

C. Claim Construction

56. I am informed that, in an IPR proceeding, the challenged claims are construed "in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent."

57. At this time, I do not believe construction of any term is necessary to resolve the invalidity challenges set forth in this Petition.

III. UNPATENTABILITY OF THE CHALLENGED CLAIMS

A. Legal Standards for Invalidity

1. Anticipation

58. I understand that in order for a patent claim to be valid, the claimed invention must be novel. I understand that if each and every element of a claim is disclosed in a single prior art reference, then the claimed invention is anticipated, and the invention is not patentable according to pre-AIA 35 U.S.C. § 102. In order for the invention to be anticipated, all of the elements and limitations of the claim must be shown in a single prior art reference, arranged as in the claim. A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. In order for a

reference to inherently disclose a limitation, that claim limitation must necessarily be present in the reference.

2. Obviousness

59. I understand that obviousness under pre-AIA 35 U.S.C. § 103 is another basis for invalidity. I understand that where a prior art reference does not disclose all of the limitations of a given patent claim, that patent claim is invalid if the differences between the claimed subject matter and the prior art reference are such that the claimed subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art. Obviousness can be based on a single prior art reference or a combination of references that either expressly or inherently disclose all limitations of the claimed invention.

60. I understand that in assessing the obviousness of claimed subject matter, one should evaluate obviousness in light of the prior art from the perspective of a person having ordinary skill in the art at the time the alleged invention was made (and not from the perspective of either a layman or a genius in that art). It is my further understanding that the question of obviousness is to be determined based on:

- The scope and content of the prior art;
- The difference or differences between the subject matter of the claim the prior art (whereby in assessing the possibility of obviousness one should consider the manner in which a patentee and/or a Court has construed the scope of a claim);

- The level of ordinary skill in the art at the time of the alleged invention of the subject matter of the claim; and

- Any relevant objective factors (the "secondary indicia") indicating non-obviousness, including evidence of any of the following: commercial success of the products or methods covered by the patent claims; a long-felt need for the alleged invention; failed attempts by others to make the alleged invention; copying of the alleged invention by others in the field; unexpected results achieved by the alleged invention; praise of the alleged invention by the alleged infringer or others in the field; the taking of licenses under the patent by others and the nature of those licenses; expressions of surprise by experts and those skilled in the art at the subject matter of the claim; and whether the patentee proceeded contrary to accepted wisdom of the prior art.

- Any relevant objective factors (the "secondary indicia") indicating obviousness: independent invention of the claimed invention by others before or at about the same time as the named inventor thought of it; and other evidence tending to show obviousness.

61. I understand that for objective evidence of secondary indicia to be accorded substantial weight, its proponent must establish a nexus between the evidence and the merits of the claimed invention. I also understand that, where the offered secondary indicia actually result from something other than what is both claimed and novel in the patent claim, there is no nexus to the merits of the claimed invention.

62. I am not currently aware of any evidence regarding secondary indicia of non-obviousness related to the claims of the '517 patent. Should Patent Owner attempt to present any alleged evidence of secondary indicia of nonobviousness, however, I reserve the right to opine on any such alleged evidence.

63. I understand that a need or problem known in the field at the time of an alleged invention can provide an obvious reason to combine elements in the manner claimed. A patent's subject matter would have been obvious if at the time of the invention, there was a known problem for which the patent claims encompassed an obvious solution. Further, if a patent claims a structure known in the prior art that only substitutes one element for another that is known in the field, I understand that the combination would have been obvious unless the result is unexpected and fruitful. Therefore, a predictable variation of prior art is obvious.

64. I also understand that a claim can be determined obvious if the claimed combination would have resulted from common sense, would have been obvious to try (such as being one of a relatively small number of possible approaches to the problem that would have been reasonably expected to succeed), or would have been the predictable result of using prior art elements according to their known functions. I also understand that obviousness can take into account the inferences and creative steps that a POSA would employ.

B. Ground 1: Lennon and Gray Render Obvious Claims 1-3, 6-7, 9-10, 12-15, and 18-19

1. Lennon

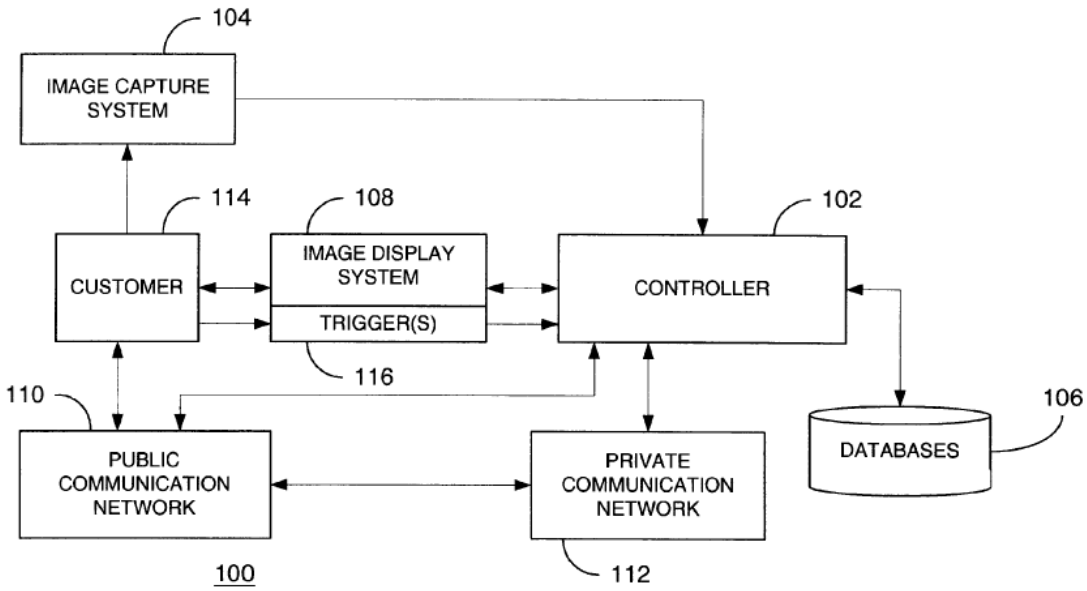
65. I am familiar with Lennon because I filed a declaration in support of the unpatentability of Lennon in an *inter partes* review, IPR2022-00124. For

purposes of this declaration, I have again familiarized myself with Lennon. As explained in more detail below, not only is Lennon in the same field as and similar to the subject matter of the '517 Patent, but it also disclosed all of the core features in the '517 Patent.

66. Lennon discloses an image capture system that uses well-known technology to enhance the user's virtual try-on experience. *See generally* Ex. 1004. For example, users can electronically view themselves wearing virtual clothing in dimly lit dance halls or moderately lit boardrooms (*id.* at 2:20-28), with different music (*id.*), and realistic visualization (*id.* at 8:57-60). Lennon also discloses distributing its compositive images through digital communication tools such as email or through vendor websites. *Id.* at 9:24-36. Lennon teaches not only the creation of composite images but also their real-time display in response to user presence, including facial feature recognition and other biometrics-triggered composite image rendering. *Id.* at 3:46-59, 7:40-8:11.

67. More specifically, Lennon discloses virtual fitting functionality by merging "video or still images of live, ordinary customers with video or still images of stored reference model images wearing the apparel." Ex. 1004, 2:29-31. Lennon's system simulates the appearance of garments on the potential customer's body by generating a "composite image" on a video display, showing the potential customer "in the featured apparel," thus allowing the customer to visualize how

different clothing items would appear when worn. *Id.* at 2:35-37. Below is an example diagram that shows various components that can be used to implement Lennon's system 100.



Id. at Fig. 1.

68. Lennon utilizes the system 100 above to allow retailers or other providers of apparel the capability to "let customers visually assess the items without having to actually try the item on." Ex. 1004, 4:6-10. Lennon teaches a general, three-step process to achieve this virtual try-on functionality, which is illustrated in Lennon's Fig. 2.

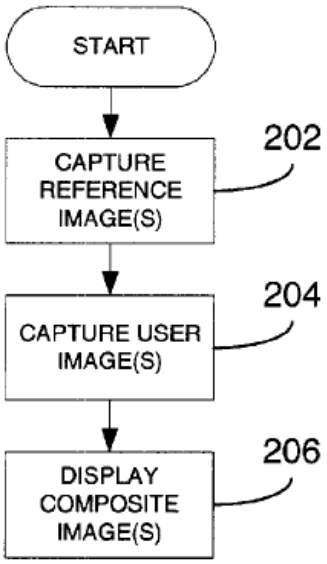
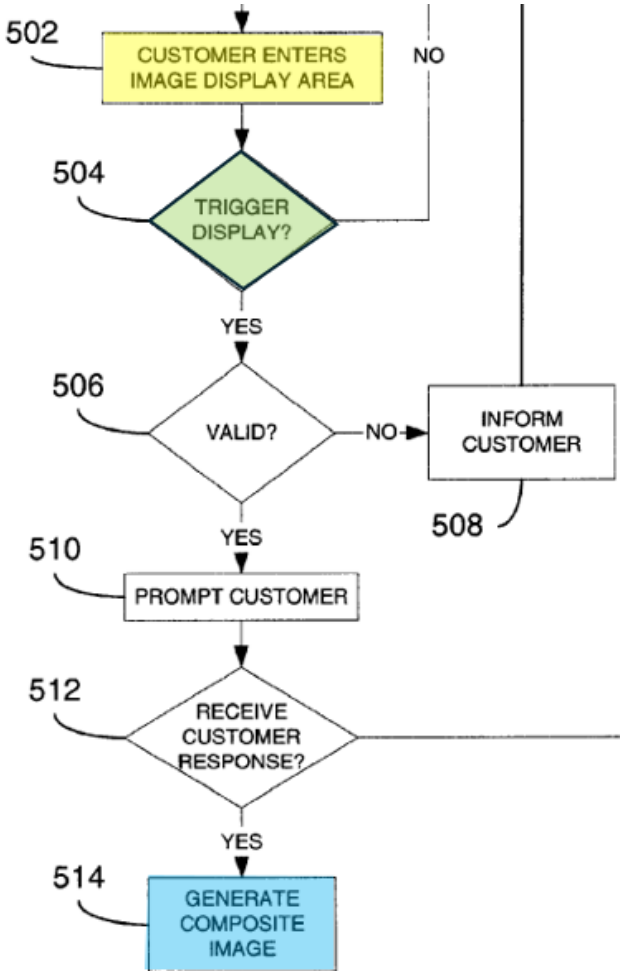


FIG. 2

Id. at 4:10-11, Fig. 2.

69. First, reference images of apparel items are captured, edited and modified such as to "edit out the extremities of the models (e.g., head, hair, hands, legs, etc.)" and then stored. *Id.* at 4:12-19, 5:26-29. Second, images of customers are captured. *Id.* at 4:19-24. "In contrast to the reference images, the customer images, when edited, may include only the customers' face, hair, hands, etc." *Id.* Optionally, motion detection or pattern recognition can be used to automatically capture the customer images. *Id.* at 6:21-25. Finally, "at step 206, a composite image comprising any one of the reference images and any one of the customer images is generated and displayed." *Id.* at 4:24-26. Body part (e.g., facial feature) recognition can also be used to identify the customer in an image display area so as to trigger the

generation and display of a composite image for that customer. *Id.* at 7:45-8:11, Fig. 5 (steps 504, 506, and 514). In other words, when a user enters an image display area, Lennon allows for a dynamic, trigger-based generation of composite images. *Id.*



Id. at Fig. 5 (excerpted and annotated).

70. The resulting composite image includes "elements unique to the customer (i.e., face, hair, hands, legs, etc.) taken from the customer's captured image"

combined with "the image of the apparel" in the ambience background. *Id.* at 8:54-60.

2. Gray

71. I have also reviewed Gray. Gray discloses the use of well-known virtual features "for enhancing the user experience" in online shopping (Ex. 1005, 1:16-18), such as manipulating virtual clothing (*id.* at 20:1-5) and utilizing digital communication tools like email and social sharing interfaces (*id.* at 12:3-7). Particularly, Gray's e-commerce platform allows users to create virtual representations of personal wardrobes, called "virtual closets," and assemble outfits using these items. *See generally* Ex. 1005. Gray states that it aims to improve upon traditional shopping carts by providing interfaces that can promote user interaction and shopping using "features to extend the length of time a user stays in the site" and interface tools that are "clever in their ease of use or in their interaction" to enhance the virtual try-on experience. *Id.* at 1:31-45. Below illustrated is an example of Gray's interface.

