

**UNITED STATES PATENT AND TRADEMARK OFFICE**

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**BEFORE THE PATENT TRIAL AND APPEAL BOARD**

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Microsoft Corporation,  
Petitioner,

v.

EyesMatch Ltd.,  
Patent Owner.

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Case No. IPR2025-00297

Patent No. 8,982,109

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**PETITION FOR *INTER PARTES* REVIEW  
OF U.S. PATENT NO. 8,982,109**

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## TABLE OF EXHIBITS

| Exhibit  | Description                                                                                                              |
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| Ex. 1001 | U.S. Patent No. 8,982,109 to Vilcovsky et al. (“the ’109 Patent”)                                                        |
| Ex. 1002 | Prosecution History of U.S. Patent No. 8,982,109                                                                         |
| Ex. 1003 | Curriculum Vitae of Lina J. Karam, Ph.D.                                                                                 |
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| Ex. 1005 | U.S. Patent Application Publication No. 2007/0040033 to <i>Rosenberg</i> (“ <i>Rosenberg</i> ”)                          |
| Ex. 1006 | Japanese Patent Application Publication No. 2007006016 to <i>Nakazawa</i>                                                |
| Ex. 1007 | Certified Translation of Japanese Patent Application Publication No. 2007006016 to <i>Nakazawa</i> (“ <i>Nakazawa</i> ”) |
| Ex. 1008 | Japanese Patent Application Publication No. 2010177777 to <i>Hatanaka</i>                                                |
| Ex. 1009 | Certified Translation of Japanese Patent Application Publication No. 2010177777 to <i>Hatanaka</i> (“ <i>Hatanaka</i> ”) |
| Ex. 1010 | U.S. Patent No. 6,816,187 to <i>Iwai</i> et al. (“ <i>Iwai</i> ”)                                                        |
| Ex. 1011 | U.S. Patent Application Publication No. 2011/0292018 to <i>Kubota</i> et al. (“ <i>Kubota</i> ”)                         |
| Ex. 1012 | U.S. Patent Application Publication No. 2008/0239107 to <i>Cho</i> (“ <i>Cho</i> ”)                                      |
| Ex. 1013 | U.S. Patent Application Publication No. 2008/0253685 to <i>Kuranov</i> et al. (“ <i>Kuranov</i> ”)                       |
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| Ex. 1016 | U.S. Patent Application Publication No. 2007/0065039 to <i>Park</i> et al. (“ <i>Park</i> ”)                             |
| Ex. 1017 | International Application Publication No. WO 2006/108279 to <i>Lizee</i> et al. (“ <i>Lizee</i> ”)                       |

| Exhibit  | Description                                                                                                                                                                                                                                                                                        |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ex. 1018 | U.S. Patent Application Publication No. 2008/0297589 to Kurtz et al. (“ <i>Kurtz</i> ”)                                                                                                                                                                                                            |
| Ex. 1019 | U.S. Patent Application Publication No. 2010/0226531 to Goto (“ <i>Goto</i> ”)                                                                                                                                                                                                                     |
| Ex. 1020 | U.S. Patent Application Publication No. 2003/0146901 to Ryan (“ <i>Ryan</i> ”)                                                                                                                                                                                                                     |
| Ex. 1021 | U.S. Patent No. 9,013,477 to Schmeitz et al. (“ <i>Schmeitz</i> ”)                                                                                                                                                                                                                                 |
| Ex. 1022 | U.S. Patent Application Publication No. 2011/0298910 to Haan et al. (“ <i>Haan</i> ”)                                                                                                                                                                                                              |
| Ex. 1023 | Matthias Straka et al., <i>A Free-Viewpoint Virtual Mirror with Marker-Less User Interaction</i> , Scandinavian Conference on Image Analysis SCIA 2011: Image Analysis, pp. 635-45 (“ <i>Straka</i> ”)                                                                                             |
| Ex. 1024 | U.S. Patent Application Publication No. 2007/0132863 to <i>Deguchi</i> (“ <i>Deguchi</i> ”)                                                                                                                                                                                                        |
| Ex. 1025 | U.S. Patent Application Publication No. 2013/0044188 to Nakamura (“ <i>Nakamura</i> ”)                                                                                                                                                                                                             |
| Ex. 1026 | 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 LLC (Nos. 1-4) in <i>EyesMatch Ltd. et al. v. Facebook, Inc. et al.</i> , Case No. 1:21-cv-111-RGA-JLH (D. Del. July 2, 2021) |
| Ex. 1027 | <i>Meta Platforms, Inc. f/k/a Facebook, Inc. et al. v. EyesMatch Ltd. et al.</i> , IPR2022-00489, Paper 9 (PTAB May 9, 2022).                                                                                                                                                                      |
| Ex. 1028 | U.S. Patent Provisional Application No. 60/656,884 to Vilcovski (“the ’884 Provisional”)                                                                                                                                                                                                           |
| Ex. 1029 | U.S. Patent Provisional Application No. 60/656,885 to Vilcovski (“the ’885 Provisional”)                                                                                                                                                                                                           |
| Ex. 1030 | U.S. Patent Provisional Application No. 61/738,957 to Vilcovsky [sic] et al. (“the ’957 Provisional”)                                                                                                                                                                                              |
| Ex. 1031 | U.S. Patent Application Publication No. 2012/0229616 to Koike (“ <i>Koike</i> ”)                                                                                                                                                                                                                   |

