

UNITED STATES PATENT AND TRADEMARK OFFICE
PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.,
SAMSUNG ELECTRONICS AMERICA, INC., and
GOOGLE LLC

Petitioners

v.

EYESMATCH LTD.

Patent Owner

Case No. IPR2024-00810
U.S. Patent No. 8,982,110

Second Declaration of Dr. Lina Karam, Ph.D.

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I. INTRODUCTION

1. I have been asked to provide this Second Declaration in support of the '110 IPR. My opinions below are consistent with my first declaration and I address a few new issues raised by Patent Owner below.

2. Additional information regarding my background, qualifications, publications, and presentations is provided in my first declaration (Ex1003) and my CV, which is provided as Exhibit 1004.

II. TASK SUMMARY AND MATERIALS REVIEWED

3. In addition to the documents I reviewed for my first declaration (Ex. 1003), I have also reviewed Patent Owner's Response (Paper 27), Dr. Forsyth's declaration (Ex. 2013), and the materials listed below.

EX	Description
1001	U.S. Patent No. 8,982,110 to Ofer Saban and Nissi Vilcovsky (filed April 15, 2014 and issued March 17, 2015) (the "'110 Patent" or "Challenged Patent")
1002	File History of U.S Patent No. 8,982,110 (App. No. 14/253,831) ("'110 Patent File History")
1003	Expert Declaration of Dr. Lina J. Karam, Ph.D.
1004	Curriculum Vitae of Dr. Lina Karam, Ph.D.
1005	U.S. Patent Pub. No. 2011/0298910 to De Haan et al. (filed February 15, 2010 and published December 8, 2011) (" <i>Haan</i> ")
1006	U.S. Patent Pub. No. US 2007/0040033 to Rosenberg (filed September 26, 2006 and published February 22, 2007) (" <i>Rosenberg</i> ")

Second Declaration of Dr. Lina Karam, Ph.D.
IPR of U.S. Patent No. 8,982,110

EX	Description
1007	U.S. Patent Pub. No. 2011/0246329 to Geisner et al. (filed April 1, 2010 and published October 6, 2011) (“ <i>Geisner</i> ”)
1008	WO Patent Pub. No. 2006/108279 to Lizee et al. (filed April 11, 2006 and published October 19, 2006) (“ <i>Lizee</i> ”)
1009	Institute for Robotics and Intelligent Systems, Alexandre R.J. Francois, <i>Software Architecture for Computer Vision: Beyond Pipes and Filters</i> (July 2003) (“ <i>Francois</i> ”)
1010	Hartley et al., <i>Multiple View Geometry in Computer Vision</i> (2nd ed., published 2004) (“ <i>Hartley</i> ”)
1011	U.S. Patent Pub. No. 2007/0065039 to Park et al. (filed September 22, 2006 and published March 22, 2007) (“ <i>Park</i> ”)
1012-1017	[Reserved]
1018	Excerpts from EyesMatch Ltd.’s and Memomi Labs Inc.’s Objections and Responses to First Set of Interrogatories of Meta Platforms, Inc., Instagram, LLC, and WhatsApp Inc. (Nos. 1-4) in <i>EyesMatch Ltd. v. Facebook, Inc.</i> , No. 1:21-cv-00111-RGA-JLH (D. Del.) (“Excerpts from Patent Owner’s Infringement Contentions in the Meta Litigation”)
1019	Excerpts from Plaintiffs EyesMatch Ltd.’s Disclosure of Asserted Claims and Infringement Contentions in <i>EyesMatch Ltd. v. Samsung Electronics America, Inc.</i> , No. 2:23-cv-00363-JRG-RSP (E.D. Tex.)
1020	<i>EyesMatch Ltd. v. Samsung Electronics America, Inc.</i> , No. 2:23-cv-00363-JRG-RSP (E.D. Tex.), Docket Control Order, Dkt. No. 27
1021	U.S. Patent No. 8,982,109 to Nissi Vilcovsky and Ofer Saban (filed March 15, 2013 and issued March 17, 2015) (the “’109 Patent”)
1022	File History of U.S Patent No. 8,982,109 (App. No. 13/843,001) (“’109 Patent File History”)
1023	U.S. Provisional Patent Application No. 61/738,957 (filed December 18, 2012)

