

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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META PLATFORMS, INC., INSTAGRAM, LLC, AND WHATSAPP INC.,  
Petitioners,

v.

EYESMATCH LTD., MEMOMI LABS INC.,  
Patent Owners.

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Case IPR2022-00489  
Patent 8,982,109

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**DECLARATION OF DR. DAVID FORSYTH IN SUPPORT OF PATENT  
OWNERS EYESMATCH LTD., MEMOMI LABS INC.'S  
PRELIMINARY RESPONSE TO PETITION FOR *INTER PARTES*  
REVIEW OF U.S. PATENT NO. 8,982,109**

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I, Dr. David Forsyth, hereby declare as follows:

**I. INTRODUCTION**

1. Counsel for Eyesmatch Ltd. and Memomi Labs Inc. (collectively “Patent Owners”) have retained me as an expert in this matter to offer opinions regarding certain validity issues for U.S. Patent 8,982,109 (the “109 Patent”).

2. I submit this declaration based on my personal knowledge and in support of Patent Owners’ Preliminary Response to the Petition for *Inter Partes* Review of the 109 Patent.

3. This declaration contains statements of my opinion formed to date and the bases and reasons for those opinions. I may offer additional opinions based on further review of materials in this matter, to rebut opinions offered by any of Petitioners’ experts, and to address issues raised by Petitioners’ briefing to the extent permitted by the Patent Trial and Appeal Board.

**A. Education and Professional Experience**

4. My qualifications and credentials are fully set forth in my *curriculum vitae*, attached as Attachment 1.

**B. Compensation**

5. I am being compensated for my time in connection with this case at my standard legal consulting rate, which is \$450 per hour. I have no personal or financial interest in the outcome of this proceeding.

**C. Materials Reviewed and Relied Upon**

6. In formulating my opinions, I have considered the 109 Patent, its corresponding file history, all documents cited in this Declaration, and the Petitioners' Petition for *Inter Partes* Review of the 109 Patent. If Petitioners alter any of their arguments after this Declaration is submitted, or Petitioners' expert submits a declaration offering any opinion, I may submit a supplemental declaration addressing any new issues and/or responding to those opinions, as appropriate and if permitted by the Patent Trial and Appeal Board.

**D. Legal Principles**

7. I am not a lawyer. I have been provided with an understanding of the legal principles that govern claim construction and patent validity. I have conducted my analysis in conformance with these principles. I set forth those understandings below.

**1. Obviousness (35 U.S.C. § 103)**

8. I understand that to obtain a patent, a claimed invention must have, as of the effective filing date of the claimed invention, been non-obvious in light of the prior art in the field.

9. I understand that patents with an effective filing date before March 16, 2013 are subject to the version of obviousness under 35 U.S.C. § 103 used prior to the America Invents Act amendments. I further understand that such patents are invalid as obvious when the differences between the subject matter sought to be

patented and the prior art are such that the subject matter as a whole would have been obvious on the date of the invention to a person having ordinary skill in the art.

10. To prove that prior art or a combination of prior art renders a patent obvious, it is necessary, by clear and convincing evidence to: (1) identify the particular references that, singly or in combination, make the patent obvious; (2) prove that those references qualify as prior art to the patent; (3) specifically identify which elements of the patent claim appear in each of the asserted references; (4) explain how the prior art references could have been combined in order to create the inventions claimed in the asserted claim; and (5) identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in a way the claimed new invention does. It must be shown that a person of ordinary skill would have had reason to attempt to make the device, or carry out the claimed method, and would have had reasonable expectation of success in doing so. Reasonable expectation of success is assessed as of the date of the invention described in the patent.

11. I have been informed that in order for a reference to be proper for use in an obviousness rejection, the reference must be analogous art to the claimed invention. I understand that a reference is analogous art to the claimed invention if: (1) the reference is from the same field of endeavor as the claimed invention (even if it addresses a different problem); or (2) the reference is reasonably pertinent to the

problem faced by the inventor (even if it is not in the same field of endeavor as the claimed invention). In order for a reference to be “reasonably pertinent” to the problem, it must logically have commended itself to an inventor’s attention in considering his problem.