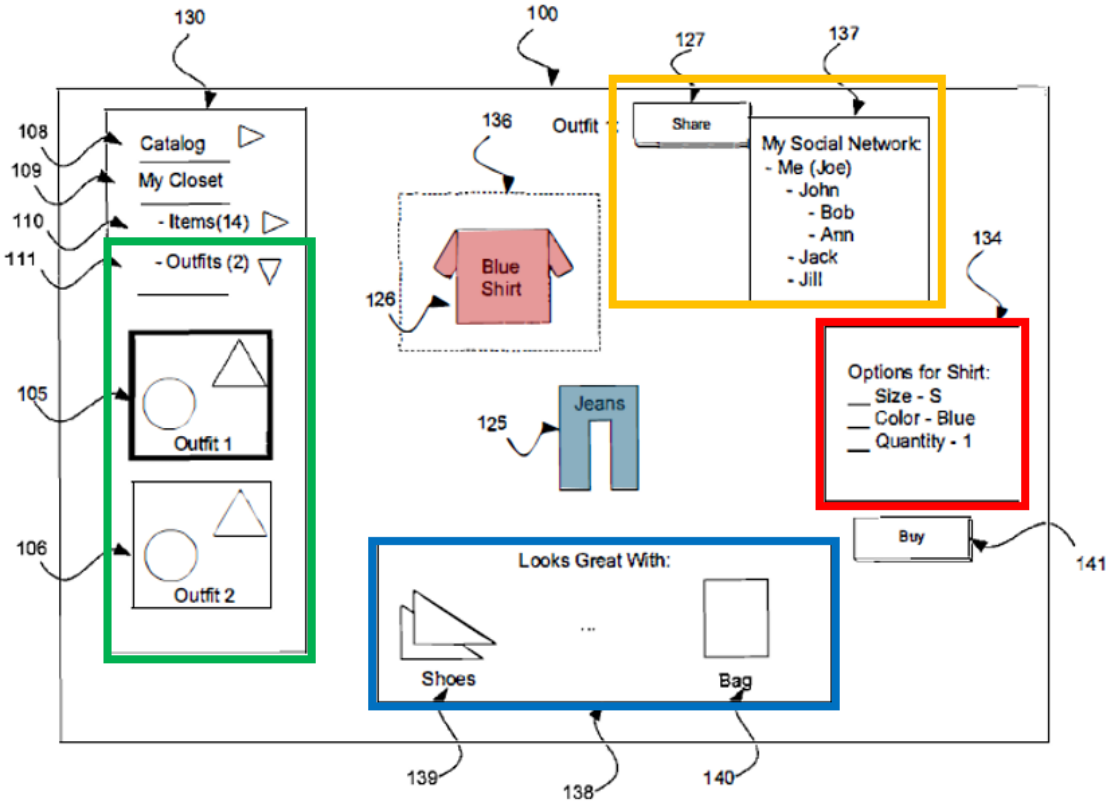


FIG. 1A

Id. at Fig. 1A (annotated).

72. Gray teaches that its users can add items such as apparel to their closets, and that can be done in several ways. *Id.* at 2:9-50. For example, a user can add to the outfit from "a selectable catalog of items" and the item will show in the virtual closet. *Id.* Such item can also be added from "a navigation of an electronic media source" over the network. *Id.* These items are stored under the user's virtual closet account and can be further adjusted by the user on their attributes (e.g., color, size, fabric, pattern, etc.). *Id.* at 10:60-11:16; *see also* Fig. 1 (highlighted in the red box above). After the items are added, the user's items can be combined into "outfits,"

which are saved and can be named by the user for future reference and actions (e.g., purchases or sharing). Ex. 1005, 6:14-48; *see also* Fig. 1 (highlighted in the green box above). This allows users to plan and track their virtual closets, as well as "try out visual combinations and arrangements of the item to coordinate and evaluate." *Id.* at 6:29-47. Moreover, the platform can recommend new clothing items that would complement existing outfits in a wardrobe, enhancing personalization and upselling opportunities for retailers. *Id.* at 11:29-45; *see also* Fig. 1 (highlighted in the blue box above).

73. Gray's system also incorporates social functionality. Ex. 1005, 5:4-51. Users may share their closets or outfits with others, allowing for collaborative fashion planning or feedback from friends. *Id.* at 11:57-12:13; *see also* Fig. 1 (highlighted in the orange box above). Gray's interface includes, e.g., "a share button 127" that allows a user to "provid[e] an item, outfit, or the closet of the user to another user." *Id.* In some cases, the user may choose to share a specific item or outfit they are considering purchasing or simply share the outfit that they have in their virtual closets. *Id.* The recipient can be someone within the user's social network, which is made up of members connected by "one or more degrees of separation (e.g., friends, or friends of friends, etc.)" *Id.*

74. Gray further provides, e.g., "a social network selection drop-down 137" that helps the user choose who to share with. Ex. 1005, 11:57-12:13. Sharing can

take many forms: a message sent through the retail website to a friend who's on the website, an email, an SMS text message, a post on a website, or other similar means. *Id.* When the share button is activated, it can save data or perform another action to make the shared content available either instantly or at a scheduled time. *Id.*

3. Motivation to Combine Lennon and Gray

75. Retailers, even the traditional brick-and-mortar ones, have a well-known incentive to facilitate try-on (e.g., by providing fitting rooms) and peer feedback activities (e.g., by having salespersons around) because they promote sales, and this incentive has remained, if not become stronger, when the commercial environment evolved into the virtual, e-commerce world. A POSA would have been motivated to combine the teachings of Lennon and Gray to address this incentive, and in turn, the very problems that the '517 patent purports to solve.

76. A POSA at the time of the invention would have been motivated to address well-recognized virtual try-on behavior using available technology. The prior art of Lennon teaches capturing a customer's image or video and superimposing digital clothing representations onto that image or video, providing a personalized and realistic virtual try-on experience. *See generally* Ex. 1004. Lennon also describes dynamic, trigger-based image composition and display in the retail setting (e.g., generating a composite image when a customer enters a display area), supporting real-time and interactive visualization. *See, e.g.*, *id.* at 7:45-8:11, Fig. 5. This

closely aligns with the real-time feedback and video-based simulation functions of the '517 Patent.

77. Notably, capturing video frames (*see* Ex. 1016 (Tekalp) at 1-56 (Ch. 1-3)), analyzing the frames using segmentation and 2D and/or 3D motion estimation type algorithms (*see id.* at 72-150 (Ch. 5-8), 153-217 (Ch. 9-11)), and tracking objects within the imagery (*see id.* at 219-41 (Ch. 12)) was well known prior to the earliest priority date of the '517 Patent. *See generally* Ex. 1016 (Tekalp).

78. Furthermore, analyzing the imagery/frames and superimposing segments/objects onto images was also well known prior to the earliest priority date of the '517 Patent. For instance, Tekalp, Shapiro, and Gonzalez described various algorithms that provide the foundation for image/frame analysis including edge detection (*see* Ex. 1022 (Gonzalez) at 567-635 (Ch. 10)), segmentation (*see id.*; Ex. 1016 (Tekalp) at 198-217 (Ch. 11)); Ex. 1021 (Shapiro) at 279-324 (Ch. 10)), and tracking (*see* Ex. 1016 (Tekalp) at 219-41 (Ch. 12)). *See generally* Ex. 1016 (Tekalp); Ex. 1021 (Shapiro); Ex. 1022 (Gonzalez).

79. Not only so, the handling of the geometry of multiple views is also discussed in detail with the underlying mathematics, equations, algorithms, etc. in Hartley. Hartley describes the mathematical details/algorithms involved in projective geometry (*see* Ex. 1018 (Hartley) at 23-150 (Part 0)), single (*see id.* at 151-233 (Part I)), two (*see id.* at 237-360 (Part II)), three (*see id.* at 363-406 (Part III)), and N-view

geometry (*see id.* at 409-558 (Part IV)). It also provides detailed discussions on camera models (*see id.* at 153-76 (Ch. 6)) and calibrations (*see id.* at 458-97 (Ch. 19)). *See generally* Ex. 1018 (Hartley).

80. All of the above would provide the proper foundation/algorithms for the techniques disclosed in Lennon to capture video imagery via calibrated cameras and digitally superimpose digital clothing representations onto the captured video frames using the proper projective geometry algorithms to provide a personalized and realistic virtual try-on experience via the use of the techniques discussed above. Thus, a POSA would have understood Lennon as disclosing a responsive system for personalizing virtual try-on experiences based on user input or presence.

81. In a complementary manner, Gray provides a robust framework for personalized wardrobe management, including item selection from catalogs, combining items into "outfits," saving those combinations, and sharing them with others. *See generally* Ex. 1005. It introduces features such as attribute setting (e.g., size, color, quantity), outfit visual previews, and social networking components for peer feedback—all designed to enhance virtual shopping engagement. *Id.* at 10:1-12:13. These elements directly correspond to the '517 Patent's interface features enabling personalized outfit selection, customization, and sharing.

82. A POSA would have understood that combining Gray's and Lennon's features would meet the growing need for more interactive, engaging, and self-

directed virtual try-on experiences. A POSA would be motivated to reach this combination because of the well-documented human behavior, e.g., in commercial settings. *See, e.g.*, Ex. 1001, 1:30-42 (discussing, as the background, the need for online e-commerce to provide simulation of virtual try-on); Ex. 1004, 1:25-29 (discussing, as the background, the need for the customer to see clothing styles and colors applied to his/her body type to form an idea of how it will look); Ex. 1005, 1:30-40 (discussing, as the background, traditional e-commerce website's lack of qualities found useful in shopping for goods in person).

83. Retailers sought to replicate the in-store experience in e-commerce, which includes social feedback and customized recommendations. Lennon discloses sharing composite images or videos of users wearing virtual garments via the Internet, including by email, World Wide Web or Internet web site, or other electronic communication to third parties. Ex. 1004, 9:27-30. Gray expands on this sharing concept by providing features that enable broader dissemination and interaction through improved sharing techniques, including sharing to social platforms and seeking peer input. Ex. 1005, 11:57-12:13. Hence, Lennon addresses the need to see clothing on one's actual image, while Gray addresses the need for deeper user engagement and social interaction. A POSA would have recognized that combining these well-established features would fulfill long-standing market needs and enhance the virtual try-on ecosystem.

84. Further, the combination presents no technical hurdles. Both Lennon and Gray rely on well-known computer vision, digital video processing, software-based graphical processing and retail-oriented graphic user interface (GUI) design. Integrating Gray's interactive GUI functionalities (e.g., virtual closet, social sharing, etc.) into Lennon's virtual try-on system would merely involve adapting existing GUI components of Gray into Lennon, which a POSA could accomplish without inventive skill. No novel hardware or algorithmic development would be required.

85. In particular, sharing of videos and/or video conferencing technologies were also well known and readily available well before the earliest priority date of the '517 Patent, with well-established compression algorithms and standards (e.g., H.264, which was made available in 2003). Video standards date as far back as H.261, which was made available in the late-1990 timeframe.

86. For instance, H.261—which was developed in the late 1980's/early 1990's and ratified in December 1990—defines the video coding and decoding methods for digital transmission over Integrated Services Digital Network (ISDN) at rates of p × 64 k bits/second, where p is in the range of 1-30. Ex. 1019 (Richardson 2002) at 79-92 (Ch. 5). H.261 was aimed at meeting projected customer demands for videophone, videoconferencing, and other audio-visual services. *Id.* Later standards such as MPEG-1/2 (*see id.* at 58-67 (Ch. 4), H.263, H.26L (*see id.* at 79-92 (Ch. 5)) and H.264 (*see* Ex. 1020 (Richardson 2003) at 85-98 (Ch. 4), 195-222 (Ch. 6))

improved on the previous standards by providing more customized algorithms and techniques to continue to increase the overall compression ratio for video imagery while maintaining acceptable image qualities.

87. A POSA would have incorporated Lennon's virtual try-on system with Gray's interface features, including its social media interface features, to create a more fluid, complete, engaging, and tailored user virtual try-on experience. The resulting system—offering virtual try-on and social feedback—would have been a combination of known elements that yields a predictable improvement. The integration of Gray's interface with Lennon's system would not have required anything beyond well-known routine software functionality to perform the above functions.

4. Independent Claim 1 and Associated Dependent Claims

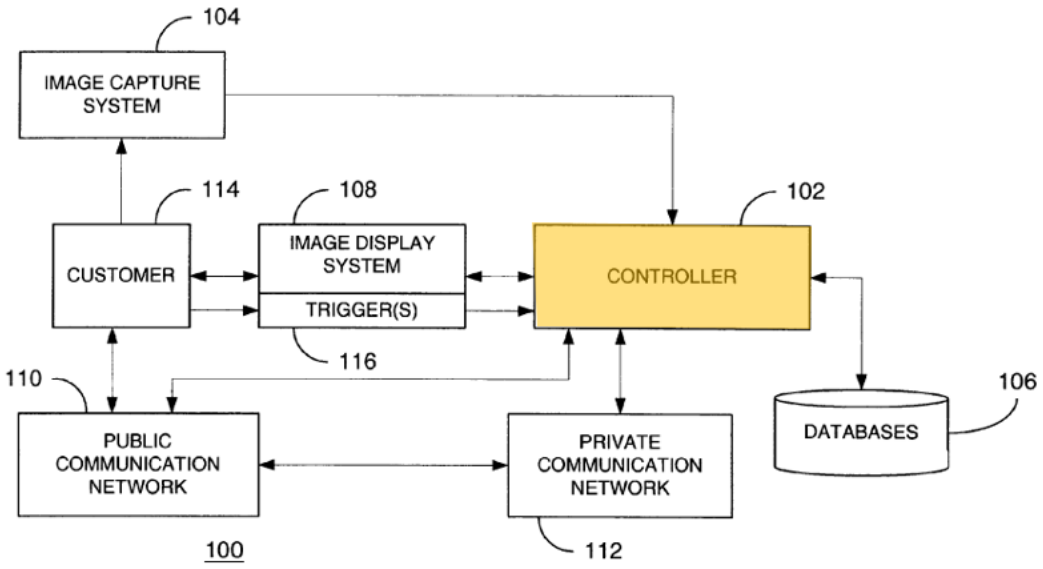
a. Claim 1

(i) 1[pre]: "A system configured for allowing a user to simulate wearing real-wearable items, the system comprising:"

88. Lennon discloses a system 100 that "allows apparel retailers and other purveyors of such items an opportunity to virtually 'dress' the potential customer in featured merchandise as a virtual 'fitting.'" Ex. 1004, 2:12-15. Lennon displays "an image of the customer in a new apparel style" through "manipulation of digitized images." *Id.* at 2:18-20. Lennon's system is therefore configured to allow a user to simulate wearing real-wearable items.

(ii) 1[a]: "one or more hardware processors configured by machine-readable instructions to:"

89. Lennon discloses that its system 100 can be implemented with "a controller 102" that may "comprise one or more computers or servers capable of executing software instructions stored in memory (e.g., volatile or non-volatile digital storage devices) via a suitable processor (e.g., microprocessor, microcontroller, digital signal processor or the like or combinations thereof)." Ex. 1004, 3:13-18. Lennon also discloses that the steps and methods in his patent can "be implemented as stored software instructions executed by a suitable processor." *Id.* at 4:34-39.