Second Declaration of Dr. Lina Karam, Ph.D.
IPR of U.S. Patent No. 8,982,110

EX	Description
1024	File History of U.S. Provisional Patent Application No. 13/088,369 (filed April 17, 2011)
1025	U.S. Provisional Patent Application No. 60/656,884 (filed March 1, 2005)
1026	U.S. Provisional Patent Application No. 60/656,885 (filed March 1, 2005)
1027	James D. Foley et al., <i>Computer Graphics: Principles and Practice</i> (2nd ed. in C, published 1995) (“Foley”)
1028	Excerpts from Alan Watt, <i>3D Computer Graphics</i> (3rd ed., published 2000) (“Watt”)
1029	Declaration of Sylvia D. Hall-Ellis, Ph. D. (“Hall-Ellis Declaration”)
1030	Patent Owners EyesMatch Ltd., Memomi Labs Inc.’s Preliminary Response in <i>Meta Platforms, Inc., Instagram, LLC, and WhatsApp Inc. v. EyesMatch Ltd., Memomi Labs Inc.</i> , IPR2022-00490, Paper 9 (“Patent Owner’s Preliminary Response in the Meta IPR2022-00490”)
1031-1034	[Reserved]
1035	Alexandre R.J. François et al. <i>A handheld mirror simulation</i> , 2003 International Conference on Multimedia and Expo. ICME '03. Proceedings (Cat. No.03TH8698), Baltimore, MD, USA, 2003, pp. 1-4, doi: 10.1109/ICME.2003.1221724 (“Francois 2”)
1036	[Reserved]
1037	Matthias Straka et al., <i>A Free-Viewpoint Virtual Mirror with Marker-Less User Interaction</i> , Scandinavian Conference on Image Analysis SCIA 2011, pp. 635–45 (“Straka”)
2008	<i>EyesMatch Ltd. v. Samsung Electronics America, Inc.</i> , No. 2:23-cv-00363-JRG-RSP (E.D. Tex.), Magistrate Claim Construction Order, Dkt. No. 56
2012	Transcript of Deposition of Dr. Lina J. Karam (February 26, 2025)

Second Declaration of Dr. Lina Karam, Ph.D.
IPR of U.S. Patent No. 8,982,110

EX	Description
2013	Declaration of Dr. David Forsyth in Support of Patent Owner EyesMatch Ltd.'s Response to Petition for <i>Inter Partes</i> Review of U.S. Patent No. 8,982,110

4. The opinions stated in this declaration are from the perspective of a person of ordinary skill in the art (POSITA).

III. TECHNOLOGY BACKGROUND

5. In my first declaration (Ex. 1003), I provided a technology background section which outlined the properties of a conventional mirror and transformations used to emulate a conventional mirror with a digital mirror. Ex. 1003, ¶¶42-67.

6. In its Patent Owner's Response (Paper 27), Patent Owner states that the Board should construe the "mirror tracking mode" limitation to mean "a mode of operation in which the user sees their reversed reflection appearing at roughly double the distance from the camera and the reflection maintains roughly the same size regardless of the user movement." Paper 27 at 11-14. As stated in my first declaration (Ex. 1003) and throughout my deposition (Ex. 2012), this construction is consistent with how a POSITA would have understood the "mirror tracking mode" limitation. Below I provide clarification on the properties of a conventional mirror and the well-known aspects of emulating such a mirror with a digital mirror. As outlined in my first declaration and throughout my deposition, the prior art discloses the mirror tracking limitation, and my opinions are consistent with this construction proposed by Patent Owner.

A. TRANSFORMING CAMERA-CAPTURED IMAGES TO MIMIC MIRROR REFLECTIONS WAS WELL KNOWN

7. A POSITA would have recognized that a camera-captured image is different from a mirror reflection in a number of ways that might make the camera

image seem unconvincing to be perceived as a mirror-like image. For example, even the '109 Patent itself, in the background section (which is incorporated by reference into the '110 Patent), explains a camera-captured image is different from a mirror reflection such that it might not be “a reliable image of the individual as if he was looking at himself in a conventional mirror.” '109 Patent (Ex. 1021), 1:61-2:48. As discussed in the prior art cited in the Petition and my declaration, such as Rosenberg, as well as the '109 Patent itself, there are several reasons for this difference.

8. *First*, the '109 Patent explains that, in a camera image, a user typically appears larger as the user approaches the camera. However, a user's reflection in a mirror stays the same size as the user approaches the mirror, as illustrated in Figure 5B below:

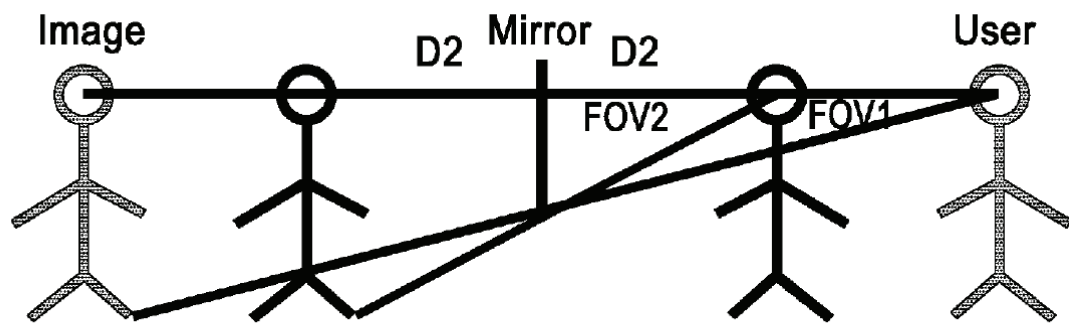


FIG. 5B

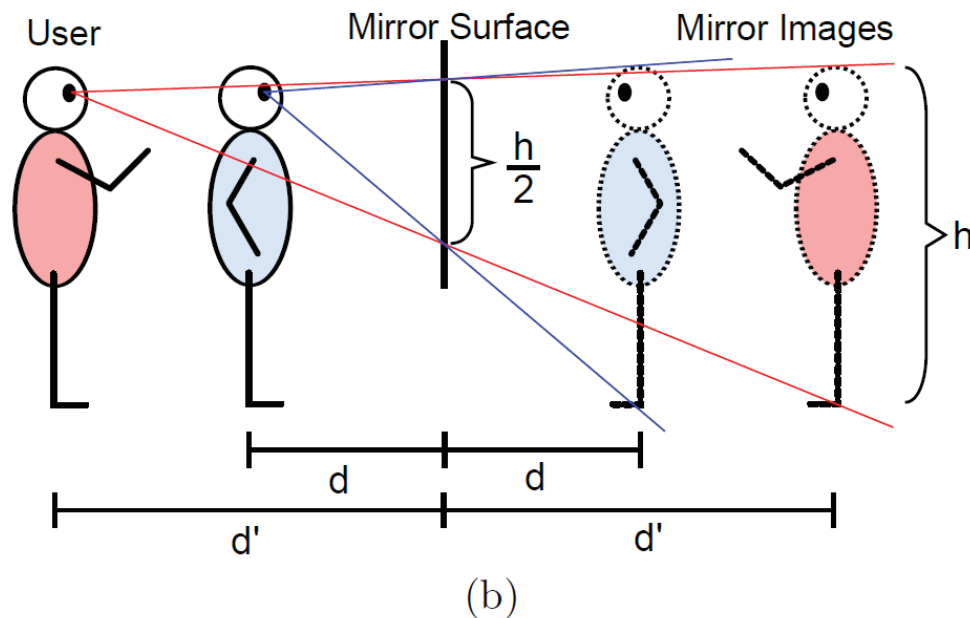
'109 Patent (Ex. 1021), Fig. 5B; *see also* '109 Patent (Ex. 1021), 2:19-27, 23:60-65.

9. The user reflection staying the same size as the user approaches the mirror, was well known to a person of ordinary skill in the art at the time of the '110

Patent. For example, *Straka* (Ex. 1037), which was published in the 2011 Scandinavian Conference on Image Analysis (SCIA 2011), explains:

A virtual mirror needs to simulate the properties of a real mirror as accurate as possible. When standing in front of a mirror at a distance d , the mirror image of oneself appears exactly at the same distance but behind the mirror. However, even though this distance can change, the size of the user in the mirror image when projected on the mirror surface stays constant at half the height h of the user.

Straka (Ex. 1037), 637. *Straka* illustrates this effect in Figure 1(b) below:



Straka (Ex. 1037), Fig. 1(b).¹

10. To simulate the constant-size mirror effect using a digital camera, *Straka* describes setting the focal length f of a virtual camera to be proportional to the user-mirror distance d . *Straka* (Ex. 1037), 641. Similarly, *Rosenberg* (Ex. 1006) describes this understanding in the art, and discloses a digital mirror system that simulates a real mirror. See, e.g., *Rosenberg* (Ex. 1006), [0027]-[0028]. For example, *Rosenberg* discloses scaling real-time video images captured by the camera so that they appear like traditional, life-size mirror images. *Rosenberg* (Ex. 1006), [0077].

11. *Second*, the '109 Patent explains “when the user approaches the mirror, the reflection of his eyes will always stay on the same virtual line into the mirror. Conversely, depending on a camera’s height, as the user gets closer to the camera, the user’s eyes may appear at different levels.” ’109 Patent (Ex. 1021), 2:29-33.

12. This eye level mirror effect was also well known to a person of ordinary skill in the art and accounted for in prior art digital mirror systems. For example,

¹ Caption of *Straka*’s Figure 1(b): “When the user has a distance d from the mirror, the mirror image appears at the same distance behind the mirror. The height of the mirror image on the mirror surface always is half the height h of the user and does not depend on the distance d .” *Straka* (Ex. 1037), Fig. 1(b), 637.

Straka discloses approximating the position of a user's eyes. *Straka* (Ex. 1037), 640-41. Similarly, *Rosenberg* discloses a camera mounted at eye level "provide[s a] user with a natural and accurate visual perspective of himself or herself as compared to a traditional mirror." *Rosenberg* (Ex. 1006), [0027], [0028] ("[E]mbodiments of the present invention often strive to achieve placement of the camera such that the image captured by the camera is taken from a vantage point ... that generally corresponds with a user's typical eye level."), [0075] ("image captured by the camera 402 is taken from a vantage point that is centered horizontally with respect to the display screen and at an elevation vertically that generally corresponds with a user's typical eye level.").