12. The claimed invention must be considered as a whole in analyzing obviousness or non-obviousness. In determining the differences between the prior art and the claims, the question under the obviousness inquiry is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious.

13. As part of the process of determining the scope and content of the prior art, it is appropriate to consider whether there is evidence of a “teaching, suggestion, or motivation” to combine the teachings in the prior art, the nature of the problem or the knowledge of a person having ordinary skill in the art.

14. In assessing obviousness, I have been instructed to consider the distortion caused by hindsight bias, to guard against slipping into the use of hindsight, and to be cautious of arguments that rely upon after-the-fact reasoning, and avoid the temptation to read into the prior art the teaching of the invention in issue.

15. The following factors should be considered in analyzing obviousness: (1) the scope and content of the prior art; (2) the differences between the prior art and the claims; (3) the level of ordinary skill in the pertinent art, and (4) the objective

evidence of non-obviousness (if present).

**E. Level of Ordinary Skill in the Art**

16. I understand that obviousness must be analyzed from the perspective of a hypothetical person having ordinary skill in the art (“POSA”) at the time of the effective filing date. Ascertaining the level of ordinary skill is necessary to maintain the objectivity in the obviousness inquiry, and therefore the Board must ascertain what would have been obvious to a POSA at the time of the effective filing date, and not to the inventor, a judge, a layman, those skilled in remote arts, or to geniuses in the art at hand. Factors that may be considered in determining the level of ordinary skill in the art may include: (A) type of problems encountered in the art; (B) prior art solutions to those problems; (C) rapidity with which innovations are made; (D) sophistication of the technology; and (E) educational level of active workers in the field.

17. Based upon my experience in this area, a POSA as of December 2012 would have possessed at least a bachelor’s degree in electrical engineering or computer science, and two years of work experience related to capturing, storing, processing, and would also have familiarity with 3-D graphics programming and/or computer vision.

18. I have considered the types of problems encountered in the art, the prior solutions to those problems found in prior art references, the rapidity with which

innovations are made, the sophistication of the technology, the level of education of active workers in the field, and my own experience working with those of skill in the art at the time of inventions. As my *curriculum vitae* and my educational and professional experience show, I met this level of skill in 2012, and have since exceeded it.

## **II. OVERVIEW OF THE 109 PATENT**

19. The field of endeavor of U.S. Patent No. 8,982,109 (the “109 Patent”) is digital mirror systems that emulate traditional mirrors. Specifically, the 109 Patent is directed to methods of modifying a stream of images of a user captured by a camera, such that the images appear to be the reflection of a mirror, including by reversing, or resizing the image. (*See, e.g.*, Ex. 1001 (109 Patent) at Claim 1.) In other words, 109 Patent is directed to techniques that convincingly render a user’s image so that it appears to the user that they are looking in a conventional mirror. (Ex. 1001 (109 Patent) at 1:63-2:3.) The inventors of the 109 Patent recognized that the various digital combinations of cameras had failed to convincingly mimic a traditional mirror because the images generated by these attempts were noticeably different from what a person would actually see in a traditional mirror. (Ex. 1001 (109 Patent) at 1:62-2:4.) The specification notes some of these differences including the reversal of one’s appearance in a traditional mirror whereas a camera would display a non-reversed image. (Ex. 1001 (109 Patent) at 2:33-36.) Another



distinction between a traditional mirror and a camera is that with a traditional mirror, the mirror image is the apparent size of the subject as they move closer in or farther away from the display. “When a user looks at himself in the mirror, what he actually sees is the reflection of himself as if he was standing at a distance that is double the distance from him to the mirror.” (Ex. 1001 (109 Patent) at 2:4-6.) Since “the angle of the user’s Field of View (FOV) changes when the user changes the distance, e.g., gets closer, to the mirror,” a consequence of this phenomenon is that “when the user approaches the mirror, the FOV angle increases, which is why he continues to see the same size reflection ( $FOV1 < FOV2$ ), so that the user actually sees himself roughly at the same size, but closer.” (Ex. 1001 (109 Patent) at 2:4-23.) Conversely, as the 109 Patent notes, as a user gets closer to a camera the user appears larger in the image. “This is mainly because the FOV of a camera is fixed and is determined mainly by the size of the camera lens, or focal length.” (Ex. 1001 (109 Patent) at 2:23-27.) Another difference is that with a traditional mirror, the reflection of the user’s eyes will always stay on the same virtual line on the mirror even as the user gets closer to the mirror. Whereas, depending on camera height, the user’s eyes may appear at different levels as the user moves closer to the camera. (Ex. 1001 (109 Patent) at 2:29-33.)