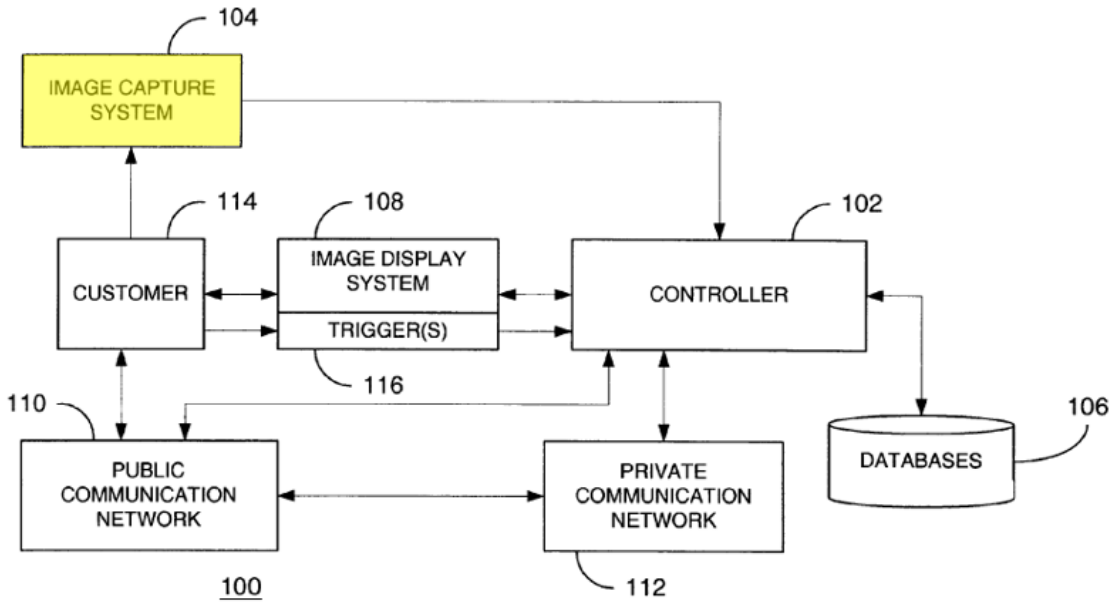


Id. at Fig. 1 (annotated).

(iii) 1[b]: "obtain, from a client computing platform,

a live video feed;"

90. Lennon includes an image capture system 104 having "one or more image capture devices, such as at least one full motion video camera or at least one still image camera, or a combination thereof." Ex. 1004, 3:18-22.



Id. at Fig. 1 (annotated).

91. Lennon teaches obtaining a live video feed from a client computing platform. In Lennon's step 204, one or more "customer images are captured." *Id.* at 4:19-20. Lennon states that "[t]he computer system is capable of merging video or still images of live, ordinary customers with video or still images of stored reference model images wearing the apparel," *id.* at 2:29-31, and that "both the reference images and the customer images may comprise full motion video or still images." *Id.* at 4:20-22.

92. The above is further consistent with what a POSA's understanding of the '517 Patent. The '517 Patent states that it uses "[a]n imaging device … configured to capture still images and/or a live video feed of a user of a given client computing platform" but only generically provides a list of imaging devices, which "may include an analog camera, a digital camera, a 2D camera, a stereo camera, a 3D camera, and/or other imaging devices." Ex. 1001, 2:33-36.

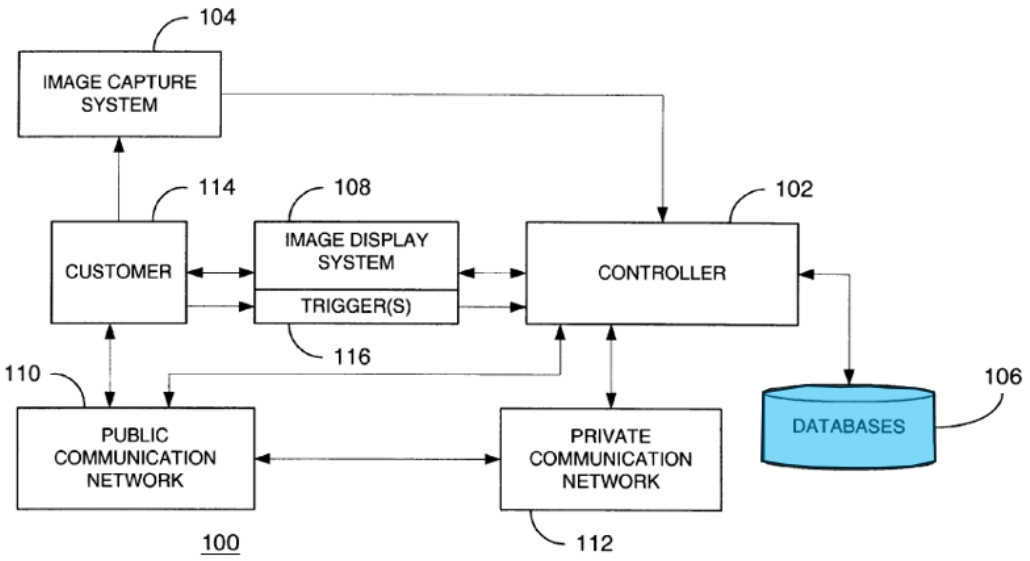
(iv) 1[c]: "recognize a position and/or orientation of one or more body parts of a user within the live video feed, the one or more body parts including a first body part;"

93. Lennon discloses recognition of a position and/or orientation of a body part of a user within the live video feed. During the reference image building process for a given apparel (e.g., steps in Fig. 3), "[w]hen a sufficient number of body sizes and types are recorded" for the given apparel item, Lennon teaches that "the images are edited … to remove the parts of the image other than the apparel style, i.e., the models' face, hair, hands, legs, etc." Ex. 1004, 5:35-38. Lennon further explains that the functionality of recognition of a position and/or orientation of body parts of a user in images or video is already well-known at the time. "Such editing [of face, hair, hands, legs out of images] can be accomplished using existing software such as Avid SoftImage or Adobe After Effects." *Id.* at 5:35:40. While Lennon only specifically mentions Avid SoftImage and Adobe After Effects, other software was

well-known in the art at the time of invention. Algorithms—such as camera calibration, segmentation, motion estimation, stereo imaging, object detection, and multiple view geometry—are just a few examples that would perform the above functions and were well-known to a POSA. *See, e.g.*, Ex. 1016 (Tekalp) at 72-150 (segmentation and motion estimation); Ex. 1021 (Shapiro) at 279-324 (Ch. 10) (segmentation); Ex. 1022 (Gonzalez) at 567-635 (Ch. 10) (segmentation); Ex. 1018 (Hartley) at 458-97 (calibration), 151-558 (multiple view geometry).

94. This is consistent with the '517 Patent, where it merely includes a functional description where "[a] motion-capture module 116 may be configured to recognize position and/or orientation of one more body parts of the user" to determine a position, size, and/or orientation for a given virtual-wearable item. Ex. 1001, 13:4-12.

95. After the editing process, "[s]torage programs and visual pattern recognition programs are used to create the database of edited apparel styles." Ex. 1004, 5:52-59. These edited reference images can be stored in the database 106 shown in FIG. 1 below. *Id.*



Id. at Fig. 1(annotated). Lennon also explains that the edited apparel styles may be stored separately or combined with "other meta information, i.e., information that describes each reference image in some manner, such as identification of each apparel style, body type, etc." *Id.*

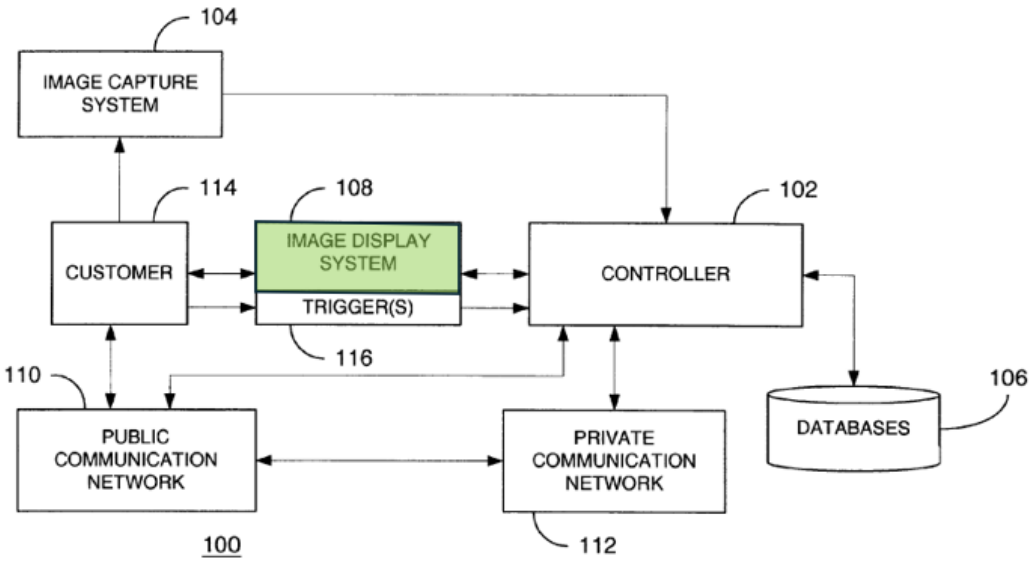
96. After having established the reference image database, Lennon teaches to use "a controlled environment as closely identical as practicable to that used to capture the reference images" for obtaining customer images. *Id.* at 6:8-15. Techniques similar to those used for capturing and establishing the reference image database are used for customer image capturing. "Because of the similarity of the controlled environments used, the same camera angles and heights are used when acquiring the customer's body image," thereby resulting in the similarity of the resulting customer images to the stored reference images, *id.* at 6:35-40, which in turn

allows "a more accurate determination of the customer's biometrics, i.e., body size and shape." *Id.* Contrary to the reference images, "the customer images, when edited, may include only the customers' face, hair, hands, etc." *Id.* at 4:22-25.

97. Considering the above, and in view of Lennon's emphasis that "both the reference images and the customer images may comprise full motion video or still images," *id.*, a POSA would have understood that Lennon disclosed recognition of a position and/or orientation of a body part of a user within the live video feed.

(v) 1[d]: "provide a virtual-outfitting interface for presentation to the user via the client computing platform, the virtual-outfitting interface including two or more separate portions simultaneously presented in the virtual-outfitting interface, the two or more separate portions including a main display portion and an icon that is overlaid upon the main display portion,"

98. Lennon discloses that its system "retrieves the stored reference images from a database and applies the stored reference image to the digitized image of the customer's body." Ex. 1004, 2:31-37. "The potential customer is shown in the featured apparel (the stored reference image) by displaying the composite image on a video display." *Id.*



Id. at Fig. 1 (annotated). Lennon thus provides the claimed virtual-outfitting interface for presentation to the user via the client computing platform.

99. Lennon further teaches that the customer "may be allowed to directly enter requests (for example, in response to the same questionnaire or without prompting) for other apparel styles or colors from the images stored in the database." Ex. 1004, 9:8-11. Allowing the customer to select apparel in a virtual try-on setting is a basic, well-known function. The Background section of Lennon also states that "[h]aving created a virtual model, the customer can select various clothing styles for display using the virtual model." Ex. 1004, 1:37-39.

100. By having (1) a main display portion to show the composite images while having (2) another portion displaying additional information such as other apparels and options available, Lennon discloses an interface having "two or more

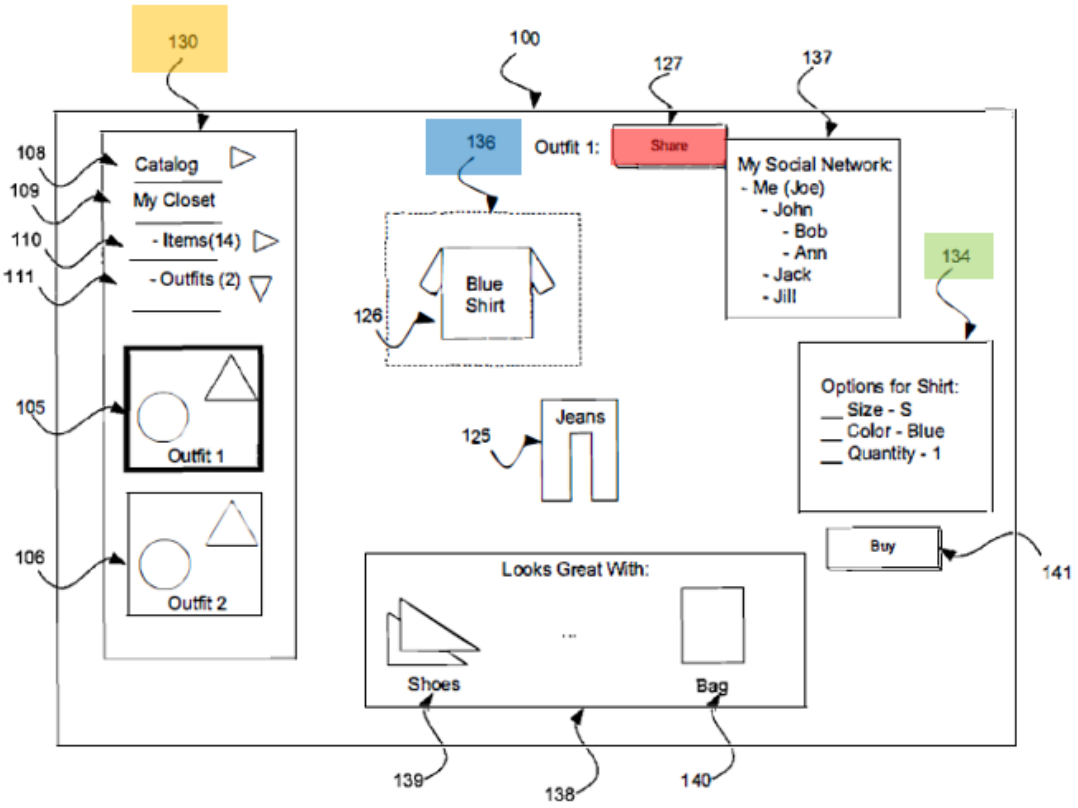
separate portions" that are to be presented simultaneously to the user so that the user can view the composite results in the main display portion while being able to try on different apparels or select different options such as size or color. Lennon's teaching would have made it obvious to a POSA at the time of the invention to implement a "virtual-outfitting interface including two or more separate portions simultaneously presented in the virtual-outfitting interface" as required in this claim element.