13. *Third*, the '109 Patent explains that, when one looks at a mirror, one's image appears to be reversed left and right, but not top and bottom. '109 Patent (Ex. 1021), 2:33-40. This mirror effect was also well known to a person of ordinary skill in the art, and left-right inversion was performed on camera-captured images to mimic mirror reflections. For example, *Rosenberg* discloses inverting left-right camera-captured images by flipping the image pixels around a vertical axis so that the right side of the user appears on the right side of the display, and the left side of the user appears on the left side of the display (from the user's perspective). *Rosenberg* (Ex. 1006), [0003], [0025]-[0027], [0035], [0041], [0061], [0077], [0083]. This is also shown in Figure 5 of *Rosenberg* below:

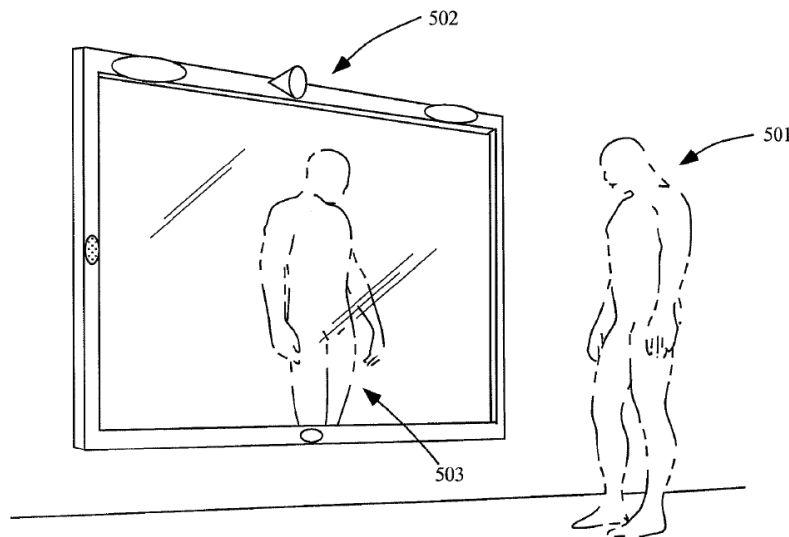


Fig. 5

Rosenberg (Ex. 1006), Fig. 5, [0077].

14. Thus, a POSITA would understand that when a prior art reference talks about a digital mirror emulating a traditional mirror or a conventional mirror, it would have the properties of a conventional mirror, such as reversed reflection, appearing at roughly double the distance, and maintaining roughly the same size regardless of the user movement.

B. TRANSFORMING CAMERA-CAPTURED IMAGES TO MATCH A CAMERA POINT OF VIEW TO A VIRTUAL MIRROR POINT OF VIEW
MATCHING USER'S VIEWPOINT WAS WELL KNOWN

15. Further, it was well-known in the art and common knowledge to a POSITA on how to transform camera-captured images to emulate mirror images. Thus, the very nature of transforming camera-captured images to match a certain

point of view was not novel, and was a well-known technique that would have been applied by a POSITA when emulating a traditional mirror with a virtual mirror.

16. By way of example of this well-known technique, *Francois 2* (Ex. 1035) which was published in the 2003 IEEE International Conference on Multimedia & Expo (IEEE ICME 2003), explains that “[w]hen a person looks into a planar mirror, they see what they would see from the symmetrical (virtual) point of view” and that “the image perceived by the viewer on the mirror surface is a perspective projection on the mirror plane with respect to the virtual viewpoint.” *Francois 2* (Ex. 1035), 2.1 (Mirror geometry). This is illustrated below:

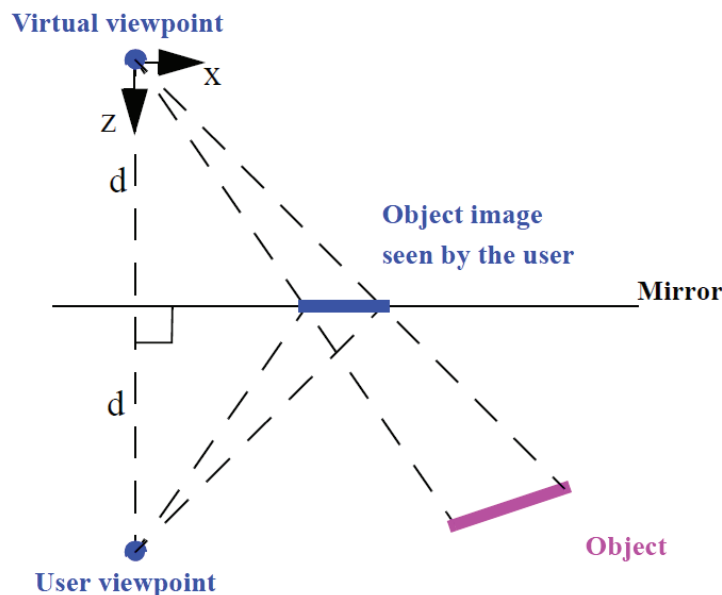


Figure 2. Mirror geometry.

Francois 2 (Ex. 1035), Fig. 2.