20. To address these disparities between user appearance in a camera and in a traditional mirror, the 109 Patent discloses implementing a series of software

transformations of the received image that cause a camera and conventional computer to mimic a mirror with a captured video stream. First, the image is flipped. (*See, e.g.*, Ex. 1001 (109 Patent) at Claim 1.) Then, to mimic a mirror image, a “transformation mapping” is applied. The transformation can include an algorithm that moves the image of the subject in the frame so as to keep their eyes consistently at the same level of the frame, as would occur with a mirror. (Ex. 1001 (109 Patent) at 19:31- 52, Claim 1.) Next, the image is resized based on changes in the subject’s distance from the camera; this causes the camera/computer to display the subject at a consistent size when they approach or move away from the camera, as a mirror does, instead of increasing in size to the point at which they take up the entire frame as with a camera. (*See, e.g.*, Ex. 1001 (109 Patent) at Claim 1.) Finally, in order to smoothly mimic a mirror, the system applies these transformations at a variable rate based on the subject’s distance. (*See, e.g.*, Ex. 1001 (109 Patent) at Claim 1.)

### **III. OPINIONS**

#### **A. A POSA Would Not Be Motivated To Combine Rosenberg and Francois with Vidunas**

21. In my opinion, a Person of Ordinary Skill in the Art (“POSA”) would not be motivated to combine Rosenberg and Francois with Vidunas to meet limitation 1(d) of Claim 1 of the 109 Patent which requires: “resizing the image to reduce variations caused by changes in object's distance to the camera”. First, it is my opinion that Vidunas is not analogous art to Rosenberg and Francois. Second, it

is my opinion that a POSA would not be motivated to combine Vidunas with Rosenberg and Francois for the purpose of resizing because the motivation for resizing in Vidunas is different than the motivation in the 109 Patent or in the combination of Rosenberg and Francois.

**1. Vidunas is Not Analogous Art**

22. I understand that “Two separate tests define the scope of analogous prior art: (1) whether the art is from the same field of endeavor [as the claimed invention], regardless of the problem addressed and, (2) if the reference is not within the field of the inventor’s endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved.” *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004).

23. In my opinion, like the 109 Patent, both Rosenberg and Francois are also directed to digital mirror systems that emulate traditional mirrors. Rosenberg’s mirror system is “adapted to provide real-time captured images that approximate what a user would see when viewing an ordinary mirror, with the additional of various other image processing features.” (Ex. 1003, ¶ 006.) Francois relies on 3-D geometry “synthesized and displayed in real-time” “to simulate a real mirror on a computer screen, images of the observed world, consistent with the viewer’s position”. (Ex. 1004 at p. 0021.)

24. However, in my opinion Vidunas (Ex. 1005) is not directed to digital

mirror systems that emulate traditional mirrors. Rather, in my opinion, Vidunas is directed to “systems and methods reduce the resolution of video before transference to a display system.” (Ex. 1005 at Abstract.) Vidunas addresses the mismatch between modern video cameras that “can capture video at resolutions greater than that which can be displayed by many modern display systems, such as computer monitors” (Ex. 1005 at 1:26-28) by “provid[ing] systems and methods reduce the resolution of video before transference to a display system.” (Ex. 1005 at 1:39-40.) Moreover, in my opinion, unlike the 109 Patent, Rosenberg, and Francois, Vidunas is particularly focused on systems with multiple displays and ensuring the appropriate resolution is directed to each display. (*See, e.g.*, Ex. 1005 at 5:34-36 (“Consequently, viewing station 303 may be located in a different part of a customer premises or in a different geographic location than video server 302 or viewing station 305.”), *id.* at 6:1-2 (“The viewing parameters may differ for viewing areas 304 and 306 of viewing stations 303 and 305.”) *See also, id.* at independent Claims 1 (“receiving viewing parameters for plural viewing areas”), 9 (“a network interface configured to receive viewing parameters for plural viewing areas”), 17 (“receive viewing parameters for plural viewing areas”).)