| Exhibit  | Description                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ex. 1032 | U.S. Patent Application Publication No. 2009/0051779 to Rolston (“ <i>Rolston</i> ”)                                                                                                                                                                                                                                                                                                                                     |
| Ex. 1033 | Eriko Iwabuchi et al. <i>Smart Makeup Mirror: Computer-Augmented Mirror to Aid Makeup Application</i> . In: Jacko, J.A. (eds) Human-Computer Interaction. Interacting in Various Application Domains. HCI 2009. Lecture Notes in Computer Science, vol 5613. Springer, Berlin, Heidelberg. <a href="https://doi.org/10.1007/978-3-642-02583-9_54">https://doi.org/10.1007/978-3-642-02583-9_54</a> (“ <i>Iwabuchi</i> ”) |
| Ex. 1034 | U.S. Patent Application Publication No. 2011/0210970 to Segawa (“ <i>Segawa</i> ”)                                                                                                                                                                                                                                                                                                                                       |
| Ex. 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. II-745, doi: 10.1109/ICME.2003.1221724 (“ <i>François</i> ”)                                                                                                                                                          |
| Ex. 1036 | Mark J. T. Smith et al. <i>A study guide for Digital Image Processing</i> , 1997 by Scientific Publishers (“ <i>Smith</i> ”)                                                                                                                                                                                                                                                                                             |
| Ex. 1037 | Mahesh M. Subedar, et al. <i>Increased depth perception with sharpness enhancement for stereo video</i> , Proc. SPIE 7524, Stereoscopic Displays and Applications XXI, 75241B (17 February 2010) (“ <i>Subedar</i> ”)                                                                                                                                                                                                    |
| Ex. 1038 | U.S. Patent No. 8,139,892 to Watson (“ <i>Watson</i> ”)                                                                                                                                                                                                                                                                                                                                                                  |
| Ex. 1039 | U.S. Patent Application Publication No. 2011/0254691 to Ooi (“ <i>Ooi</i> ”)                                                                                                                                                                                                                                                                                                                                             |
| Ex. 1040 | U.S. Patent No. 9,355,585 to Tripathi et al. (“ <i>Tripathi</i> ”)                                                                                                                                                                                                                                                                                                                                                       |
| Ex. 1041 | U.S. Patent Application Publication No. 2009/0122195 to van Baar et al. (“ <i>van Baar</i> ”)                                                                                                                                                                                                                                                                                                                            |
| Ex. 1042 | U.S. Patent Application Publication No. 2007/0273787 to Ogino et al. (“ <i>Ogino</i> ”)                                                                                                                                                                                                                                                                                                                                  |
| Ex. 1043 | <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                                                                                                                                                                                                                                                                                    |

## I. Precise Relief Requested

Petitioner requests cancellation of claims 1-18 of U.S. Patent 8,982,109 based upon the following references:

| Exhibit | Reference                                                                                           | Prior-Art Status <sup>1</sup> |
|---------|-----------------------------------------------------------------------------------------------------|-------------------------------|
| 1005    | <i>Rosenberg</i> , U.S. Patent App. Publ.<br>2007/0040033; published February 22, 2007              | §102(b)                       |
| 1006    | <i>Nakazawa</i> , <sup>2</sup> Japanese Patent App. Publ.<br>2007006016; published January 11, 2007 | §102(b)                       |
| 1008    | <i>Hatanaka</i> , <sup>3</sup> Japanese Patent App. Publ.<br>2010177777; published August 12, 2010  | §102(b)                       |
| 1010    | <i>Iwai</i> , U.S. Patent 6,816,187; issued November 9,<br>2004                                     | §102(b)                       |
| 1011    | <i>Kubota</i> , U.S. Patent App. Publ. 2011/0292018;<br>published December 1, 2011                  | §102(b)                       |
| 1012    | <i>Cho</i> , U.S. Patent Appl. Publ. 2008/0239107;<br>published October 2, 2008                     | §102(b)                       |

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<sup>1</sup> Prior-art status assessed under pre-AIA §102.

<sup>2</sup> *Nakazawa* citations per certified translation (Ex. 1007).