101. Lennon also includes multiple display screens, stating that its "image display system 108 allows composite images … to be displayed to a customer in close proximity to ***one of the display screens***." Ex. 1004, 3:46-50 (emphasis added). Lennon further introduces "trigger devices 116" that are placed in close proximity to its display screens, such as "keypads, card readers, ***touch screens***, cameras or the like" for triggering composite image generation as well as receiving customer inputs. *Id.* at 3:53-59 (emphasis added). Thus, having two portions in a screen where one portion displays the composite image outcome while the other portion displays other information (e.g., selectable apparel options) is not in any way inventive. This would merely require basic well-known routine software methods to integrate/visualize multiple windows in a given screen where, for example, one window displays the composite image while the other window (either side by side or placed somewhere on the screen) would display other types of information. Having both

simultaneously displayed on the screen would make it more convenient for the user to view the imagery and can be easily accomplished using routine software techniques.

102. Having "an icon that is overlaid upon the main display portion" such as claimed would have been obvious at least because a POSA would have known to implement a user interface to allow the customer to enter options such as selecting different apparel for the composite image/video output, and an icon would have been a well-known, obvious choice for such user interface. This is consistent with the specification's description of icons. Ex. 1001, 5:62-66; *see also id.* at 13:63-14:3.

103. Gray also discloses this limitation. Gray teaches a user interface for a virtual closet, where the interface includes two or more separate portions having a main display portion and an icon that is overlaid upon the main display portion. Below is an example interface from Gray.



Ex. 1005, Fig. 1A (annotated).

104. As can be seen from the above, Gray at least discloses that a configure control 136 that "enables the user to resize, skew, flip, or otherwise model the visual representation of the item." *Id.* at 10:49-50. Gray also shows an options panel 134 in its interface where it includes "at least one attribute about an item within the canvas and enables editing the attribute," e.g., color, size, fabric, pattern, etc. *Id.* at 10:60-65. Another user interface in Gray includes a management panel 130 that includes "a plurality of activation components 108-111 that can have various functions, such as selecting and displaying the outfit within the canvas of interface or providing a rating to a certain outfit." *Id.* at 10:13-28. "Interface 100 also has a

plurality of controls for managing the items, outfit, or virtual closet, including share button 127, social network selection drop down 137, and buy button 141." *Id.* at 10:9-12. All these examples of Gray's interface render the claimed feature obvious.

105. This limitation would therefore have been obvious over Lennon and Gray.

(vi) 1[e][1]: "wherein the main display portion includes a composite video feed that incorporates the live video feed of the user and a first virtual-wearable item, and"

106. Lennon teaches this limitation. Lennon explains that it is "capable of merging video or still images of ***live, ordinary customers*** with video or still images of stored reference model images wearing the apparel." Ex. 1004, 2:29-31 (emphasis added). In describing the "image capture system 104", Lennon also specifies that it "comprises one or more image capture devices, such as ***at least one full motion video camera*** or at least one still image camera[.]" *Id.* at 3:18-22 (emphasis added). Lennon's system then "retrieves the stored reference images from a database" and "applies the stored reference image to the digitized image of the customer's body" to generate the composite video feed. *Id.* at 2:31-34. As a result of Lennon's system, "[i]n effect, the composite image combines each customer's actual appearance (as dictated by his or her facial features, hair color, etc.) with an image of the desired

apparel item as it would appear when worn by a person having a similar body shape to the customer." *Id.* at 4:24-31.

107. Lennon's composite video feed incorporates "the live video feed of the user" and "a first virtual-wearable item" as claimed. In generating the composite image/video, Lennon specifically uses a multitude of cameras, located at specific locations, heights, and at specific angles, to take in a live video of the user. *See, e.g.*, Ex. 1004, 4:58-62 ("[O]ne or more fixed, vertical posts are erected at the end of or along the runway with a camera array or lens array mounted at [five specific example heights]"), 4:64-66 ("Similarly equipped posts at forty-five degree angles relative to the end post(s) are also preferably provided in order to capture a full 180° view").

108. After the video of the user is taken in a live manner, the video is processed and edited (e.g., to remove the clothing that is worn by the user, leaving "only the customers' face, hair, hands, etc." (*see, e.g.*, *id.* at 4:22-24)), and then the video of the user can be incorporated into the composite video, which includes "customer's captured image (as identified at step 506) combined with a reference image of the selected apparel item is generated at step 514." *Id.* at 8:48-60.

109. Lennon further states that the "[t]echniques for merging elements from separate video or still image sources are ***well known*** in the art as embodied, for example, in Adobe's After Affects Producer bundle program." Ex. 1004, 8:51-54 (emphasis added). This is also consistent with the teachings in the '517 Patent. In the

entirety of the '517 Patent, I found that Patent Owner provides almost no implementation detail, relying on a POSA's knowledge to fill the gaps. For example:

> In some implementations, the main display portion may include a composite video feed that incorporates a video feed of the user and one or more virtual-wearable items selected by the user via the item-search/selection module. The video feed of the user may be obtained by an imaging device associated with one of the client computing platforms. Presentation of the composite video feed may be in real time or near-real time.

Ex. 1001, 4:40-47; *see also* 1:59-63 (repeating the same description in Summary), 8:9-15 (repeating the same description almost verbatim).

110. A POSA would thus have understood that Lennon disclosed this limitation.

(vii) 1[e][2]: "wherein a position, size, and/or orientation of the first virtual-wearable item is determined such that the first virtual-wearable item moves within the main display portion according to the position and/or orientation of the user within the live video feed so that the user appears to be wearing the first virtual-wearable item in real time in the main display portion; and"

111. Lennon teaches that "[t]he composite image comprises elements unique to the customer (i.e., face, hair, hands, legs, etc.) taken from the customer's captured image combined with the image of the apparel in the ambience background." Ex.

1004, 8:54-60. "Thus, the composite image, when displayed, provides a more realistic depiction of what the customer would look like in the selected apparel in the appropriate background." *Id.* Lennon emphasizes the use of composite visuals, where the user's image is combined with reference images of apparel. This approach ensures that the virtual-wearable item is accurately rendered in the live video feed, making the user appear to be wearing the item.

112. Lennon achieves this by using a combination of: (1) controlled environments, and (2) established computer vision and image/video processing techniques that are known to a POSA. *See, e.g.,* Ex. 1016 (Tekalp) at 72-150; Ex. 1017 (Ballard) at 115-220 (Part II); Ex. 1018 (Hartley) at 458-97.

113. Regarding the first point, Lennon explains that "[b]ecause of the similarity of the controlled environments used, the same camera angles and heights are used when acquiring the customer's body image." Ex. 1004, 6:35-40. "The similarity of the resulting customer images to the stored reference images allows a more accurate determination of the customer's biometrics, i.e., body size and shape." *Id.* Lennon's use of a controlled environment reduces the processing and editing workload necessary in merging the captured videos into composite videos.

114. Regarding the second point, Lennon describes the editing of the images such that "[r]eference images comprise various apparel items as worn by models and edited to remove at least some portions of the image other than the apparel item

being worn, i.e., the models' face, hair, hands, legs, etc." and "the customer images, when edited, may include only the customers' face, hair, hands, etc." Ex. 1004, 4:15-19, 4:22-24. Lennon explains that "[s]uch editing can be accomplished using existing software such as Avid SoftImage or Adobe After Effects" and that "both the reference images and the customer images may comprise full motion video or still images." *Id.* at 5:35-40, 4:19-22. Lennon also discloses that its computer "is capable of distinguishing differences between body sizes and is capable of filling in variations." *Id.* at 2:48-51. Lennon utilizes "[a] value system or weighting system" that "assigns a value to distinguish the various body forms of customers." *Id.* This further "helps ensure a close match of the stored reference images to the captured image, creating a more realistic viewing of how the apparel style or color will look on the potential customer." *Id.* at 2:43-48.

115. Consequently, a POSA, after reading Lennon, would understand that Lennon leverages established image processing methods to edit the captured model reference images as well as the live video of the user, and the rendered apparels necessarily follow the user's position and orientation to make them look realistic. By integrating these techniques, the virtual-wearable item moves in synchronization with the user's movements, creating "a more realistic depiction of what the customer would look like in the selected apparel." Ex. 1004, 8:54-60.

116. In comparison to the above, the '517 Patent's specification merely uses nonce words, e.g., "motion-capture module," to describe these claimed functions, and the disclosures are completely result oriented. For example, the '517 Patent describes that:

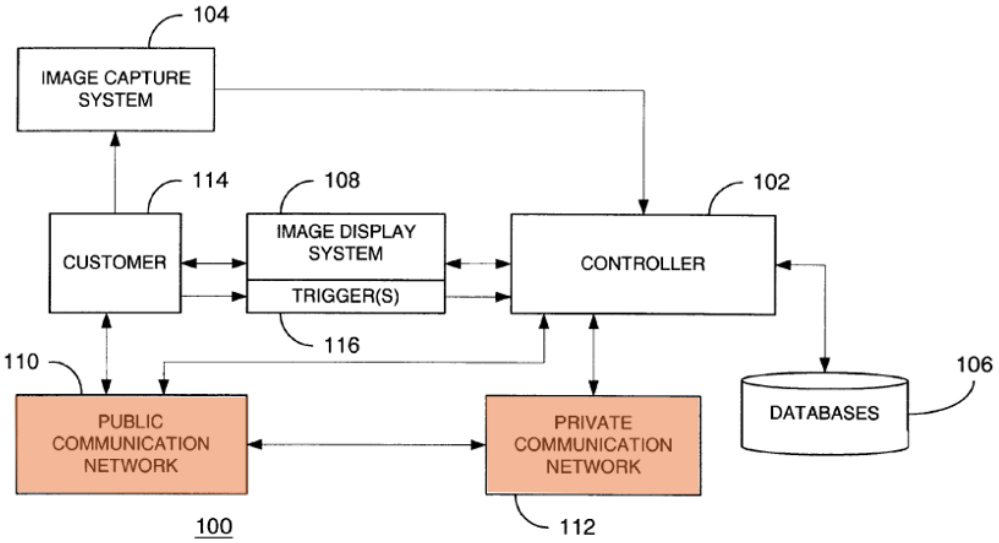
> [T]he motion-capture module may be configured to recognize position and/or orientation of one more body parts of the user in the main display portion in order to determine a position, size, and/or orientation for a given virtual-wearable item in the main display portion. Once the one or more body parts are recognized, the composite-imaging module may position a virtual-wearable item at a predetermined offset and/or orientation relative to the recognized one or more body parts.

Ex. 1001, 5:3-11. This is not different from the claims in any substantial way. There is no algorithm or explanation of any kind that enables a POSA on how exactly these claimed functions are implemented, and therefore, the '517 Patent necessarily relies on the readily available knowledge of a POSA to implement these functions. As such, even after reviewing the '517 Patent, a POSA would not regard this limitation in question as covering anything different from what is discussed in Lennon. A POSA would have understood that Lennon discloses this limitation.

(viii) 1[f]: "provide a social-networking tool graphically presented in the virtual-outfitting interface, the social-networking tool allowing the user to interface with one or more social-networking services with which the user is

associated."

117. Lennon teaches sharing of the resulting composite images via the Internet with third parties. For example, Lennons states that "[i]f the customer has an established e-mail address, the composite image can be sent via the public or private communication networks 110, 112 to the e-mail address provided." Ex. 1004, 9:27-30.

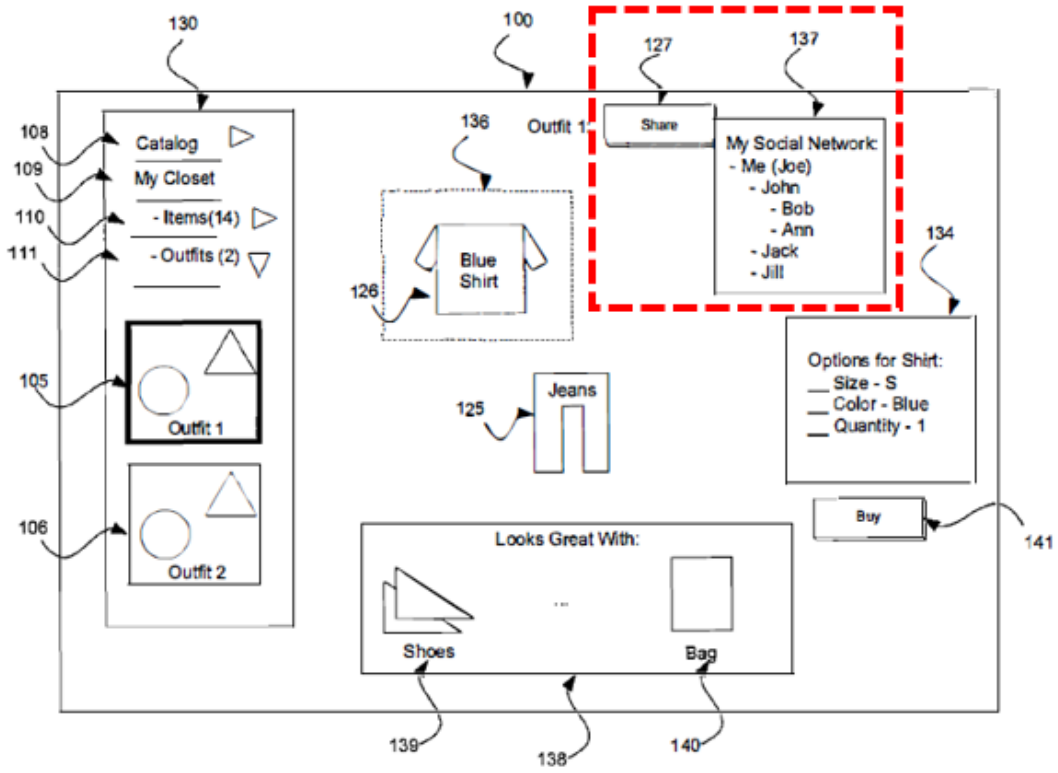


Id. at Fig. 1 (annotated).