25. In my opinion, Vidunas is not reasonably pertinent to the problem of digital mirror systems accurately emulating traditional mirrors. Francois, which is directed to digital mirror systems that emulate traditional mirrors, does not address

resolution at all, and Rosenberg, which also is directed to digital mirror systems that emulate traditional mirrors, addresses possible future high resolution screens only briefly in passing (Ex. 1003, ¶ 0059). On the other hand, in my opinion, the focus of Vidunas is “reduc[ing] the resolution of a video before transference to a display system.” (Ex. 1005 at Abstract.) Notably, reducing the resolution of video and thus the resulting quality of the images is the opposite of what a POSA interested in having a digital mirror system emulate a traditional mirror would want. Resolution is very important in the context of convincingly emulating a traditional mirror.

26. In my opinion, a POSA would not be motivated to combine Rosenberg and Francois with Vidunas because Vidunas is not analogous art and is not reasonably pertinent to the problem of digital mirror systems accurately emulating traditional mirrors.

**2. Resizing in Vidunas is Based on a Different Need Than in the 109 Patent, Rosenberg and Francois**

27. I understand that Petitioners rely on combining Vidunas with Rosenberg and Francois for Claim 1, limitation 1(d): “resizing the image to reduce variations caused by changes in object's distance to the camera”. I also understand that Petitioners assert that a POSA would have been motivated to combine the explicit disclosure of cropping images in Vidunas with the combination of Rosenberg and Francois because it would have been obvious to a POSA “to crop the images of the mirror display system described in the Rosenberg-Francois

combination to emphasize the user appearing in the image” and because a POSA “would have also appreciated the clear benefits of cropping an image, for example, and image enlarged based on increased distance.” (Pet. at 40-41.)

28. I disagree with Petitioners. To the extent that Francois discloses scaling operations, such scaling is based on equations based on the subject object’s distance to the camera. (Ex. 1004 at 22-23.) Conversely, in my opinion, Vidunas’ disclosure of cropping images is not based on a need to resize based on the subject object’s distance to the camera but rather with considerations of display size, data transfer, and network bandwidth. (*See, e.g.*, Ex. 1005 at 1:63-65) (“In some embodiments modifying the video based on the viewing parameters to produce the modified video comprises scaling a resolution of the video and cropping the video.”); (*Id.* at 11:42-46) (“Scaling the images before compression will dramatically reduce the bandwidth required to transmit the compressed images, and it will reduce the CPU power required to decompress the images on the workstation.”); (*Id.* at 1:32-34) (“Since more data is needed to represent higher resolution video, it follows that more bandwidth is used to transmit the data of higher resolution video.”).

29. In my opinion, since perception and distortion correction based on the subject object’s distance to the camera does not even factor into the considerations of cropping for Vidunas, a POSA would not be motivated to combine these references.

**B. A POSA Would Not Have Been Motivated to Combine Rosenberg and Francois with Either of Dunton or Yong**

30. I understand that Petitioners rely on the combination of Rosenberg and Francois with either of Dunton or Yong to meet Claim 1, limitation 1(h): “varying rate at which the non-ordered steps are performed on the series of images according to the distance”. In my opinion, neither Dunton or Yong are not analogous art to either of Rosenberg and Francois. Additionally, in my opinion, neither Dunton nor Yong disclose the elements of the limitation for which they are cited.

**1. Neither Dunton nor Yong is Analogous Art**

31. I understand that “Two separate tests define the scope of analogous prior art: (1) whether the art is from the same field of endeavor [as the claimed invention], regardless of the problem addressed and, (2) if the reference is not within the field of the inventor’s endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved.” In re Bigio, 381 F.3d 1320, 1325 (Fed. Cir. 2004).