<sup>3</sup> *Hatanaka* citations per certified translation (Ex. 1009).

| <b>Exhibit</b> | <b>Reference</b>                                                                                             | <b>Prior-Art Status<sup>1</sup></b> |
|----------------|--------------------------------------------------------------------------------------------------------------|-------------------------------------|
| <b>1013</b>    | <i>Kuranov</i> , U.S. Patent App. Publ. 2008/0253685;<br>published October 16, 2008                          | §102(b)                             |
| <b>1014</b>    | <i>Chang</i> , U.S. Patent App. Publ. 2007/0081208;<br>published April 12, 2007                              | §102(b)                             |
| <b>1016</b>    | <i>Park</i> , U.S. Patent App. Publ. 2007/0065039;<br>published March 22, 2007                               | §102(b)                             |
| <b>1017</b>    | <i>Lizee</i> , WO 2006/108279, published October 19,<br>2006                                                 | §102(b)                             |
| <b>1040</b>    | <i>Tripathi</i> , U.S. Patent No. 9,355,585, issued May<br>31, 2016, from an application filed April 3, 2012 | §102(e)                             |

Claims 1-18 are unpatentable under the following pre-AIA §103 grounds:

| <b>Ground</b> | <b>Claims</b>  | <b>References</b>                              |
|---------------|----------------|------------------------------------------------|
| 1             | 1-6, 8, 17     | <i>Rosenberg, Nakazawa</i>                     |
| 2             | 1-6, 8, 11, 17 | <i>Rosenberg, Nakazawa, Hatanaka</i>           |
| 3             | 1-6, 8, 17     | <i>Rosenberg, Nakazawa, Tripathi</i>           |
| 4             | 11             | <i>Rosenberg, Nakazawa, Tripathi, Hatanaka</i> |
| 5             | 7              | <i>Rosenberg, Nakazawa, Iwai</i>               |
| 6             | 7              | <i>Rosenberg, Nakazawa, Hatanaka, Iwai</i>     |

| Ground | Claims | References                                    |
|--------|--------|-----------------------------------------------|
| 7      | 7      | <i>Rosenberg, Nakazawa, Tripathi, Iwai</i>    |
| 8      | 9      | <i>Rosenberg, Nakazawa, Kubota</i>            |
| 9      | 9      | <i>Rosenberg, Nakazawa, Hatanaka, Kubota</i>  |
| 10     | 9      | <i>Rosenberg, Nakazawa, Tripathi, Kubota</i>  |
| 11     | 10     | <i>Rosenberg, Nakazawa, Cho</i>               |
| 12     | 10     | <i>Rosenberg, Nakazawa, Hatanaka, Cho</i>     |
| 13     | 10     | <i>Rosenberg, Nakazawa, Tripathi, Cho</i>     |
| 14     | 12     | <i>Rosenberg, Nakazawa, Park</i>              |
| 15     | 12     | <i>Rosenberg, Nakazawa, Hatanaka, Park</i>    |
| 16     | 12     | <i>Rosenberg, Nakazawa, Tripathi, Park</i>    |
| 17     | 13-15  | <i>Rosenberg, Nakazawa, Kuranov</i>           |
| 18     | 13-15  | <i>Rosenberg, Nakazawa, Hatanaka, Kuranov</i> |
| 19     | 13-15  | <i>Rosenberg, Nakazawa, Tripathi, Kuranov</i> |
| 20     | 16     | <i>Rosenberg, Nakazawa, Chang</i>             |
| 21     | 16     | <i>Rosenberg, Nakazawa, Hatanaka, Chang</i>   |
| 22     | 16     | <i>Rosenberg, Nakazawa, Tripathi, Chang</i>   |
| 23     | 18     | <i>Rosenberg, Nakazawa, Lizee</i>             |
| 24     | 18     | <i>Rosenberg, Nakazawa, Hatanaka, Lizee</i>   |
| 25     | 18     | <i>Rosenberg, Nakazawa, Tripathi, Lizee</i>   |

Each ground is discrete and presented with sufficient particularity. *Samsung Electronics Co., Ltd. et al v. Resonant Systems, Inc.*, IPR2023-00992, Paper 16 at

16-18 (Jan. 10, 2024) (30 grounds, 14 claims, each claim challenged no more than three times). Each claim is challenged under no more than three grounds because Petitioner relies on *Rosenberg*, *Hatanaka*, and *Tripathi* for unique mappings for limitation 1[h].