118. Lennon further describes, "if the merchant has an interactive and secure World Wide Web or Internet web site, the customer can be permitted to access their digitized body image and generate composite images with the merchants apparel images." *Id.* at 9:30-34. Lennon also teaches the possibility of using a cell phone or a hand-held computer device to share the composite images. "[T]he customer's captured image can be stored in a personal communication device, such as a cell

phone, personal digital assistant (PDA) or palmtop computer." *Id.* at 10:13-18. "In this manner, the customer can selectively provide his or her image with any of a variety of retailers[.]" *Id*. It would have therefore been obvious to a POSA to implement a user interface that enables the user to share the composite videos generated by Lennon to another person or on a social network on the Internet.

119. In addition, Gray explicitly teaches a user interface 100 that "also has a plurality of controls for managing the items, outfit, or virtual closet, including ***share button 127***, ***social network selection drop down 137***, and buy button 141." Ex. 1005, 10:9-11 (emphasis added). Gray explains that its share button 127 "enables providing an item, outfit, or closet of the user to another user." *Id.* at 11:57-66. Gray also provides examples of things that can be shared by a user to a friend, e.g., "a particular item or outfit to be purchased may be selected to be shared" and "the outfit being currently managed [can be] shared." *Id.* Gray further states that the people to whom the user can share the outfit with can include "the other user may be within the social network of the user" and that "a social network may comprise data representing an interrelation between members such that the members may be connected by one or more degrees of separation (e.g., friends, friends of friends, etc.)." *Id.*



Id. at Fig. 1A (annotated). Gray thus provides a social-networking tool graphically presented in the virtual-outfitting interface.

120. As I discussed above, it would have been obvious to a POSA to integrate Lennon's composite image virtual try-on system with Gray's sharing and social media user interface abilities because it would have been both logical and desirable to extend Lennon's sharing abilities to the additional social sharing options disclosed in Gray. Furthermore, the result of the combination would have been predictable. This limitation is thus rendered obvious by Lennon in view of Gray.

b. Claim 2: "The system of claim 1, wherein interfacing with a given social-networking service includes sharing a snapshot with one or more contacts of the user within

the given social-networking service."

121. Lennon already expressly discloses sharing the composite image of the user's realistic faces that are merged with an appropriate reference image via the Internet such as an e-mail. Ex. 1004, 9:26-34. Gray also explicitly discloses "sharing the outfit by sending a message to a mobile device, or posting to an external third-party webpage," "sharing at least a portion of the outfit to another user associated with the user," as well as "shar[ing] the outfit with one of his friends, friend's friend, etc." Ex. 1005, 5:14-19, 5:25-39, 11:57-66.

122. As such, a POSA would have been motivated to combine these teachings to substitute or augment Lennon's email and website-based sharing with the social-sharing mechanisms taught in Gray, including sharing with contacts through social-networking platforms. This is because such modification represents a predictable use of prior art elements according to their established functions, and it yields no unexpected results. Implementing social-network-based sharing using known techniques to distribute visual content such as snapshots to contacts would have been a routine design choice aimed at improving user engagement. Accordingly, this limitation is rendered obvious in view of Lennon and Gray.

c. Claim 3: "The system of claim 1, wherein interfacing with a given social-networking service includes providing a comment on a profile page of the user within the given social-networking service, wherein the comment on the profile page includes one or both of a

link or information associated with a real-wearable item corresponding to the first virtual-wearable item."

123. Lennon expressly discloses sharing the composite image of the user's realistic faces that are merged with an appropriate reference image via the Internet such as an e-mail or a website. Ex. 1004, 9:26-34. Complementarily, Gray discloses "sharing the outfit by … ***posting to an external third-party webpage***," and "sending a message to inform one or more people of a particular outfit … and providing within the message ***a link that pulls the recipient*** to the website to be able ***to view the outfit***." Ex. 1005, 5:14-19, 7:6-16 (emphasis added). Gray explains that "the link pulls the recipient to an interactive outfit canvas in the website displaying the outfit and from which the recipient also has access to the personal closet [of the user.]" *Id.* "[T]he recipient is also provided options to ***submit feedback*** to the outfit which is stored on the website and available to a creator of the outfit." *Id.* (emphasis added).

124. In view of Lennon and Gray's disclosure above, a POSA would have found it obvious to include the function of posting a comment on a user's profile page within a social-networking service, where the comment includes either a link to a real-wearable item, or information associated item, or both. This is because, at the time of the alleged invention, it was already common practice in social networking systems for users to post links, product references, and commentary on their own or other friends' profile pages. As such, the combination would have merely used

techniques known to a POSA in a predictable way to achieve the expected functionality of social engagement such as posting and commenting on virtual outfits having real-world fashion items.

d. Claim 6: "The system of claim 1, wherein:

the first virtual-wearable item includes one or both of a virtual garment or a virtual accessory; or

the first virtual-wearable item visually represents a corresponding real-wearable item."

125. Lennon discloses this limitation. Lennon's system "allows apparel retailers and other purveyors of such items an opportunity to virtually 'dress' the potential customer in featured merchandise as a virtual 'fitting.'" Ex. 1004, 2:12-15. "Reference images comprise various apparel items as worn by models[.]" *Id.* at 4:15-16. During the image/video editing process, Lennon also teaches "shoes or fashion accessories to enhance the overall effect to accommodate different styles of the apparel item." *Id.* at 5:40-44.

Claim 7: "The system of claim 1, wherein the two or more separate portions of the virtual-outfitting interface further include a conferencing portion configured to display video of one or more other users, the conferencing portion being configured to facilitate video communications between the user and at least one of the one or more other users via the one or more social-networking services with which the user is

associated."

126. In the context of promoting shopping with feedback from friends who are within the user's social network, Gray discloses user interface functions that involve playback of multimedia content and interactions within the user's social network circle. As previously discussed, Gray's GUI includes multiple simultaneously presented display portions, including a main display area and overlaid buttons and icons for editing, sharing, or purchasing, enabling users to interact with virtual outfits directly within the same screen. *Id.* at 10:49-50, 10:60-65, 10:13-28, 10:9-12.

127. Gray's GUI also supports communication with, and receiving content from, third-party websites. For example, Gray discloses a user interface for "a third-party media such as a third-party website 174, which includes interface 104, blog content 172, link item 171." Ex. 1005, 13:32-37. "The blog content 172 may be any content, including a social networking data (e.g., showing posts to friends, ***sharing of video***, etc), text content, ***multimedia content*** (e.g., HTML, video (Flash), links), or the like." *Id.* Gray explicitly teaches that the user interface for the third-party content can be "configured to receive information from a server other than the server providing the other content of third-party website, to enable, for example, ***cross-domain communications***." *Id.* at 13:45-63. Gray's third-party user interface can also "use substantially the same source code and/or application programming

interface (API)" as the [Gray's virtual closet interface] to provide, among other things, management of the outfit." *Id.*

128. Because Gray's system is designed to be compatible with various other third-party application programs, integrating a video conferencing feature would have been within the scope of Gray's system capabilities. As such, a POSA would understand that this integration allows users to engage in video communications within the same interface used for virtual outfitting. The social aspect of Gray's system also aligns with the concept of facilitating video communication through social-networking services, as users could engage in real-time discussions about their virtual outfits. Given the prevalence of video conferencing and social networking technologies at the time of the '517 Patent, integrating these features into Gray's virtual outfitting system would be a predictable improvement to a POSA.

129. Therefore, a POSA would find it obvious to incorporate a conferencing portion configured to display video of other users and facilitate communications via social-networking services into the combination of Lennon and Gray. As discussed above, video conferencing algorithms and technologies were readily available well before the earliest priority date of the '517 Patent, with well-established compression algorithms and standards such as H.264, which was made available in 2003, even date as far back as H.261 that was made available in late-1990 timeframe. This would not require more than routine well-known software technologies to add a

video conferencing window into Gray's interface to allow users to interact with other users in real time and discuss the choice of clothing, etc. as needed. A user that is utilizing the Lennon/Gray system would find it convenient to initiate a video conference call with friends/family members to help in selecting/deciding on clothing options.

e. Claim 9: "The system of claim 1, wherein a size and/or position attributed to the two or more separate portions of the virtual-outfitting interface is dynamic."

130. Gray discloses that its virtual closet interface is adjustable and dynamic. Gray describes that its user can "move an item incrementally forward and back in layers in comparison to other items on the canvas." Ex. 1005, 22:52-64. As shown in Gray's Fig. 7A below, "item 126 can be moved forward in the layers above item 125, or vice versa." *Id.*

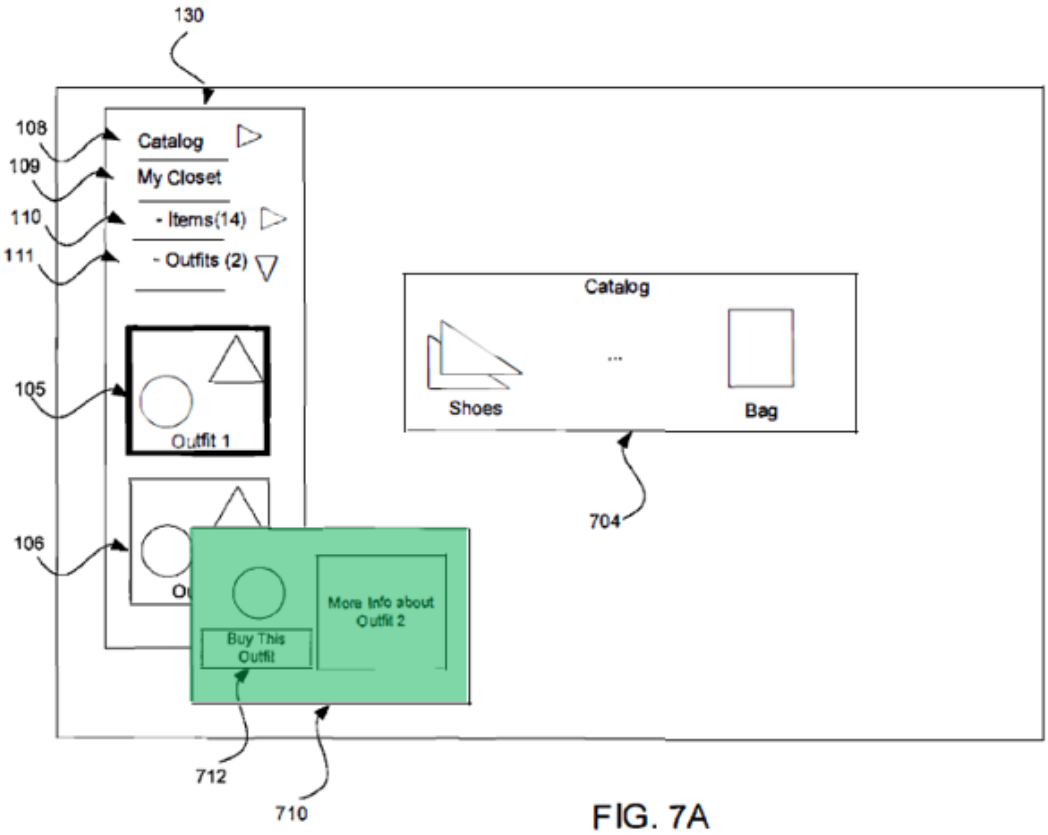


FIG. 7A

Id. at Fig. 7A (annotated)

131. Gray describes that, in the above-illustrated user interface, "[a]ny of number of items can be moved in any level of the layer of items" and "[t]he user can use a drop down menu, key menu, or other input to change the layering of the items." *Id.* Additionally, Gray also teaches a "configure control 136" that enables the user "to resize, skew, flip, or otherwise model the visual representation of the item." *Id.* at 10:49-59.

132. Furthermore, this limitation is rendered obvious by Gray where it describes an "outfit canvas mode" in which shoppers can "try out visual combinations

and arrangements of items." Ex. 1005, 19:50-20:7. In particular, when in the outfit canvas mode, Gray teaches that "two or more items can be resized or moved on the canvas to allow the shopper to assemble various arrangements or combinations to aid in the evaluation of the items." *Id.* Further, Gray describes that, when the website operates purely in the outfit canvas mode, interactions with the items (e.g., resizing and repositioning) may be "limited to the items currently in the canvas," but certain embodiments of Gray's system can "also include the ability to add items from the closet or catalog using ***a simultaneously displayed interface to those modes***" and a user may also "be able to remove items to such resources." *Id.* (emphasis added). For example, a user can "invoke the canvas from within the closet such as from an individual item in the closet." *Id.* at 22:40-51. When "the closet 130 is displayed while the user surfs the site (e.g., the catalog 704)," an item or an outfit "can be activated to invoke the canvas 708, thus replacing (or even overlaying) the catalog 704 with the canvas 708." *Id.*

133. These features described above show that Gray's system includes an interface that has multiple, concurrently displayed, and interactive portions. As such, in view of these features, a POSA would have known that simultaneously displaying different website modes (e.g., outfit canvas, closet, and catalog), together with the ability to add, remove items across different websites modes, as well as the ability

to resize and reposition items, would have required dynamic attribution of size and/or position attributed to different portions of the user interface.