17. With the world coordinate system taken to be centered at the virtual viewpoint, as shown in Figure 2 above, *Francois 2* explains that the relationship

between the world coordinates (x, y, z) of a point (e.g., point on the object or user in Figure 2) and the coordinates (x_p, y_p) of the point's projected image on the mirror plane, with the center of projection being the virtual viewpoint, can be represented as shown below:

$$\begin{bmatrix} U_p \\ V_p \\ W_p \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1/d & 0 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \\ 1 \end{bmatrix} \quad \begin{aligned} x_p &= U_p / W_p = dx/z \\ y_p &= V_p / W_p = dy/z \end{aligned}$$

where d is the orthogonal distance of the viewpoint to the mirror plane. *Francois 2* (Ex. 1035), 2.1 (Mirror geometry), Fig. 2.

18. Thus, in this example, given a camera with a camera center positioned at (t_x, t_y, t_z) in the world coordinate system, and with a camera image plane that coincides with the mirror plane (i.e., mirror plane is at a distance equal to camera focal length f from camera center), and with camera coordinate axes whose directions coincide with the world coordinate axes, let (x'_p, y'_p) be the coordinates of the projected image of the point (x, y, z) on the camera image plane, which also coincides with the mirror plane, with respect to the camera center. This is illustrated by the red dot on the mirror imaging plane in Figure 5 below.

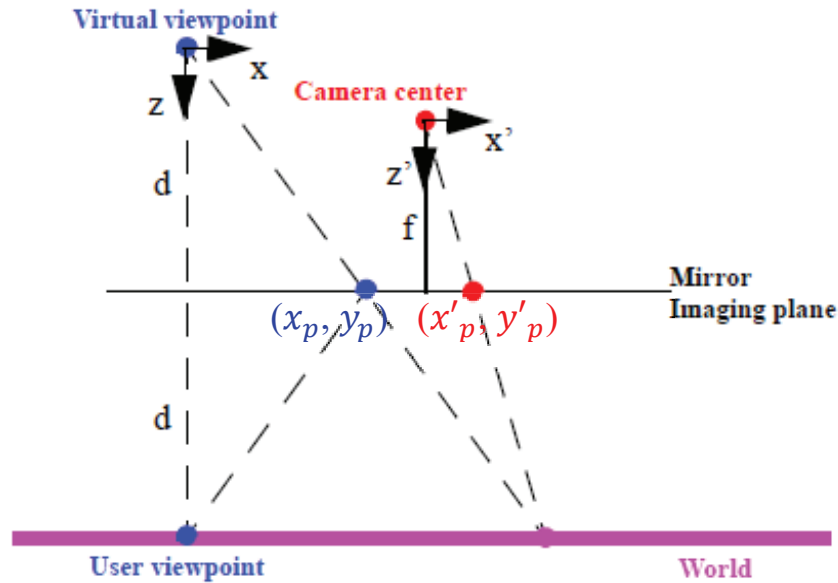


Figure 5. Flat world assumption.

Francois 2 (Ex. 1035), Fig. 5 (annotated).

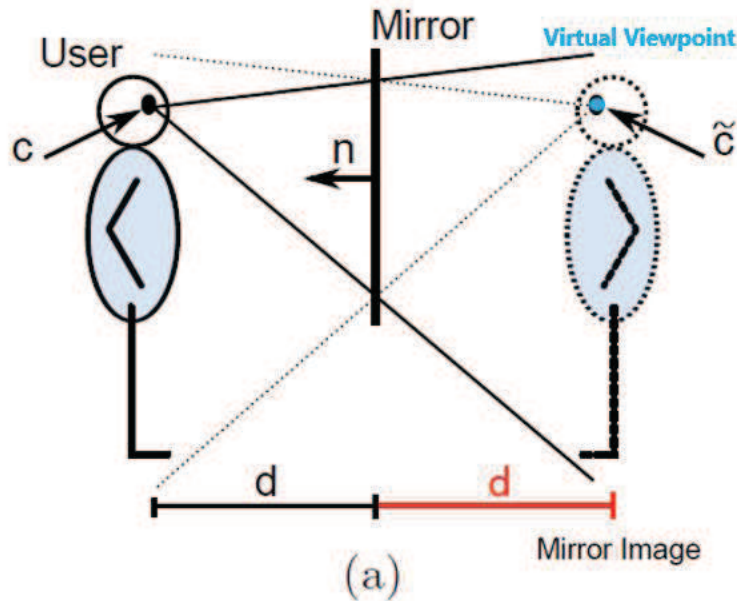
19. *Francois 2* explains that, in order to synthesize the mirror images corresponding to the user's viewpoint from the images captured by the camera, the coordinates of the camera image (x'_p, y'_p) with respect to the camera center (see red dot on mirror imaging plane in Figure 5 above) and the coordinates (x_p, y_p) of the images corresponding to the user's viewpoint (see blue dot on mirror imaging plane in Figure 5 above) must be related geometrically. *Francois 2* (Ex. 1035), 2.3 (User view synthesis). As taught by *Francois 2*, this relationship is represented by the equations below:

$$x_p = d((f + d)x'_p / f + t_x) / ((f + d) + t_z)$$
$$y_p = d((f + d)y'_p / f + t_y) / ((f + d) + t_z)$$

where f is the camera focal length, (t_x, t_y, t_z) is the location of the camera center, and d is the orthogonal distance of the user's viewpoint to the mirror plane. *Francois 2* (Ex. 1035), 2.3 (User view synthesis). Using the equations above, the points (x_p, y_p) of the mirror projection image can be obtained by geometrically transforming the points (x'_p, y'_p) of the camera-captured image. *Francois 2* (Ex. 1035), 2.3 (User view synthesis).