32. In my opinion, like the 109 Patent, both Rosenberg and Francois are also directed to digital mirror systems that emulate traditional mirrors. Rosenberg’s mirror system is “adapted to provide real-time captured images that approximate what a user would see when viewing an ordinary mirror, with the additional of various other image processing features.” (Ex. 1003, ¶ 006.) Francois relies on 3-D geometry “synthesized and displayed in real-time” “to simulate a real mirror on a

computer screen, images of the observed world, consistent with the viewer's position". (Ex. 1004 at p. 0021.) Notably, I do not see anything in either Rosenberg or Francois suggesting varying either the frame rate or the rate of performing the processing steps. I also do not see anything in either reference identifying a problem or question which would require varying either the frame rate or the rate of performing the processing steps. In my opinion, this is yet another reason a POSA would not be motivated to combine Rosenberg and Francois with either Dunton or Yong.

33. Unlike Rosenberg and Francois, in my opinion, both Dunton and Yong are directed to video frame capture rate, not digital mirror systems that emulate traditional mirrors. Dunton discloses an apparatus in which the volume of image data for video image capture is reduced by having lower resolution or "by either digital scaling, cropping, or a combination of optical scaling and selective readout of sensor signals." (Ex. 1006 at Abstract, 1:35-43.) As a result, "video images have a lower resolution but a greater angular field of view" meaning that close-up scenes can be captured and transmitted at a lower resolution at a higher frame rate. (Ex. 1006 at 2:60-67.) Yong (Ex. 1007) discloses a "method, apparatus, and software product for implementing algorithms for improving a frame rate by reducing a size and resolution of selected versus unselected image frames captured by a sensor in an image processing pipeline before displaying (or before encoding) in electronic



devices.” (Ex. 1007 at Abstract; 4:25-32.) The reduction in image size or resolution will result in faster processing times for the video stream. (Ex. 1007 at 6:6-15.) I see nothing in either reference that discusses mirrors or using digital technology to approximate a mirror.

34. Also, in my opinion, neither Dunton nor Yong is reasonably pertinent to the problem of digital mirror systems accurately emulating traditional mirrors. I see nothing in either reference that mentions mirrors at all. And I do not see anything in Rosenberg and Francois, which are directed to digital mirror systems accurately emulating tradition mirrors, that address varying the rate at which the steps to emulate traditional mirrors are performed. Petitioners admit as much. (Pet. at 47.)

35. In my opinion, a POSA would not be motivated to combine Rosenberg and Francois with either Dunton or Yong because neither is analogous art and neither is reasonably pertinent to the problem of digital mirror systems accurately emulating traditional mirrors.

## **2. Neither Dunton nor Yong Discloses the Elements of the Limitation for Which They are Cited**

36. I understand that Petitioners assert that a POSA would be motivated to combine Rosenberg and Francois with Dunton and Yong based on Francois’ discussion of scaling images based on the subject object’s distance to the camera (Ex. 1004 at 22-23) which I also understand that Petitioners assert would necessarily result in a reduction in the amount of data transferred in the data stream to the display

(Pet. at 49-50).

37. It is important to note that varying the frame rate of a video stream is related to, but distinct from, varying the rate at which processing steps such as those recited in the 109 Patent Claim 1, limitations 1(b)-(e) are performed. In my opinion, Petitioners conflate the concept of frame rate (disclosed in Dunton and Yong) with the rate at which processing steps such as those recited in the 109 Patent Claim 1, limitations 1(b)-(e) are performed (not disclosed in either Dunton or Yong). The frame rate at which images are captured is different from the rate at which the processing steps are performed, such that varying the frame rate does not necessarily entail varying the rate at which the processing steps are performed. For example, one could vary the frame rate of a video stream but not vary the rate at which a set of processing steps is applied to those frames. For example, those steps could be omitted for some frames in a sequence, and so the frame rate of the video stream would not change but the processing rate would. Alternately, a method could process frames by inserting an intermediate frame between each frame in the video sequence; such a method would have a processing rate that was the same as the original frame rate, but would double the frame rate of the video stream. Consequently, the frame rate and the processing rate may be different and disclosure of varying the frame rate of the video stream does not, in itself, disclose varying the rate of processing. Consequently, the frame rate and the processing rate may be

different and disclosure of varying the frame rate does not, in itself, disclose varying the rate of processing. Dunton and Yong disclose varying the frame rate only. I do not see anything in either Dunton or Yong that discloses varying the rate at which processing steps are performed.