134. The dynamic attribution feature also fits well with Lennon at least because Lennon, as discussed above regarding element 1[d], already teaches an interface including a main portion showing the composite image while having another portion displaying additional information such as other apparels and options available. Therefore, a POSA would find it obvious to implement this feature in the combination of Lennon and Gray.

f. Claim 10: "The system of claim 1, wherein the one or more hardware processors are further configured by the machine-readable instructions to:

determine the position, size, and/or orientation of the first virtual-wearable item based on the position and/or orientation of the one or more body parts of the user recognized within the live video feed, wherein the first virtual-wearable item is positioned at a predetermined offset and/or orientation relative to the one or more body parts of the user.

135. As discussed above regarding element 1[e][2], a POSA would have recognized that Lennon discloses determining the position, size, and/or orientation of the first virtual-wearable item based on the position and/or orientation of the one or more body parts of the user recognized within the live video feed.

136. Lennon discloses that reference images of apparel are edited to isolate only the garment (e.g., by removing the model's face, limbs, etc.), and that these

edited garment images are superimposed onto edited customer images that retain only selected body features such as the face, hair, hands, and legs. Ex. 1004, 4:15-24, 4:22-24. To a POSA, Lennon's editing process necessarily implies that the apparel must be positioned with a predetermined offset and orientation relative to those retained body parts to produce a realistic composite image. Without such precise spatial alignment, e.g., if the garments were simply overlaid without regard to consistent positioning, then the resulting composite image would resemble a crude collage or cut-and-paste, which would lack visual coherence and realism. *Id.* Moreover, Lennon discusses reinforcing realism by using standardized capture conditions (e.g., fixed camera angle and height) and image processing tools such as Avid SoftImage or Adobe After Effects. *Id.* at 5:35-40, 6:35-40. The virtual-wearable item must be placed at a consistent and deliberate location relative to the user's visible body parts to create a seamless and realistic viewing experience. *Id.* Accordingly, Lennon teaches or at least renders obvious that the virtual-wearable item is positioned at a predetermined offset and/or orientation relative to one or more body parts of the user.

g. Claim 12: "The system of claim 1, wherein one or more characteristics of the first virtual-wearable item are utilized to render the first virtual-wearable item in the main display portion to enhance a realness of the first virtual-wearable item as it appears within the main

display portion."

137. Lennon teaches that characteristics of the virtual-wearable item, e.g., body size, fit, and style, are accounted for to enhance realism in the display. Lennon explains that the merchant using the system "selects the desired range of body sizes for each selected apparel style." Ex. 1004, 5:7-3. Then, "video or still images of models, having a variety of body sizes typical to the majority of potential customer' body forms and wearing corresponding sizes of the selected apparel item, are taken within the controlled environment, i.e., walking down the runway." *Id.* at 5:13-22. "Prior to recording, a visual reference may be referred to gauge apparel sizes" to ensure accurate representation. *Id.* Lennon's approach makes sure that the virtual-wearable items used in the composite image are visually and proportionally appropriate to the customer's body type, as opposed to being generic or one-size-fits-all.

138. As such, a POSA would understand that Lennon teaches utilizing characteristics of the virtual-wearable item (e.g., size/style) to enhance the realness of the displayed composite. This understanding is also consistent with the specification of the '517 Patent, which states that "[c]haracteristics associated with a virtual-wearable item (e.g., type of fabric, texture of fabric, and/or other characteristics) may be utilized in rendering … to enhance the realness." Ex. 1001, 5:21-26, 13:22-26.

5. Independent Claim 13 and Associated Dependent Claims

a. Claim 13

(i) 13[pre]: "A method for allowing a user to simulate wearing real-wearable items, the method being performed by one or more hardware processors configured by machine-readable instructions, the method comprising:"

139. Claim 13 is an independent claim directed to a method for the same subject matter as claim 1. Specifically, the preamble is disclosed for the same reasons discussed above for element 1[pre] and 1[a].

(ii) 13[a]: "obtaining, from a client computing platform, a live video feed;"

140. As discussed above regarding element 1[b], this limitation is disclosed.

(iii) 13[b]: "recognizing a position and/or orientation of one or more body parts of a user within the live video feed, the one or more body parts including a first body part;"

141. As discussed above regarding element 1[c], this limitation is disclosed.

(iv) 13[c]: "providing a virtual-outfitting interface for presentation to the user via the client computing platform, the virtual-outfitting interface including two or more separate portions simultaneously presented in the virtual-outfitting interface, the two or more separate portions including a main display portion and an icon that is overlaid upon the main display portion,"

142. As discussed above regarding element 1[d], this limitation is disclosed.

(v) 13[d][1]: "wherein the main display portion includes a composite video feed that incorporates the live video feed of the user and a first virtual-wearable item, and"

143. As discussed above regarding element 1[e][1], this limitation is disclosed.

(vi) 13[d][2]: "wherein a position, size, and/or orientation of the first virtual-wearable item is determined such that the first virtual-wearable item moves within the main display portion according to the position and/or orientation of the user within the live video feed so that the user appears to be wearing the first virtual-wearable item in real time in the main display portion; and"

144. As discussed above regarding element 1[e][2], this limitation is disclosed.

(vii) 13[e]: "providing a social-networking tool graphically presented in the virtual-outfitting interface, the social-networking tool allowing the user to interface with one or more social-networking services with which the user is associated."

145. As discussed above regarding element 1[f], this limitation is disclosed.

b. Claim 14: "The method of claim 13, wherein interfacing with a given social-networking service includes sharing a snapshot with one or more contacts of the user within the given social-networking service."

146. As discussed above regarding claim 2, this limitation is disclosed.

c. Claim 15: "The method of claim 13, wherein interfacing with a given social-networking service includes

providing a comment on a profile page of the user within the given social-networking service, wherein the comment on the profile page includes one or both of a link or information associated with a real-wearable item corresponding to the first virtual-wearable item."

147. As discussed above regarding claim 3, this limitation is disclosed.

d. Claim 18: "The method of claim 13, wherein:

the first virtual-wearable item includes one or both of a virtual garment or a virtual accessory; or

the first virtual-wearable item visually represents a corresponding real-wearable item."

148. As discussed above regarding claim 6, this limitation is disclosed.

Claim 19: "The method of claim 13, wherein the two or more separate portions of the virtual-outfitting interface further include a conferencing portion, wherein providing the virtual-outfitting interface for presentation further comprises:

providing video of one or more other users for display within the conferencing portion, wherein the conferencing portion is configured to facilitate video communications between the user and at least one of the one or more other users via the one or more social-networking services with which the user is associated."

149. As discussed above regarding claim 7, this limitation is disclosed. In particular, in the relevant paragraphs above, I have explained how Gray discloses to a POSA an interface including a conferencing portion configured to display video of one or more other users. In view of Gray's disclosure, the POSA would have

implemented a step of "providing video of one or more other users for display within the conferencing portion" to achieve that functionality in the interface.

C. Ground 2: YouCam 3 User's Guide and YouCam 3 Publication Video Render Obvious Claims 1-3, 6-7, 9-10, 12-15, and 18-19

1. YouCam 3 User's Guide and YouCam 3 Publication Video

150. YouCam 3 is a webcam software application that integrates real-time video processing, facial tracking, and multimedia output to enhance live video user experience with interactive visual effects. The relevant software functionalities that are documented in YouCam 3 User's Guide and YouCam 3 Publication Video (collectively, YouCam 3 "Official Publications") address the same problems discussed in the '517 Patent.

151. This is apparent from YouCam 3 Publication Video showing live footage of a user in real-time wearing virtual wearables in an augmented reality (AR) display. Ex. 1007 at 0:20-0:38. The Publication Video discloses a video interface that tracks the user's face outfitted with the virtual wearables, rendering these items in real time relative to the user's facial orientation. *Id.* It also discloses a live video feed and social networking integration. *Id.* at 1:02-1:12.

152. Further, YouCam 3 User's Guide elaborates on the features and functions disclosed in the Publication Video. The User's Guide describes the generation of a composite video that appears as if the user is wearing virtual garments. Ex.

1006 at 2, 9-10. It is a real-time overlay of virtual accessories, avatars, and filters those onto a live webcam video that can be both displayed to the user and recorded. *Id.*

153. The YouCam 3 Official Publications also disclose face tracking functionality that positions and maintains the alignment of augmented reality (AR) items (e.g., gadgets and avatars) relative to facial features in the live video feed. Ex. 1006 at 2, 9-10; Ex. 1007 at 0:20-0:38. This enables dynamic rendering of wearable items such as hats or masks that maintain consistent spatial relationships with the user's head position and orientation. *Id.* These overlays are rendered as if they are worn by the user, and they are updated in real time as the user moves, thereby creating a visually realistic augmented effect. *Id.* YouCam3's use of face tracking to apply real-time effects such as hat and avatars over a live video feed meets the '517 Patent's composite video and motion tracking requirements, where a virtual item (e.g., garment/accessory) is visually integrated with the user in real time. Ex. 1006 at 2, 9-10; *see also* Ex. 1007 at 0:20-0:38.

154. The software described in the User's Guide uses a "virtual driver" to interface with third-party messaging clients, including Windows Live Messenger, Skype, Yahoo Messenger, and AOL Instant Messenger, effectively substituting the raw webcam feed with a processed video stream containing effects. Ex. 1006 at 2-3, 6. It supports multiple operating modes, including standalone, instant messaging

(IM), and mirror mode, each designed to accommodate a use case such as recording, live chatting, or personal viewing. *Id.* at 4; *see also* Ex. 1007 at 1:02-1:12.

155. The YouCam 3 Official Publications also disclose a searchable and browsable gallery of visual effects—avatars, gadgets, frames—that users select to appear on themselves in the video feed. Ex. 1006 at 1; Ex. 1007 at 0:47-0:49. It features the functions of the '517 Patent's item-selection module.

156. In addition to visual enhancements, the User's Guide also shows that YouCam 3 provides photo snapshot and video capture capabilities, and allows direct upload of photos and videos to Facebook and YouTube, enabling integration with social-networking services. Ex. 1006 at 4, 18-20, 22; Ex. 1007 at 1:02-1:12.

2. Motivation to Combine YouCam 3 Official Publications

157. A POSA would have been motivated to consult both the teachings of YouCam 3 User's Guide and YouCam 3 Publication Video to implement a real-time virtual try-on system as claimed in the '517 Patent. YouCam 3 Official Publications describe the same underlying commercial product. They are naturally complementary to each other. The Publication Video visually demonstrates actual operations of the technical and functional features during real-world use. The User's Guide provides technical details and operational instructions, such as webcam effects, taking snapshots, recording, and manipulating video, etc. *See generally* Ex. 1006. It

would be practical for a POSA to study both the User's Guide and Publication Video together to fully understand the functionality of the described software.

158. Collectively, the YouCam 3 Official Publications disclose core functionality directly aligned with the claims of the '517 Patent, including: (1) capturing live webcam video of the user; (2) applying graphical effects—such as virtual wearable items (e.g., hats, masks)—that track and respond to the user's facial orientation; (3) rendering the resulting composite video feed in real time; and (4) capturing snapshots and videos of the composite imagery and sharing them via social media platforms like Facebook and YouTube. Hence, the features of the '517 Patent were described and disclosed.

159. Moreover, a POSA would understand that YouCam 3 Official Publications disclose an interface of wearable virtual items, allowing users to browse, select, and virtually wear—functionality equivalent to the item-selected portions recited in the '517 Patent. Although the claims of the '517 Patent do not require commercial store/retail settings, even if they did, the technology disclosed in YouCam3 Official Publications, e.g., real-time compositing and graphical augmentation, was highly transferable to virtual retail environments. A POSA would recognize the functionalities disclosed in the Official Publications beyond novelty entertainment.

160. The commercial incentive was there: By the mid-to-late 2000s, there was an industry trend toward virtual try-on systems for enhancing on-line shopping

experiences. *See, e.g.*, Ex. 1001, 1:30-42. Integrating a consumer-facing AR system like YouCam 3 with a virtual retail platform would allow potential shoppers to visualize themselves wearing branded clothing or accessories before purchase. Afterall, in YouCam 3, users were actually able to see what they looked like wearing a limited number of hats and masks. Therefore, a POSA would have readily recognized the value of using the technology disclosed in YouCam 3 Official Publications, e.g., face tracking, AR composite imagery, and social media integration, to other scenarios including virtual try-on e-commerce. *Id*. Adapting the software features described in the Official Publications to support virtual clothing selection requires no inventive ingenuity. Such adaptation would also yield no more than predictable use of prior art elements according to their established functions, and such adaptation would be obvious for a POSA.

161. Furthermore, these YouCam 3 Official Publications included sufficient detail so that a POSA could understand how the relevant features function. The technical components used in YouCam 3, e.g., facial feature tracking, viewing and manipulating webcam video imagery such as enhancement, zoom in/out, and adding/applying distortion and filtering type effects, overlay rendering, and social media sharing, were well within the routine knowledge and capabilities of a POSA at the time of the invention of the ’517 Patent.

162. For example, computer vision and digital image/video processing literature discloses well known techniques for image/frame segmentation, motion estimation, object tracking, image-based rendering and 3D sensing and object pose estimation, among others—all of which are well known and familiar to a POSA.

163. As more specific examples, facial feature tracking would potentially involve image/frame segmentation (*see, e.g.*, Ex. 1022 (Gonzalez) at 567-635 (Ch. 10); Ex. 1016 (Tekalp) at 198-217 (Ch. 11); Ex. 1021 (Shapiro) at 279-324 (Ch. 10)) to locate objects in the scene, edge/corner detection (*see, e.g.*, Ex. 1022 (Gonzalez) at 567-635 (Ch. 10); Ex. 1017 (Ballard) at 119-46 (Ch. 4)) to locate relevant features, and motion estimation/tracking (*see, e.g.*, Ex. 1016 (Tekalp) at 72-241 (Parts II and III)) to track the various objects/features in the video frames. All these techniques were known to a POSA.