## II. Overview of the '109 Patent

### A. Specification

The '109 Patent describes “enabling appearance comparison” using “a mirror-display device” (LCD), “imaging device” (video camera), and “image control unit”:

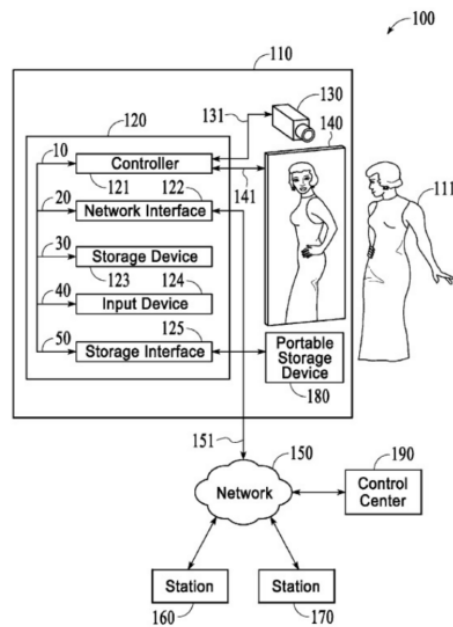


FIG. 1

'109 Patent, Fig. 1, 5:20–60, 6:33–57, 7:32–43, 18:27–32, 23:11–14. The camera can sit above the display tilted downwards. *Id.*, 15:26–31.

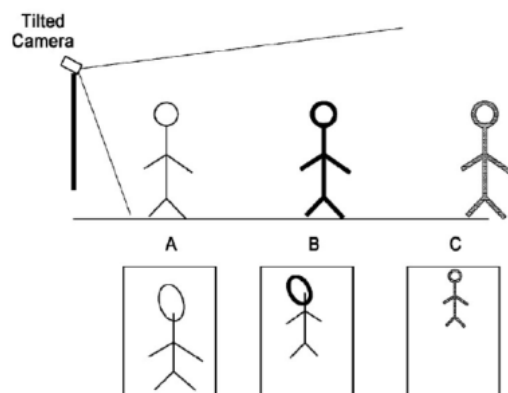


FIG. 8

*Id.*, Fig. 8. For “appearance comparison,” the mirror-display device “operate[s] selectably in two modes”: (i) “mirror mode” displaying images “in real time”; or (ii) “display mode” displaying already-captured images. *Id.*, 3:48–57, 5:61–6:32, 9:33–63, 12:62–14:5, 28:5–37, Fig. 4; Decl. ¶¶23–24.

The ’109 Patent describes performing transformation mapping to mimic a mirror reflection, including left-right flipping, geometric (e.g., tilt/projection), translation (elevation or horizontal offset), scaling, resizing for zoom, barrel-effect, and fish-eye. ’109 Patent, 3:39–47, 5:26–29, 14:6–11, 16:46–17:28, 18:19–21, 22:1–13, 23:41–24:9, 24:51–53, 25:48–51, 27:3–6, 28:5–10, 28:56–29:58, 30:52–67. The mapping “reassigns new addresses to each pixel of the original image” (*id.*, 29:28–32, 14:40–43), is triggered when a user is detected (*id.*, 18:40–57, 23:18–23, Figs. 9, 12), and is performed according to the distance between the user and camera/screen (*id.*, 27:41–28:4). Decl. ¶25. Such digital mirrors and transformations were well known. *Id.*, ¶¶36–52.

## **B. Priority Date**

The '109 Patent claims priority to a December 18, 2012, provisional.

Ex. 1002, 83; Ex. 1030; '109 Patent (Related U.S. Application Data). While it also claims priority to other earlier applications, they do not support several limitations, including “applying a transformation mapping.” Ex. 1028; Ex. 1029. The earliest priority date is December 18, 2012. Patent Owner previously claimed priority to December 18, 2012. Ex. 1026, 3; Ex. 1027, 13;<sup>4</sup> Decl. ¶¶28–35.

## **III. Level of Ordinary Skill**

A person of ordinary skill in the art (“POSITA”) as of December 18, 2012, would have a bachelor’s degree in electrical or computer engineering, or a closely related field such as computer science, and two years of work experience with image capture and processing systems or related fields. A person with less and/or different education, but more relevant practical experience, or vice versa, may also meet this standard. The prior art also evidences such level of skill. Decl. ¶¶65–67.

## **IV. Claim Construction**

Claims only need to be construed to the extent necessary to resolve a controversy. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017). No terms require construction because the claims encompass the prior-art mappings under any reasonable construction consistent with

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<sup>4</sup> Citation to exhibit page number.

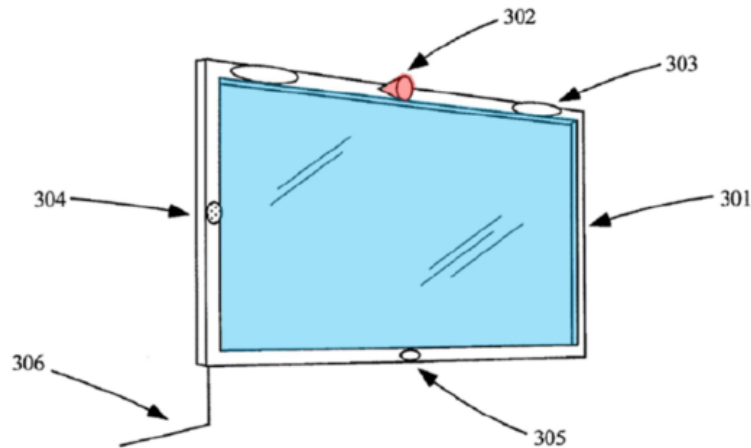
*Phillips*. 37 C.F.R. §42.100(b); *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc).<sup>5</sup>