20. Thus, as discussed above, a POSITA would have understood the well-known technique of how to transform camera-captured images to mirror images.

21. As another example, like *Francois 2*, *Straka* also teaches simulating a mirror image based on a virtual camera position that mirrors the user's eyes' position. *Straka* (Ex. 1037), 4.3 (Virtual Mirror Camera). This is illustrated in the figure below, where the "position $\tilde{\mathbf{c}}$ of the virtual camera is simply a mirrored version of the position of the eyes $\mathbf{c}$," d represents the distance between the user and the mirror surface, and $\mathbf{n}$ represents the mirror normal:



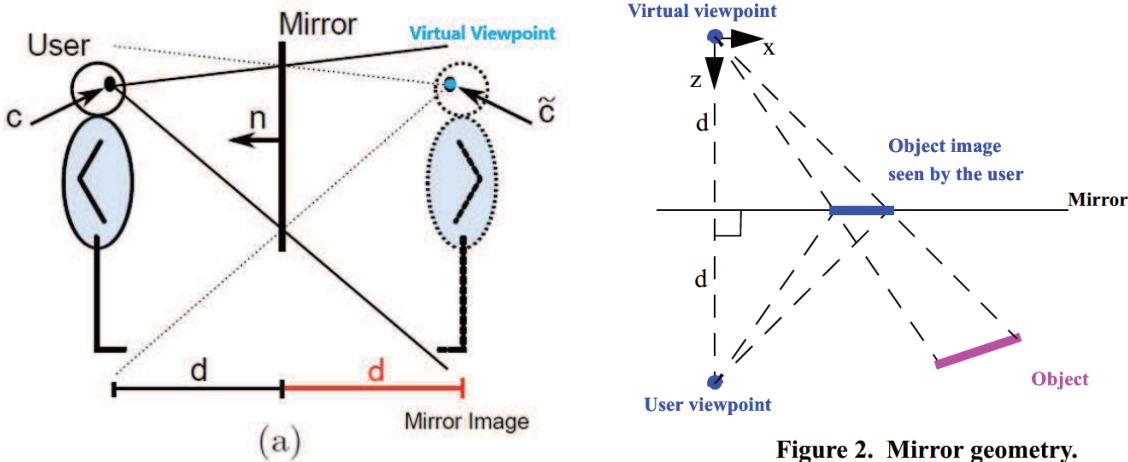
Straka (Ex. 1037), Fig. 4(a) (annotated).

22. *Straka* teaches calculating an optically correct mirror image from the user's view point using a virtual projection matrix $\tilde{P} = \tilde{K}[\tilde{R}|\tilde{t}]$, where $\tilde{R}$ is a rotation matrix to transform the camera's point of view to be normal to the mirror and such that the horizontal and vertical axes of the camera coordinate system coincide with the horizontal and vertical axes of the mirror plane, $\tilde{t}$ is a translation vector corresponding to the virtual camera position $\tilde{c}$, and $\tilde{K}$ is an intrinsic matrix that mirrors and projects the scene to a display. *Straka* (Ex. 1037), 4.3 (Virtual Mirror Camera), Fig. 4(a). Again, a POSITA would have been aware of this well-known technique when trying to emulate a traditional mirror with a digital mirror as described in the prior art. See, e.g., *Haan* (Ex. 1005), Abstract, [0006], [0024],

[0057], [0063]; *Rosenberg* (Ex. 1006), Abstract, [0027], [0037], [0077]-[0079], claim 1.

C. IT WAS WELL KNOWN IN THE ART THAT A MIRROR REFLECTION APPEARS AT ROUGHLY DOUBLE THE DISTANCE AND MAINTAINS ROUGHLY THE SAME SIZE.

23. There is no dispute that within the foundational understanding of digital mirror systems a POSITA would have known that the mirror reflection appears at roughly double the distance and maintains the same size. For instance, both *Straka* and *Francois 2* acknowledge that the virtual camera in a digital mirror should be positioned approximately symmetrically to the user's viewpoint—aligning with the virtual reflection of the user's eye position, as illustrated below. *Straka* (Ex. 1037), Fig. 4(a); *Francois 2* (Ex. 1035), Fig. 2.



Straka (Ex. 1037), Fig. 4(a) (annotated); *Francois 2* (Ex. 1035), Fig. 2.