38. In addition, without regard for either this distinction between frame rate and processing rate and without regard for the truth of Petitioners' assertion, I do not see anything in Dunton or Yong that discusses using distance as a factor in varying frame rate. Dunton's discussion of decreasing resolution of images or cropping and resizing images for video image capture is not based on distance of the subject object to the camera but rather on the goal of reducing data per image frame "so that a greater frame rate can be achieved between the digital camera and the host computer." (Ex. 1006 at 1:35-43.) Similarly, Yong's discussion of reducing image size or resolution is based on the goal of reducing processing time and processing load (*see e.g.*, Ex. 1007 at 4:25-42; 6:6-15), not on the distance of the subject object to the camera. In my opinion, even assuming that Dunton and Yong related to varying the rate of the performance of processing steps (not simply frame rate), there is no disclosure of that variance being based on distance. In my opinion, a POSA would not be motivated to combine these references when distance based on the subject object's distance to the camera does not even factor into considerations regarding varying the rate of the steps performed on a video stream.

I reserve the right to offer opinions relevant to the validity of the 109 Patent claims at issue and/or offer testimony in support of this Declaration. I declare under the penalty of perjury under the laws of the United States of America that the foregoing is true and correct to the best of my knowledge based on the information available to me at this time, and that this declaration was executed on May 9, 2022.



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Dr. David Forsyth

# ATTACHMENT 1

## **Curriculum Vitae:**

**D.A. Forsyth**

### **Birth**

2 May, 1963, Cape Town, South Africa.

### **Degrees**

1. B.Sc., Electrical Engineering, U. of the Witwatersrand, Johannesburg, 1984
2. B.Sc., Electrical Engineering, U. of the Witwatersrand, Johannesburg, 1986
3. M.A., (procedural degree), Oxford University, 1989
4. D.Phil., Oxford University, 1989

### **Appointments**

1. Fellow, Magdalen College, Oxford, Jan. 1989-Jan. 1992
2. Assistant Professor, Dept. of Computer Science, U. of Iowa, Sept. 1991-Jul. 1994
3. Associate Professor, Dept. of Computer Science, U. of Iowa, July 1994-Jul. 1996
4. Assistant Professor, Dept. of Computer Science, U. of California, Berkeley, Jul. 1994-Jun. 1996
5. Associate Professor, Dept. of Computer Science, U. of California, Berkeley, Jul. 1996-Jun. 2002
6. Full Professor, Dept. of Computer Science, U. of California, Berkeley, Jul. 2002-Jun 2006
7. Full Professor, Dept. of Computer Science, U. of Illinois, Aug. 2004-Present
8. Fulton Watson Copp Chair in Computer Science, U. of Illinois, May 2014-Present

### **Honors and Awards**

1. Diocesan College Rhodes Scholar, 1985
2. National Science Foundation Research Initiation Award, 1992
3. National Science Foundation Young Investigator Award, 1992
4. Marr Prize, Best Paper at 1993 ICCV, 1993
5. Best Paper in Cognitive Computer Vision, ECCV, 2002
6. Okawa Foundation Fellowship, 2003
7. IEEE Technical Achievement Award, 2006
8. IEEE Fellow, 2009
9. ACM Fellow, 2014