**V. Claims 1–18 Are Unpatentable**

**A. Ground 1: *Rosenberg* and *Nakazawa* Render Obvious Claims 1–6, 8, and 17**

**1. *Rosenberg***

*Rosenberg* discloses a digital system that emulates a traditional mirror comprising a **display screen** (LCD) and **digital video camera** above the **screen**, centered horizontally, and aimed downward:

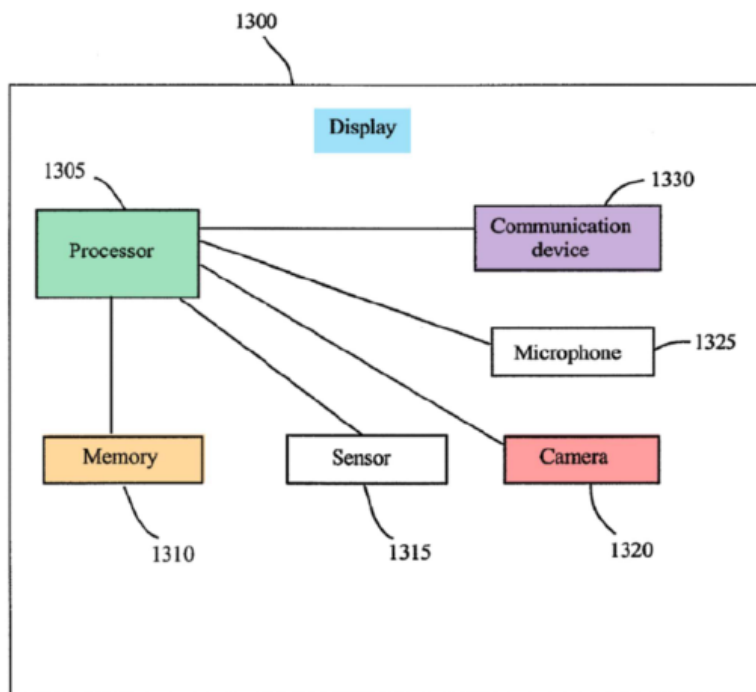


*Rosenberg*, Fig. 3<sup>6</sup>, Abstract, [0062]. It also includes a **processor** and **memory** that “achieve unique mirroring features” (*Rosenberg*, [0035]):

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<sup>5</sup> Petitioner does not waive §112 and claim scope arguments raised in litigation.

<sup>6</sup> Annotations added unless otherwise noted.



*Id.*, Fig. 13, [0074], [0109]. In its digital-mirror state, *Rosenberg*'s **camera** captures real-time video images, which are left-right inverted and scaled to give the user the impression of standing before a mirror:

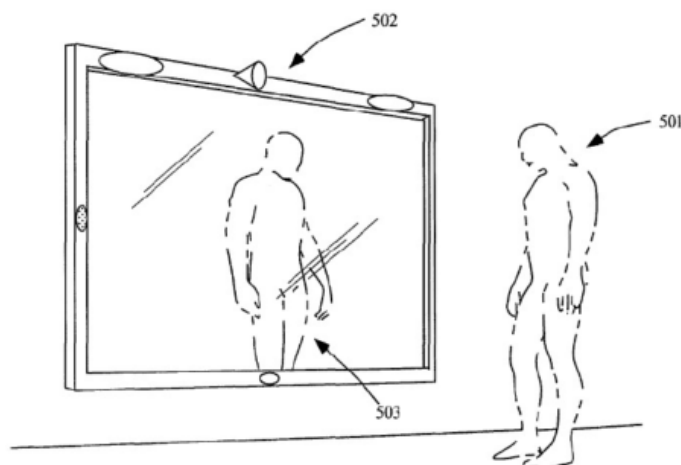


Fig. 5

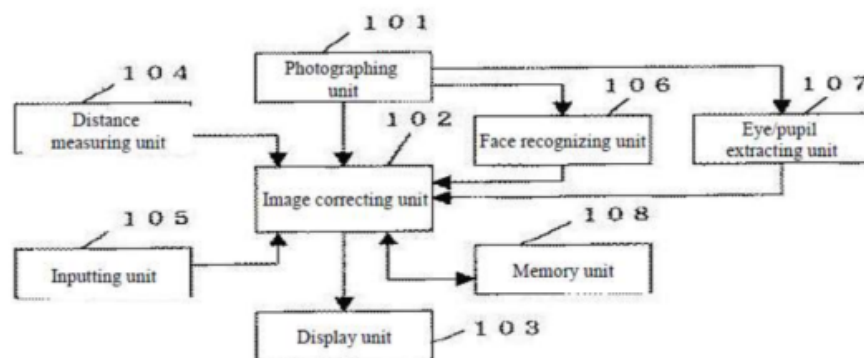
*Id.*, Fig. 5, [0077]; Decl. ¶¶70–73.