24. A POSITA would have understood that to mimic the behavior of a mirror, the camera center of the virtual camera (virtual viewpoint) is set to be located

symmetrically at a distance from the user equal to twice the distance between the user and the screen, denoted as d . As taught by *Francois 2* and *Straka*, this configuration results in the virtually imaged user appearing at approximately twice that distance—i.e., $2d$ —from the user. *Francois 2* (Ex. 1035), 2.1 (Mirror geometry) (teaching that “when a person looks into a planar mirror, they see what they would see from the symmetrical (virtual) point of view”), Fig. 2; *Straka* (Ex. 1037), 4.3 (Virtual Mirror Camera), Fig. 4(a), Equation (4).

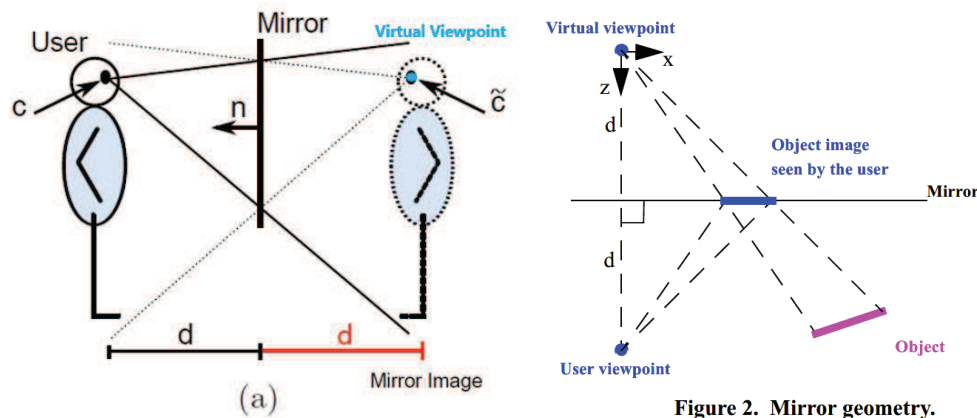
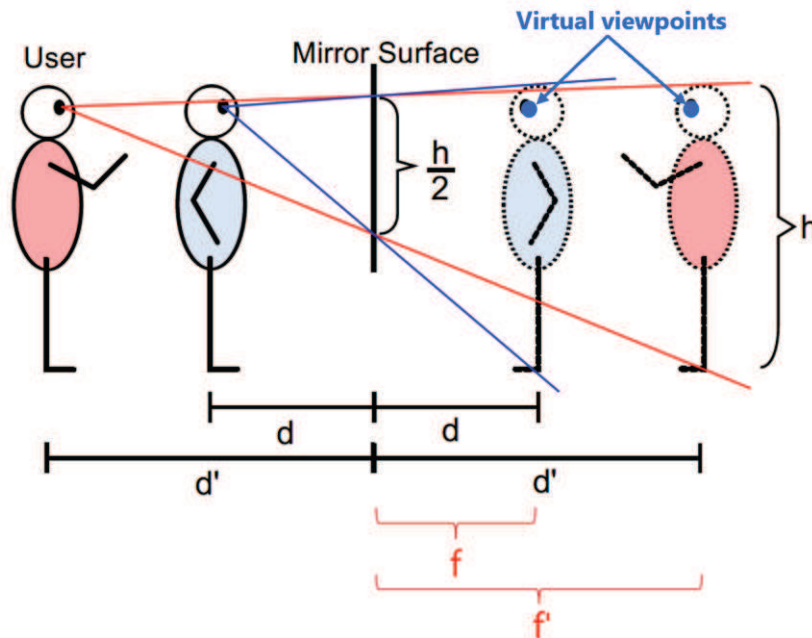


Figure 2. Mirror geometry.

Straka (Ex.1037), Fig. 4(a) (annotated); *Francois 2* (Ex. 1035), Fig. 2 (annotated).

25. Furthermore, a POSITA would recognize that when the virtual focal length matches the user-to-screen distance d , the displayed image maintains its apparent size (e.g., $h/2$) as shown in the illustration below.



Straka (Ex.1037), Fig. 1(b) (annotated).

26. A POSITA would have understood that when the virtual camera center (virtual viewpoint) is placed from the user at a distance ($2d$) that is double the user-to-screen distance (d) with the virtual camera image plane coinciding with the mirror image plane (i.e., virtual camera focal length $f=d$), the displayed image on the screen appears at half the size of the user regardless of the user's movement toward or away from the screen.

27. A POSITA would have further understood that achieving the effect of a virtual camera centered at the virtual viewpoint located at $(x=0, y=0, z=0)$ with a focal length f set to d can be accomplished through a straightforward transformation, as taught by *Francois 2*. The representative transformation from the

3D world coordinate system (x, y, z) to the camera image plane coordinate system (x_p, y_p) is illustrated by the following matrix multiplication:

$$\begin{bmatrix} U_p \\ V_p \\ W_p \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1/d & 0 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \\ 1 \end{bmatrix} \quad \begin{aligned} x_p &= U_p / W_p = dx/z \\ y_p &= V_p / W_p = dy/z \end{aligned}$$

Francois 2 (Ex. 1035), 2. From the equations above, a POSITA would understand that, when the user is at a distance d from the mirror imaging plane, which coincides with the camera image plane ($f = d$), the user is located at a distance $z = 2d$ from the virtual viewpoint (virtual camera center) and the size of the imaged user stays constant in the virtual mirror image since replacing, in the equations above, y (the vertical dimension) with the user height h and replacing z with $2d$ (the user's distance from the virtual viewpoint) gives $y_p = h/2$, which indicates that the user's height in the mirror plane image is constant and is perceived to be half the user's height. *Francois 2* (Ex. 1035), 2; *see also Straka* (Ex.1037), Fig. 1(b).