## Consulting Activities

1. Consultant, intellectual property law firm, 65 hours billed, 1998-99
2. Consultant on retainer, FujiFilm Software CA, 2001-2006
3. Consultant, venture capital firm, 3 hours billed, 2002
4. Consultant, intellectual property law firm, 13 hours billed, 2003
5. Consultant, State's attorney's general, 1 hour, 2006
6. Technical Advisor, Euclid Media, 2007-2008
7. Technical Advisor, Animate-me, 2007-2008, helped them get NSF SBIR award.
8. Technical Advisor, Snap-and-buy, 2007-2008
9. Technical Advisor, Lumenous, 2015-present, helped them get NSF SBIR award.
10. Technical Advisor, Depix, 2020-present
11. Technical Advisor, Revery.ai, 2020-present
12. Consultant, Foley+Lardner, 2009-2010  
including reading and report preparation, 10 hours deposition, attendance at trial, about 4 hours direct examination at trial, about 2 hours cross examination at trial. Matter was 337-TA-680 in the ITC
13. Consultant, Sheridan and Ross (IP law firm), 2012-2013;  
including reading, search and report preparation; district court case number 6:11-cv-00494
14. Consultant, Fish and Richardson, 2014-2015  
including reading and report preparation, deposition in IPR invalidity, deposition on non-infringement, presenting to district court judge on technical tutorial. Matter was IpLearn-Focus, LLC vs Microsoft Corp, district court case number 3:14-cv-00151-JD. IPR's were IPR2015-00095; IPR2015-00096; IPR2015-00097.
15. Consultant, Irell and Manella, 2016-2018  
including reading, search and report preparation; 3 full day depositions; IPR petitions; *Legend3D, Inc. v. Prime Focus Creative Services Canada Inc.*, IPR2016-00806; *Prime Focus Creative Services Canada Inc. v. Legend3D, Inc.*, IPR2016-01243; and *Prime Focus Creative Services Canada Inc. v. Legend3D, Inc.*, IPR2016-01491.
16. Consultant, Klarquist Sparkman, 2019-current  
Including reading, search and report preparation for invalidity and non-infringement, for district court matter. 1 full day deposition. *Kewazinga Corp. v. Microsoft Corporation*, Southern District of New York, 1:2018-cv-04500 (SDNY)
17. Consultant, Scientific Advice to Apple, 2021
18. Consultant, Kerr, Russell and Weber,  
2020-current, *Innovision vs Autis*: engaged, but no actual work done and no income., 2021
19. Consultant, Oblon, 2021,  
Eagle View v. Nearmap, advice on some prior art. 2021
21. Consultant, Tensegrity Law group, 2021
22. Consultant, Quinn Emmanuel, 2021

## **Graduated PhD Students**

1. C.A. Rothwell (co advised with A. Zisserman)
2. J.Haddon
3. F.S.Cho
4. S.J. Chenney
5. S.Ioffe
6. P.Duygulu (co-advised)
7. O.Arikan
8. D.Ramanan
9. T.Berg (nee Miller)
10. J.Edwards
11. R.White
12. L.Ikemoto
13. N.Loeff
14. A.Farhadi
15. D.Tran
16. A.Sorokin
17. G.Wang
18. V.Hedau (joint with D. Hoiem)
19. B.Jones (joint with B. Bailey)
20. R.Sodhi (joint with B. Bailey)
21. K.Karsch
22. A.Sadeghi
23. Z.Liao
24. S. Singh
25. D. Tsatsoulis
26. J. Liu
27. J. Rock
28. A. Deshpande
29. M. Vasileva
30. D. Roberts (joint with M. Golparvar Fard)

## **Editorial Boards**

1. Associate Editor, IEEE Trans. Multimedia
2. Editorial Board, Int. J. Computer Vision
3. Associate Editor, IEEE Trans Pattern Analysis and Machine Intelligence, 2 terms
4. Associate Editor, J. ACM, since 2011
5. Associate Editor, ACM Transactions on Graphics, since 2011