*Rosenberg*'s system also includes proximity sensors for detecting a user, and automatically engages digital-mirror functionality when the user is within a certain proximity range. *Id.*, [0025], [0032], [0056], [0069]–[0072]. Different sensors (e.g., digital camera) can be used. *Id.*, [0034], [0069], [0073], [0109], Fig. 13; Decl. ¶74.

## 2. *Nakazawa*

*Nakazawa* discloses a photographing device that corrects deviations in the orientation and/or line of sight in a captured image when (i) the camera is located above/below a display, and (ii) a user looks at the display during image capture. *Nakazawa*, [0001]–[0003], [0007]–[0008], [0030], [0032]. *Nakazawa*'s device includes a photographing unit (digital camera), display (LCD), image-correcting unit, distance-measurement unit, and memory unit, among others:

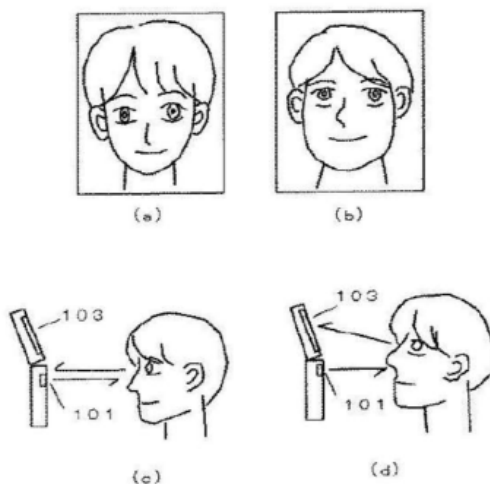
[FIG. 1]



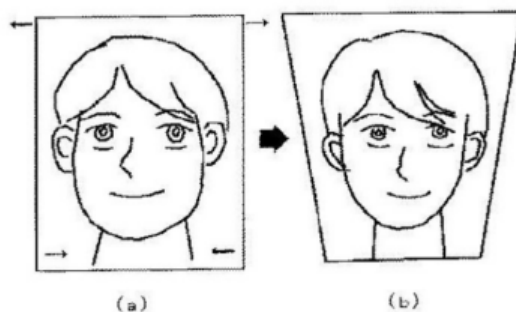
*Id.*, Fig. 1, [0030]; Decl. ¶¶75–76.

When a user looks at the camera during image capture (Fig. 2(c)), an image like Figure 2(a) is captured (“front orientation”). *Id.*, [0031]–[0033]. When the user looks at the display (Fig. 2(d)), a distorted image like Figure 2(b) is captured. *Id.*

[FIG. 2]



*Id.*, Fig. 2. To obtain an image with a front orientation when a user is not looking at the camera during capture, *Nakazawa* corrects the image based on face orientation by adjusting the size of different regions across the image’s field:



*Id.*, Fig. 3; *id.*, Fig. 4, [0033]–[0035]; Decl. ¶¶76–79.

### 3. Rationale to Combine

*Rosenberg* and *Nakazawa* are analogous, in the same field of endeavor as each other and the '109 Patent. Decl. ¶110.

A POSITA would have been motivated to use *Nakazawa*'s correction in *Rosenberg*'s system to reduce distortion and provide a realistic mirror image. Doing so would have: (i) provided “a more realistic replication of a true mirror image” by correcting unnatural image perspectives captured by an above-screen camera (*Rosenberg*, [0027]–[0028]); and (ii) “giv[en] users an increased view of the top of their head” (*id.*, [0027], [0061]) by allowing a user to switch between images (uncorrected and corrected) (*Nakazawa*, [0001]–[0005], [0032]–[0036]). Decl. ¶110.

*Rosenberg*'s system has “a traditional mirror mode” wherein the digital mirror “replicate[s] the performance of a standard household mirror, providing the user with a left-right reversed frontal image.” *Rosenberg*, [0025]–[0027], [0036]–[0039], [0061], [0077], [0083], [0109], [0113]–[0115]. In a first embodiment, the camera is above the screen, near center, whereas in a second embodiment, the camera is behind the display, approximately at eye level. *Id.*, [0027]. A POSITA would have been motivated to use *Nakazawa*'s transformation mapping with either to provide a more realistic mirror image. Decl. ¶111.