28. Additionally, as explained in ¶¶ 17-18 *supra*, *Francois 2* teaches that the image captured by a camera with a fixed focal length f , positioned arbitrarily at coordinates (t_x, t_y, t_z) , can be transformed to a mirror image by simulating a virtual camera located at the virtual viewpoint at double the distance from the user, with an effective focal length equal to d . A POSITA would understand that, under this

transformation, each pixel (x'_p, y'_p) in the captured image is mapped to a new position (x_p, y_p) in the transformed (or displayed) image, in accordance with the equations provided below:

$$x_p = d((f + d)x'_p / f + t_x) / ((f + d) + t_z)$$
$$y_p = d((f + d)y'_p / f + t_y) / ((f + d) + t_z)$$

Francois 2 (Ex. 1035), 3.

29. Thus, as discussed above, a POSITA would have known that such a transformation leads to the imaged user being perceived to be at double the distance and of constant height independent of the distance of the user. *Francois 2* (Ex. 1035), 2.3 (User View Synthesis).

30. Accordingly, a POSITA would have recognized that applying the transformation as described above would result in a digital mirror in which the user sees their reversed reflection appearing at double the distance from the camera and the reflection maintains the same size regardless of the user movement, consistent with the Magistrate Claim Construction Order (Ex.2008).

D. OCCCLUSION EFFECT

31. Patent Owner attempts to distinguish the references (*Haan* and *Rosenberg*) by arguing that “moving a camera toward or away from a scene is not equivalent to making an image larger or smaller.” *Forsyth Dec.* (Ex. 2013) at ¶¶ 65,

117; *see also, id.* at ¶¶62-64, 79. Dr. Forsyth further concludes that “Haan contains a gross error [(i.e., magnifying or zooming changes point of view)] in describing camera properties such that a POSITA would be disinclined to rely on Haan alone or in combination to meet limitation 1(f).” *Id.* at ¶¶ 79.

32. Contrary to Dr. Forsyth’s allegation, a POSITA would recognize that omitting occlusion effects is a widely accepted approximation, as also taught by *Francois 2*. *Francois 2* (Ex. 1035), 2.3 (User View Synthesis) at 3 (teaching that “[s]ince we are designing our mirror as a first person interaction tool, we assume that the center of interest is the user himself, and that the background is of lesser importance. We thus model the world as a plane parallel to the mirror/imaging plane, at the same distance as the user’s viewpoint (see figure 5).”), Fig. 4 (teaching occlusion can lead to an “underconstrained problem”), Fig. 5 (teaching a “simpler approximation approach” for modeling the environment based on the assumption that the user is the center of interest and that the background is less important, avoiding thus the need for more complex 3D world modeling for the considered application).

33. Notably, none of the references discussed in this IPR and the related IPR2024-00856—including the ’109 and ’110 Patents—analyzes occlusion effects in the context of digital mirror devices.

34. Indeed, *Francois 2* explicitly adopts a flat world assumption and effectively disregards the subtle variations introduced by occlusion effects. *Francois 2* (Ex. 1035) at 3. Similarly, the '109 Patent (Ex. 1021) itself disregards the occlusion effects, stating that “performing **tilt, elevation, and scale** translations provides a **rather convincing image** that only needs to be right-to-left reversed to **very effectively mimic a mirror reflection.**” '109 Patent (Ex. 1021), 24:3–9. Therefore, for the considered virtual mirror application with a user being imaged, a POSITA would not regard *Haan*’s moving point of view as a “gross error” and would consider *Haan*—and the other references cited in the IPRs—as rendering the concept of changing the point of view obvious, despite the subtle differences between image scaling and actual viewpoint shifts.

35. In addition, Patent Owner’s position is misplaced because the occlusion effect concerns whether and how a particular portion of the background is obscured by objects placed in front of it. However, in construing “mirror tracking mode,” the Magistrate Claim Construction addresses how “the user sees their reversed reflection appearing ...”. Magistrate Claim Construction Order (Ex. 2008), 41.

IV. **CONCLUSION**

36. In signing this Declaration, I understand that it will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I understand that I may be subject to cross-

examination in this case, and that any cross-examination will take place in the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

37. I declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and that those statements were made with the knowledge that willful false statements and the like so made are punishable by fine, imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Executed on May 29, 2025.

A handwritten signature in black ink, appearing to be 'Lina Karam', is written over a horizontal line.

Dr. Lina Karam, Ph.D.