164. Additionally, image manipulation techniques that involve filtering and enhancement methodologies were also well known to a POSA at the time of the invention. These include well-known routine techniques that involve smoothing/sharpening both in the spatial and frequency domain, median/Gaussian filtering, homomorphic filtering as well as techniques for image restoration involving inverse filtering, Wiener filtering, among others, to minimize noise effects. Ex. 1022 (Gonzales) at 75-278 (Ch. 3-5).

165. Moreover, overlay rendering would involve routine image-based rendering techniques such as those described in these journal papers published by well-known publishers. *See, e.g.*, Ex. 1023 (Yilmaz); Ex. 1024 (Yang); Ex. 1025 (Kang). All of the above involve routine, well-known computer vision techniques as examples for implementing the functionalities disclosed in YouCam 3 Official Publications. Similarly, software development libraries and kits (SDKs) for facial detection (e.g., OpenCV), virtual camera drivers, and software (and website) user interface development were well-known and readily available at the time.

166. Accordingly, with this background as to what a POSA would be intimately familiar with at the time of the invention, after studying YouCam 3 User's Guide and Publication Video, a POSA would not only have been motivated to combine the references, but a POSA facing the same problems identified in the '517 Patent would also have been able to implement or imitate the relevant features described in these materials without undue difficulty and experimentation.

3. Independent Claim 1 and Associated Dependent Claims

a. Claim 1

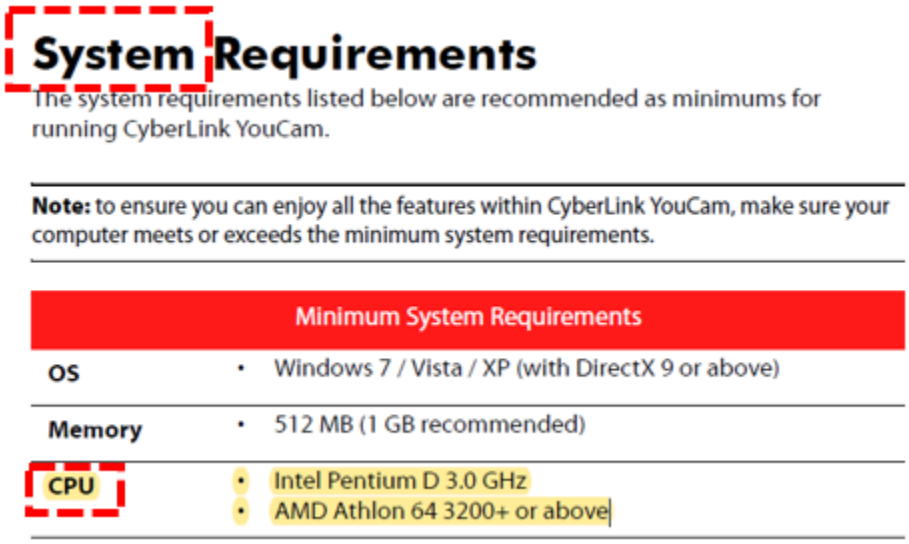
(i) 1[pre]: "A system configured for allowing a user to simulate wearing real-wearable items, the system comprising:"

167. This feature is disclosed in YouCam 3 User's Guide. The User's Guide describes that YouCam 3 "uses a virtual driver to easily work with most webcam

devices and messaging software, allowing [users] to perform the following functions: … ***add accessory effects, such as hats and masks*** to your webcam image." Ex. 1006 at 2 (emphasis added); *see also* Ex. 1007 at 0:20-0:38.

(ii) 1[a] : "one or more hardware processors configured by machine-readable instructions to:"

168. The User's Guide teaches that YouCam 3 is a software program that is in the form of machine-readable instructions. Ex. 1006 at 1; Ex. 1007 at 0:05-0:19. As described, YouCam 3 configures hardware processors (e.g., CPUs) to execute the machine-readable instructions.



System Requirements

The system requirements listed below are recommended as minimums for running CyberLink YouCam.

Note: to ensure you can enjoy all the features within CyberLink YouCam, make sure your computer meets or exceeds the minimum system requirements.

Minimum System Requirements	
OS	• Windows 7 / Vista / XP (with DirectX 9 or above)
Memory	• 512 MB (1 GB recommended)
CPU	• Intel Pentium D 3.0 GHz • AMD Athlon 64 3200+ or above

Ex. 1006 at 5 (annotated); *see also* Ex. 1007 at 2:10-2:19 (narration: "YouCam 3 has been designed for the latest PC Hardware including touch systems, HD webcams, and ultra-light netbooks.").

(iii) 1[b]: "obtain, from a client computing platform,

a live video feed;"

169. The User's Guide discloses that YouCam 3 has three different modes, stand alone mode, IM mode and mirror mode. Ex. 1006 at 4. "Within stand alone mode you can record and upload videos to YouTube, and e-mail and print photos" and the "[s]urveillance features are also only available within [stand alone] mode." *Id.* For the instant messengering (IM) mode, "when a webcam session is started, CyberLink YouCam will launch[.]" as a "virtual driver." *Id.* at 4, 2. The mirror mode "is designed to act just like a mirror if ever you need it." *Id.* at 4; *see also* Ex. 1007 at 0:20-0:38, 1:19-1:45.

170. The user can "capture live webcam video, or to take a desktop capture" either automatically from the IM mode or simply by "launch[ing] CyberLink YouCam manually." Ex. 1006 at 4. "With CyberLink YouCam you can instantly capture a live webcam video." *Id.* at 12. The User's Guide contains repeated descriptions of YouCam's real-time rendering capabilities in various application scenarios. *See, e.g.*, *id.* at 3 (under "Video Image and Preview," stating that YouCam can "[e]nhance your webcam video image using the auto-lighting and video noise reduction features."); *id.* at 9 ("CyberLink YouCam has a lot of effects that you can apply to your live webcam image. When applied, a user viewing your webcam will instantly see the effect."); *id.* at 8 ("When CyberLink YouCam is launched manually from the start menu, desktop shortcut or from the icon in the system tray, you can

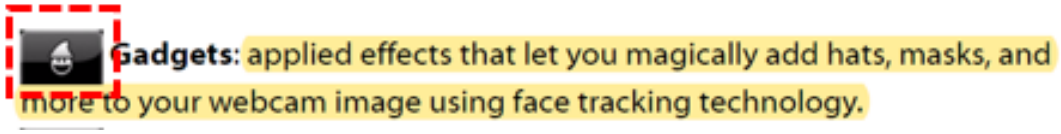
view webcam video in stand alone mode."); *id.* at 12 ("CyberLink YouCam will begin to capture the current webcam video."); *see also generally* Ex. 1007.

171. A POSA would therefore have recognized that the User's Guide and the YouCam 3 Publication Video for YouCam 3 disclosed this limitation.

(iv) 1[c]: "recognize a position and/or orientation of one or more body parts of a user within the live video feed, the one or more body parts including a first body part;"

172. Both YouCam 3 references disclose "face tracking technology." Ex. 1006 at 2; Ex. 1007 at 0:20-0:38. "Face tracking technology … enhances avatars, enables auto-zoom, enables the use of gadgets, and more." Ex. 1006 at 2. The User's Guide explains that YouCam 3's "gadget" function lets "[users] magically add hats, masks, and more to [the users'] webcam image." *Id.* at 9. An example from the YouCam 3 Publication Video is reproduced below.

Id. at 1 (annotated).



Id. at 9 (annotated).

173. As shown above, among the gadgets that are disclosed in the YouCam 3 User's Guide are virtual wearable items such as hats and masks. *Id.* Therefore, by use of machine-readable instructions (software), the system described in the User's Guide recognizes the position and orientation of at least the user's face, i.e., a body part, within the live webcam video stream.

See also, e.g., Ex. 1007 at 0:31-0:37 (narration: "headgear gadgets use face tracking to keep masks, hats … exactly where you are."). As shown in the above screen capture, the effect of "gadgets," which graphically overlays the virtual item to specific regions of the user's face, demonstrates positional and/or orientational recognition of body parts such as the face. This is because the feature requires the identification and tracking of facial features (i.e., one or more body parts) to accurately render the effects.

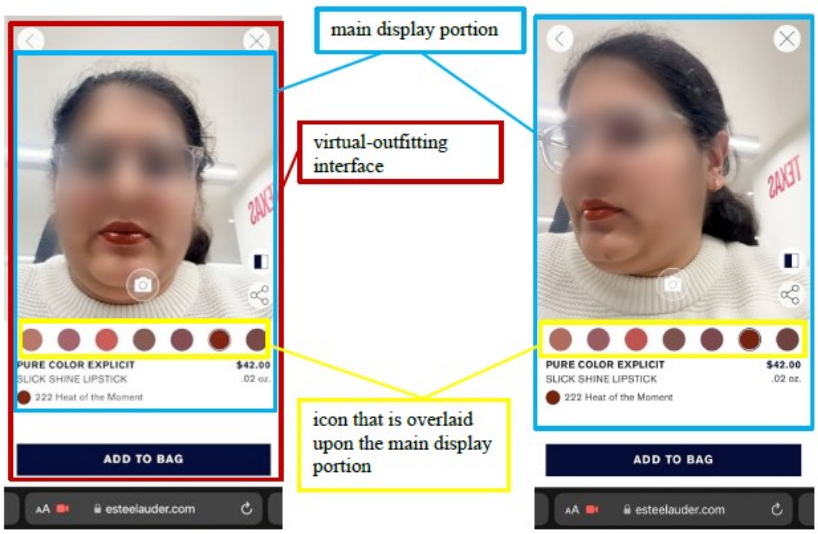
174. The User's Guide also discloses an "auto face detection" feature that enables the user to "track and follow your face as it moves within the webcam image." Ex. 1006 at 9. Thus, the User's Guide as well as YouCam 3 Publication Video disclose automatically detecting and tracking the user's face, zooming in and following its movements. *Id.*; Ex. 1007 at 0:20-0:38.

(v) 1[d]: "provide a virtual-outfitting interface for presentation to the user via the client computing platform, the virtual-outfitting interface including two or more separate portions simultaneously presented in the virtual-outfitting interface, the two or more separate portions including a main display portion and an icon that is overlaid upon the main display portion,"

175. As discussed in Ground 1, the icon in this claim reads on any icon if it is "overlaid upon the main display portion." This is consistent with the specification's description of icons. Ex. 1001, 5:62-66; *see also id.* at 13:63-14:3.

176. I understand that the Patent Owner submitted a claim chart in the Eastern District of Texas to illustrate its claim interpretation. After reviewing the claim chart, it is my expert opinion that the Patent Owner interprets the limitation in accordance with what I described in the previous paragraph, i.e., the icon in this claim reads on any icon if it is "overlaid upon the main display portion."

Claim 13	THE ESTÉE LAUDER COMPANIES, INC. (Virtual Try-on)



Ex.1011 at 20. The Patent Owner asserted in the above claim chart that the "icon" associated with color options on the main display meets this limitation. *See id.*

177. The User's Guide discloses that YouCam 3's virtual-outfitting interface (i.e., boxed in dark red) includes two or more separate portions, and the two portions are simultaneously presented in the display (i.e., virtual-outfitting interface):

Ex. 1006 at 1 (annotated); *see also* Ex. 1007 at 0:47-0:52 (same interface). YouCam3's interface, as shown in the User's Guide (and the Publication Video), includes a main display portion (boxed in light blue) and at least one icon (boxed in yellow) that is overlaid upon the main display portion. *Id.* The User's Guide similarly shows, in YouCam 3's interface, use of a "system tray icon" (Ex. 1006 at 3), an emotion effect icon (*id.* at 9), a "snapshot" icon (*id.* at 11), and a "burst" icon (*id.* at 12). For these reasons, this limitation is disclosed.

(vi) 1[e][1]: "wherein the main display portion includes a composite video feed that incorporates the live video feed of the user and a first virtual-

wearable item, and"

178. YouCam 3's main display, as shown in the YouCam 3 Publication Video, includes a composite video feed that incorporates the live video feed of the user and a first virtual-wearable item (i.e., the police hat).

See Ex. 1007 at 0:31-0:37.

(vii) 1[e][2]: "wherein a position, size, and/or orientation of the first virtual-wearable item is determined such that the first virtual-wearable item moves within the main display portion according to the position and/or orientation of the user within the live video feed so that the user appears to be wearing the first virtual-wearable item in real time in the main display portion; and"

179. YouCam 3 User's Guide discloses this limitation. YouCam 3 User's Guide explains, in the "Webcam Effects" section, "YouCam has a lot of effects that

you can apply to your live webcam image. When applied, a user viewing your webcam will instantly see the effect. These effects are also applied to any photo snapshots or webcam video you are recording at the time." Ex. 1006 at 9; *see also* Ex. 1007 at 0:20-0:38. YouCam 3's gadget effects, which include virtual accessories such as hats, masks, and facial overlays that track the user's face in real-time and are displayed within the live video feed. *Id.* The following screenshots from YouCam's Publication Video show the visual effects of the face tracking.

Ex. 1007 at 0:24.

Id. at 0:25.

180. The Publication Video shows that the gadgets are dynamically aligned with the user's facial features, such that they remain properly positioned as the user moves. *Compare* Ex. 1007 at 0:24 *with id.* at 0:25. This demonstrates that the implementation of continuous determination and recalculation of position, size, and/or orientation (e.g., to compensate for head tilt) of the virtual wearable item so that the virtual-wearable item moves within the main display portion according to the position and/or orientation of the user within the live video feed. *Id.* The result is that the user appears to be wearing the item in real time in the main display. *Id.*

(viii) 1[f]: "provide a social-networking tool graphically presented in the virtual-outfitting interface, the social-networking tool allowing the user to interface with one or more social-networking services with which the user is

associated."