*Rosenberg* explains positioning the camera above the screen “provides the user with a view . . . from a somewhat unnatural perspective.” *Rosenberg*, [0027], [0061]. *Nakazawa* identifies this same “unnatural perspective” (*Nakazawa*, [0001]–[0003], [0008], [0034]), i.e., projective/perspective distortion, caused by different positions of the camera relative the user. As *Rosenberg* notes, however, an image “from a vantage point perfectly straight ahead” is preferred to better replicate a mirror image. *Rosenberg*, [0028], [0075]. A POSITA would have been motivated to use *Nakazawa*’s correction in *Rosenberg*’s first embodiment to correct unnatural perspectives so images appear to be taken from a frontal position (*id.*, [0028]), while allowing the user to view the head-top (*id.*, [0027], [0061]; *Nakazawa*, [0036]). Decl. ¶112.

While a POSITA would have understood the camera in *Rosenberg*’s second embodiment would have provided mirror images to a user, a POSITA would have nevertheless understood that the second embodiment requires complex hardware and precise alignment (*id.*, [0027], [0061], [0075]), and that instead using a camera above the display and implementing a software solution, like *Nakazawa*’s, would obviate the need for complex hardware and precise alignment. Decl. ¶114; *Elektro Ltd. v. ZAP Surgical Sys., Inc.*, 81 F.4th 1368, 1374 (Fed. Cir. 2023). A POSITA would also have been motivated to implement *Nakazawa*’s correction in

*Rosenberg*'s second embodiment to correct distortions from eye-level variations and improve user experience. Decl. ¶113.

A POSITA would have known how to incorporate *Nakazawa*'s correction into *Rosenberg*'s digital mirror functionality and would have expected success in doing so because it requires only ordinary skill. *Rosenberg*'s system is equipped for such modification; it includes an above-screen camera, processor for adjusting and/or modifying images, and memory accessible by the processor to store images. *Rosenberg*, [0006], [0027], [0035]–[0036], [0061]–[0062], [0074], [0078], Figs. 3, 13. *Rosenberg*'s processor can be a single microprocessor or a combination of hardware and software components, including programmable and hardwired processing components that facilitate image processing functionalities. *Id.*, [0006], [0026]–[0027], [0031]–[0051], [0056], [0070], [0073]–[0074], [0080]–[0093], [0099]–[0107], [0109], [0111], [0114], [0016]; Decl. ¶115.

Like *Rosenberg*, *Nakazawa*'s device captures and displays images. *Nakazawa*, Abstract, [0008]–[0011]. It includes an image-correction unit that receives images from a digital camera and modifies them for display. *Id.*, Abstract, [0030], [0034]–[0036], Fig. 1. It performs similar steps as in *Rosenberg*, including capturing and scaling an image, correcting distortion, and displaying. *Id.*, Fig. 7, [0017], [0027], [0041]–[0042]; Decl. ¶116.

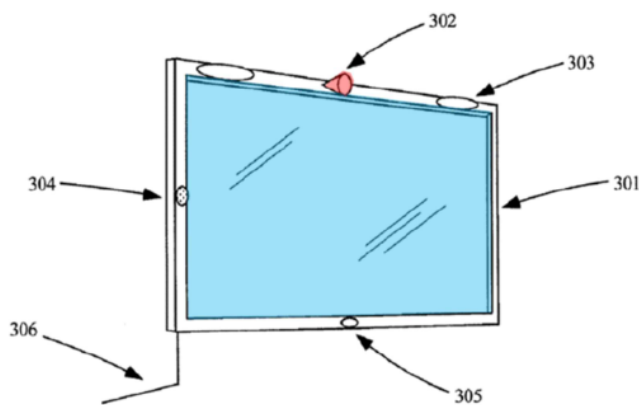
A POSITA would have understood *Nakazawa*'s image-correction unit would have been implemented by a processor configured to execute software programs. A POSITA would have understood *Rosenberg*'s processor would be capable of performing these steps since it is programmable and performs image processing routines. *Rosenberg*, [0035]; Decl. ¶116.

Moreover, *Nakazawa*'s correction can correct and present images in a video call (*Nakazawa*, [0002]–[0003]), which a POSITA would have known would be conducted in real-time. *Nakazawa*'s correction also can be automated to reduce processing time by registering the degree of magnification in memory. *Id.*, [0025], [0038]. A POSITA would have understood *Nakazawa*'s correction is a geometric transformation that includes pixel displacement and image scaling, like operations in *Rosenberg*, and *Nakazawa*'s correction would be easily added to *Rosenberg*'s process for displaying a real-time mirror image. *Rosenberg*, [0026], [0034]–[0052], [0109]–[0111]; Decl. ¶117.