6. Editor in Chief, IEEE Trans. Pattern Analysis and Machine Intelligence, 2013-2017

## Service and Administration

1. Committee member, U.C. Berkeley Committee on Admissions, Enrollment and Preparatory Education, 1995-2001 (Dealt with the University's response to the UC Regents order on affirmative action; established now well-known new admission policy for UC Berkeley, currently being taken up by other UC campuses).
2. Committee member, U.C. Berkeley Rhodes and Marshall Scholarship Committee, 1999-2003.
3. Member, National Research Council Committee on Tools and Strategies for Protecting Kids from Pornography and Their Applicability to Other Inappropriate Internet Content. (3 years of hearings, both closed and public, and an extensive report that was very well received by the popular press)
4. Founder and Member, Executive Committee of the Board, Berkeley Foundation for Opportunity in Information Technology. (Foundation seeks to ensure that Demographics of California University Computer Science Departments reflects that of the state, by helping targeted schoolchildren improve their understanding of science and their college application packets; by offering scholarships; and by various other means.)
5. Program Co-Chair: ECCV2008, CVPR 2000, CVPR2011, CVPR2018, CVPR2021  
(Note: For vision conferences, program chairs cannot submit papers; PC is a major administrative task; CVPR2018 had approx. 5000 submissions and CVPR 2021 had approx. 7000 submissions)
6. General Co-Chair: CVPR2006, CVPR2015, ICCV2019
7. Associate Department Chair, UIUC CS Department, 2011-2015
8. Adjunct Professor, TTIC, 2015-ongoing
9. Scientific Advisory Board, Allen Institute for Artificial Intelligence, 2015-to date
10. Scientific Advisory Board, KAUST Visual Computing Institute, 2016-ongoing
11. Scientific Advisory Board, Baidu Research, 2017-ongoing
12. Editor in Chief, IEEE Trans. Pattern Analysis and Machine Intelligence, 2013-2017
13. Committee member, UIUC Senate Committee on Student Discipline, 2017-present
14. Ombud, CVPR, 2018-present
15. Member, 8'th Senate review commission, UIUC 2018-2019
16. Chair, UIUC Senate committee for Academic Freedom and Tenure, 2020-present
17. Technical Advisory board, Depix, 2019-present
18. Scientific advisor, Revery.ai, 2020-present
19. Moderator for Computer Vision, ArXiv, 2017(?) -present

20. Chair, search committee for EIC IEEE TPAMI, 2021

## US Patents

1. US 9330500 B2 Inserting objects into content, Kevin Karsch, Varsha Chandrashekhkar Hedau, David A. Forsyth, Derek Hoiem
2. US 8842118 B1 Automated image replacement using deformation and illumination estimation, Ryan White, David Forsyth
3. US 9,471,967, Relighting Fragments For Insertion Into Content, Kevin Karsch, Zicheng Liao, David Forsyth,

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2. Forsyth, D.A. and Ponce, J., *Computer Vision: A Modern Approach*, 2002. Chinese Language Edition
3. Forsyth, D.A. and Ponce, J., *Computer Vision: A Modern Approach*, 2002. Russian Language Edition
4. Forsyth, D.A. and Ponce, J., *Computer Vision: A Modern Approach*, 2002. Japanese Language Edition
5. Forsyth, D.A., Arikan, O., Ikemoto, L., O'Brien, J., and Ramanan, D., *Computational Studies of Human Motion: Part 1, Tracking and Motion Synthesis*, ISBN: 1-933019-30-1 178pp July 2006 (also available as *Foundations and Trends in Computer Graphics and Vision Volume 1 Issue 2/3* (255pp), 2006)
6. Forsyth, D.A. and Ponce, J., *Computer Vision: A Modern Approach* (2e), Prentice Hall, 2011 (heavily revised edition, about 50% new material)
7. Forsyth, D.A., *Probability and Statistics for Computer Science*, Springer Verlag, 2018
8. Forsyth, D.A., *Applied Machine Learning*, Springer Verlag, 2019

### Edited books

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2. *Computer Vision - ECCV 2008. 10'th European Conference on Computer Vision, Part II*, D.A. Forsyth, P.H.S. Torr and A. Zisserman, Springer Verlag LNCS 5303, 851pp., 2008
3. *Computer Vision - ECCV 2008. 10'th European Conference on Computer Vision, Part II*, D.A. Forsyth, P.H.S. Torr and A. Zisserman, Springer Verlag LNCS 5304, 893pp., 2008
4. *Computer Vision - ECCV 2008. 10'th European Conference on Computer Vision, Part II*, D.A. Forsyth, P.H.S. Torr and A. Zisserman, Springer Verlag LNCS 5305, 827pp., 2008
5. *Applications of Invariance in Computer Vision*, J.L. Mundy, A. Zisserman and D.A. Forsyth, (ed.s), Springer LNCS 825, 1994.
6. *Shape, contour and grouping in computer vision*, D.A. Forsyth, J.L. Mundy, R. Cipolla and V. DiGes'u (ed.s), Springer-Verlag LNCS 1681, 2000.

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