181. YouCam 3 User's Guide discloses this feature. Below is an example user interface of YouCam 3 shown in the Publication Video that depicts a social-networking tool, e.g., Facebook, graphically presented in the virtual-outfitting interface.

Ex. 1006 at 1 (annotated); *see also* Ex. 1007 at 1:02-1:12. The User's Guide also explains that the user "can upload captured photos directly to [the user's] Facebook page from within CyberLink YouCam." Ex. 1006 at 19.

Uploading Photos to Facebook

You can upload captured photos directly to your Facebook page from within CyberLink YouCam. To upload captured photos to Facebook, do this:

1. Select the photos in the captured content area that you want to upload to Facebook.
2. Select the button. The Upload Media to Facebook wizard opens, displaying the authorization window.
3. Follow the steps outlined in the window to grant CyberLink YouCam permission to upload media to your Facebook page.
4. Once the authorization and connection process is complete, enter the details about your photos as follows:

See also id. (annotated). The Facebook button in YouCam 3's interface, after activation, allows the user to authenticate, authorize, and upload media such as captured snapshots or videos to the social network services with which the user is associated, e.g., "upload media to [the user's] Facebook page." *Id.* at 20.

b. Claim 2: "The system of claim 1, wherein interfacing with a given social-networking service includes sharing a snapshot with one or more contacts of the user within the given social-networking service."

182. Below is an example of a YouCam 3 interface shown in the User's Guide that discloses this limitation.

Ex. 1006 at 1 (annotated). The above screenshot shows that YouCam 3 interfaces with social-networking services (e.g., Facebook) and enables users to share snapshots directly to their social profiles. *Id.* at 18-20; *see also* Ex. 1007 at 1:02-1:12, 1:19-1:25. "With CyberLink YouCam [users] can instantly take a photo snapshot (in the JPG, BMP or PNG format) of the current webcam video[.]" Ex. 1006 at 11.

183. Sharing snapshots and captured videos to Facebook inherently involves making them visible to the user's contacts (e.g., Facebook friends). YouCam 3 also teaches that its interface with the social media can allow the user to "select who has permissions to view these photos once [the media] are uploaded," further showing

that the media is shared with one or more contacts of the user within the social-networking site. Ex. 1006 at 20.

c. Claim 3: "The system of claim 1, wherein interfacing with a given social-networking service includes providing a comment on a profile page of the user within the given social-networking service, wherein the comment on the profile page includes one or both of a link or information associated with a real-wearable item corresponding to the first virtual-wearable item."

184. When the snapshots and the captured videos are uploaded to social-networking services (e.g., Facebook or YouTube), the User's Guide explains that the YouCam 3's interface with the social media site asks the user to provide information associated with what is uploaded, e.g., "Description," "Location," and "Caption." Ex. 1006 at 20.

- **Description**: enter in a short description for the photos you are uploading.
- **Location**: enter in the location where the photos were taken.
- **Privacy**: select who has permissions to view these photos once they are uploaded.
- **Caption**: enter a caption that will display under all of the uploaded photos.

5. Select **Upload** to begin uploading your photos to Facebook. Select the **Finished** button once your photos are uploaded.

Id. (annotated); *see also* Ex. 1007 at 1:02-1:12, 1:19-1:25. Therefore, when uploaded to Facebook or YouTube, the comments (e.g., description, location, or caption) uploaded to the user's profile page include information associated with the virtual-wearable item.

185. Moreover, based on my knowledge, a POSA at the time would have already been familiar with the well-known capabilities of social media websites at the time (e.g., commenting, posting, and linking). For example, at the time, it was known to a POSA that social media sites like Facebook already allowed users to include text captions or comments alongside uploaded media on their profile pages.

186. Therefore, when asked to apply technologies described in YouCam 3, along with its social-networking functionalities, in a virtual try-on (VTO) context, a POSA would have implemented an interface function to enable the user to provide information about a corresponding real-world item when the user uploads a snapshot of a virtual hat or accessory. And, it would have been an obvious design improvement to link VTO content to real-world product information, at least because at the time, users were routinely posting shopping links in social media comments and profile updates. Therefore, combining YouCam's social media image sharing functionality with a routine user behavior of providing information and linking about the shared items would have been an obvious extension of routine user interface improvement.

d. Claim 6: "The system of claim 1, wherein:

the first virtual-wearable item includes one or both of a virtual garment or a virtual accessory; or

the first virtual-wearable item visually represents a

corresponding real-wearable item."

187. As discussed above in element 1[c], the User's Guide shows that YouCam 3's virtual-wearable gadgets include a virtual garment or a virtual accessory, e.g., the police hat as well as a gas mask. Ex. 1006 at 1. The visual effect of the gadget is shown in YouCam 3's Publication Video, a screenshot of which is below. As shown in the screenshot, the police hat visually represents a corresponding real-wearable hat.

See Ex. 1007 at 0:31-0:37.

e. Claim 7: "The system of claim 1, wherein the two or more separate portions of the virtual-outfitting interface further include a conferencing portion configured to display video of one or more other users, the conferencing portion being configured to facilitate video communications between the user and at least one of the one or more other users via the one or more

social-networking services with which the user is associated."

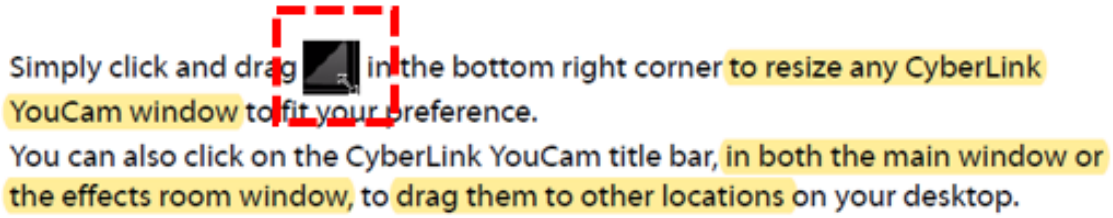
188. YouCam 3 User's Guide discloses that the software is designed to work in conjunction with instant messaging platforms that support video conferencing. Ex. 1006 at 4. Specifically, the YouCam 3 User's Guide discloses three different operating modes, "stand alone mode, IM mode and mirror mode." *Id.* In addition to the users manually launching the software, YouCam 3 launches "automatically when [users] begin a webcam session with an instant messaging software." *Id.* In the IM (Instant Messaging) mode, "when a webcam session is started, [YouCam 3] will launch in the smaller IM (instant messaging) mode. Shared document viewing is only available within IM mode." *Id.*

Ex. 1007 at 1:45-1:54 (narration: "YouCam is also a great tool for making live presentations. …you could share PowerPoint files and photos while you chat."); *see also*, Ex. 1006 at 21 ("you can share files during a webcam session); *id.* at 22 (in a "teacher mode," "the webcam video and a larger view of the shared portions of the document are shown simultaneously.").

189. As can be seen above, and also based on my knowledge, social-networking services, e.g., Windows Live Messenger, were already known at the time to support video chat. Ex. 1006 at 4. When in IM mode, YouCam 3's user interface integrates with the IM software and includes a conferencing portion configured to display video of one or more other users so as to perform, e.g., live presentations. An IM service software is a type of social-networking service. As such, this limitation is disclosed by YouCam 3 in view of knowledge of a POSA.

f. Claim 9: "The system of claim 1, wherein a size and/or position attributed to the two or more separate portions of the virtual-outfitting interface is dynamic."

190. YouCam 3 User's Guide teaches that its user interface's size and position are adjustable and dynamic. "When within both stand alone or IM mode, [users] can resize the CyberLink YouCam user interface to suit [their] requirements." Ex. 1006 at 4.



Id. (annotated).

Id. at 1 (annotated); *see also* Ex. 1007 at 0:47-0:52 (same interface).

g. Claim 10: "The system of claim 1, wherein the one or more hardware processors are further configured by the machine-readable instructions to:

determine the position, size, and/or orientation of the first virtual-wearable item based on the position and/or orientation of the one or more body parts of the user recognized within the live video feed, wherein the

first virtual-wearable item is positioned at a predetermined offset and/or orientation relative to the one or more body parts of the user."

191. As discussed above regarding element 1[e][2], a POSA would have recognized that YouCam 3 User's Guide and Publication Video disclosed determining the position, size, and/or orientation of the first virtual-wearable item based on the position and/or orientation of the one or more body parts of the user recognized within the live video feed.

Ex. 1007 at 0:24.

Id. at 0:25.

192. As shown above, the virtual-wearable items, or "gadgets," are not randomly positioned; rather, they are placed at a specific location that is relative to the user's facial features. For example, a virtual hat must be positioned slightly above the center of the user's detected face to align with the top of the head, and a mask must align with the eyes, nose, and mouth region.

193. Therefore, a POSA would recognize that the correct display of hats and masks required a "predetermined offset": a preset spatial relationship between the effect and the tracked facial features. This offset is a necessary part of how the virtual item can appear to be "worn" by the user on the screen. Similarly, the orientation of the virtual-wearable item (e.g., tilt of a hat) needs to follow the orientation

of the user's head to maintain the correct relative alignment, thereby showing the effect of being "worn."

194. Consequently, it would have been obvious to a POSA that YouCam's gadget effect, in creating the appearance of users wearing the virtual-wearable items and through the use of its face tracking technology, disclosed the claimed limitations.

h. Claim 12: "The system of claim 1, wherein one or more characteristics of the first virtual-wearable item are utilized to render the first virtual-wearable item in the main display portion to enhance a realness of the first virtual-wearable item as it appears within the main display portion."

195. YouCam 3 User's Guide discloses a system that overlays virtual-wearable items (e.g., hats, masks) onto a user's live video feed using face tracking. Ex. 1006 at 2, 9; *see also* Ex. 1007 at 0:20-0:38. The implementation of virtual items that maintain proper alignment and movement with respect to the user's face inherently serves the purpose of enhancing perceived realism. Moreover, the system as described in the User's Guide makes use of characteristics of the virtual-wearable item, e.g., the item's shape, size, orientation, and placement logic, when rendering it in the main display portion. For example, a police hat is not simply drawn as a static image but is anchored to the user's head and rotates accordingly, in response to the head turns or moves; similarly, a gas mask with respect to the user's full face. The User's Guide further confirms that "[g]adgets are applied effects that let you

magically add hats, masks, and more to your webcam image using face tracking technology." Ex. 1006 at 9.

196. A POSA would have understood that rendering an augmented reality (AR) overlay in real time with facial alignment, including size and/or orientation adaptation, was a well-established method to increase the realism of a virtually rendered item. Therefore, this limitation is disclosed.

4. Independent Claim 13 and Associated Dependent Claims

a. Claim 13

(i) 13[pre]: "A method for allowing a user to simulate wearing real-wearable items, the method being performed by one or more hardware processors configured by machine-readable instructions, the method comprising:"

197. Claim 13 is an independent claim directed to a method for the same subject matter as claim 1. Specifically, the preamble is disclosed for the same reasons discussed above for element 1[pre] and 1[a].

(ii) 13[a]: "obtaining, from a client computing platform, a live video feed;"

198. As discussed above regarding element 1[b], this limitation is disclosed.

(iii) 13[b]: "recognizing a position and/or orientation of one or more body parts of a user within the live video feed, the one or more body parts including a first body part;"

199. As discussed above regarding element 1[c], this limitation is disclosed.

(iv) 13[c]: "providing a virtual-outfitting interface for presentation to the user via the client computing platform, the virtual-outfitting interface including two or more separate portions simultaneously presented in the virtual-outfitting interface, the two or more separate portions including a main display portion and an icon that is overlaid upon the main display portion,"

200. As discussed above regarding element 1[d], this limitation is disclosed.

(v) 13[d][1]: "wherein the main display portion includes a composite video feed that incorporates the live video feed of the user and a first virtual-wearable item, and"

201. As discussed above regarding element 1[e][1], this limitation is disclosed.

(vi) 13[d][2]: "wherein a position, size, and/or orientation of the first virtual-wearable item is determined such that the first virtual-wearable item moves within the main display portion according to the position and/or orientation of the user within the live video feed so that the user appears to be wearing the first virtual-wearable item in real time in the main display portion; and"

202. As discussed above regarding element 1[e][2], this limitation is disclosed.

(vii) 13[e]: "providing a social-networking tool graphically presented in the virtual-outfitting interface, the social-networking tool allowing the user to interface with one or more social-networking services with which the user is

associated."

203. As discussed above regarding element 1[f], this limitation is disclosed.

b. Claim 14: "The method of claim 13, wherein interfacing with a given social-networking service includes sharing a snapshot with one or more contacts of the user within the given social-networking service."

204. As discussed above regarding claim 2, this limitation is disclosed.

c. Claim 15: "The method of claim 13, wherein interfacing with a given social-networking service includes providing a comment on a profile page of the user within the given social-networking service, wherein the comment on the profile page includes one or both of a link or information associated with a real-wearable item corresponding to the first virtual-wearable item."

205. As discussed above regarding claim 3, this limitation is disclosed.

d. Claim 18: "The method of claim 13, wherein:

the first virtual-wearable item includes one or both of a virtual garment or a virtual accessory; or

the first virtual-wearable item visually represents a corresponding real-wearable item."

206. As discussed above regarding claim 6, this limitation is disclosed.

e. Claim 19: "The method of claim 13, wherein the two or more separate portions of the virtual-outfitting interface further include a conferencing portion, wherein providing the virtual-outfitting interface for presentation further comprises:

providing video of one or more other users for display within the conferencing portion, wherein the conferencing portion is configured to facilitate video communications between the user and at least one of the one

or more other users via the one or more social-networking services with which the user is associated."

207. As discussed above regarding claim 7, this limitation is disclosed.

IV. CONCLUSION

208. I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct.

Executed at Webster, New York

Dated: June 20, 2025

By: _____
Dr. Eli Saber, PhD