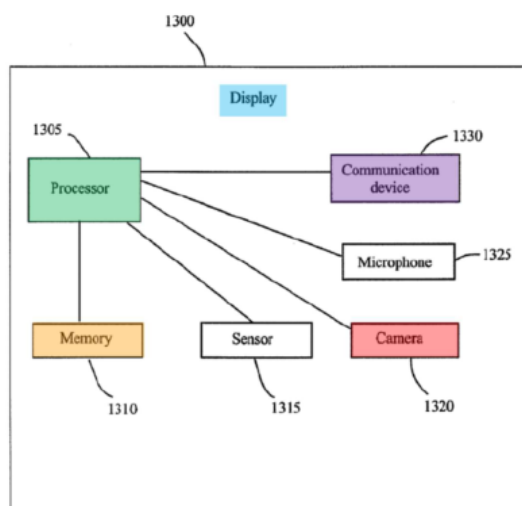
4. **Independent Claim 1**

- a. **1[pre]: “A method for operating a system having a monitor, a camera, and a processor, so as to display a mirror-mimicking image on the monitor, by performing non-ordered steps comprising:”<sup>7</sup>**

If the preamble is limiting, *Rosenberg* discloses it. Decl. ¶118. *Rosenberg*’s system includes a **camera**, **processor**, and **display** (*Rosenberg*, [0062], [0109]):



*Id.*, Fig. 3.



<sup>7</sup> Claim language is bold and italicized.

*Id.*, Fig. 13. *Rosenberg* discloses a method of operating that system “**to display a mirror-mimicking image.**” Decl. ¶¶119. *Rosenberg*’s system employs hardware and software to provide user-selectable mirroring capabilities. *Rosenberg*, [0025], [0035], [0036], [0054]–[0058]. In traditional-mirror mode, *Rosenberg*’s system (i) captures a video image; (ii) flips pixels around a vertical axis to invert the image to mimic a traditional mirror; (iii) scales the image; and (iv) displays the image so the user “is given the visual impression” of “standing before a traditional wall mirror”:

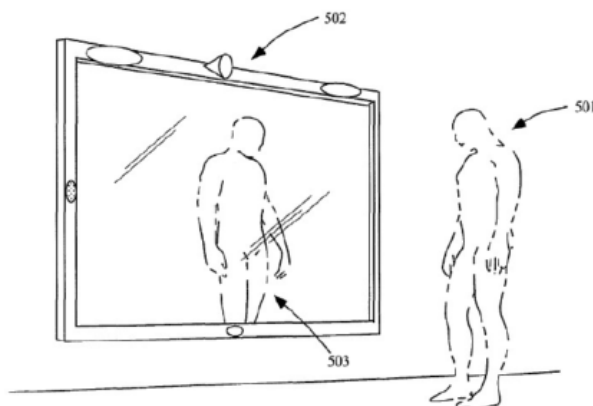


Fig. 5

*Id.*, Fig. 5, [0026], [0035], [0038], [0077].

**b. 1[a]: “obtaining a digital image from a camera;”**

*Rosenberg* discloses this limitation. Decl. ¶¶120–121. *Rosenberg*’s digital camera captures real-time digital video images. *Rosenberg*, [0026]–[0027], [0057], [0060]–[0062], [0077]. It is in communication with a processor, sending images to the processor. *Id.*, [0003], [0019], [0026]–[0027], [0035], [0038], [0050], [0060]–[0062], [0077], [0083], [0103]–[0106], Fig. 13. The processor modifies the images

to achieve mirroring features, e.g., left-right inversion, zooming, and composites, and sends those modified images to the display. *Id.*, [0035]–[0038], [0049]–[0052], [0061], [0074]–[0077], [0081]–[0083], [0089]–[0111], Figs. 5–12; Decl. ¶121.

*Rosenberg*’s system also includes a memory accessible by the processor that stores captured camera images. *Rosenberg*, [0035], [0068], [0074], [0109], Fig. 13. For example, *Rosenberg*’s processor can access video imagery in memory to effect its mirror-image freeze and/or mirror-image buffering features. *Id.*, [0035], [0039], [0044], [0055], [0068], [0074], [0089]; Decl. ¶121.

c. **1[b]: “*flipping the image about a vertical axis so as to reverse right and left sides of the image;*”**

*Rosenberg* discloses this limitation. Decl. ¶¶122–123. *Rosenberg*’s processor left-right inverts real-time digital video images from the camera by flipping pixels about a vertical axis, so the right side of the user is on the right side of the display, and the left side of the user is on the left side (from user’s perspective):

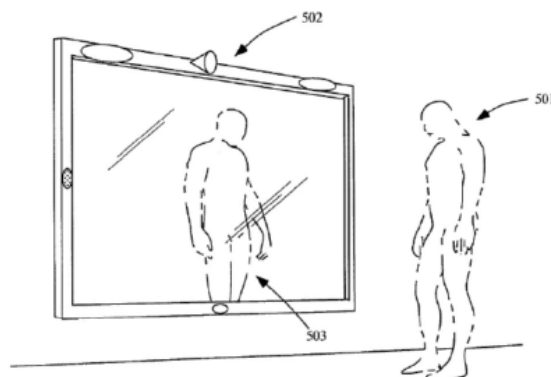


Fig. 5

*Rosenberg*, Fig. 5, [0003], [0026]–[0027], [0035], [0041], [0061], [0068], [0077], [0083]; Decl. ¶123.

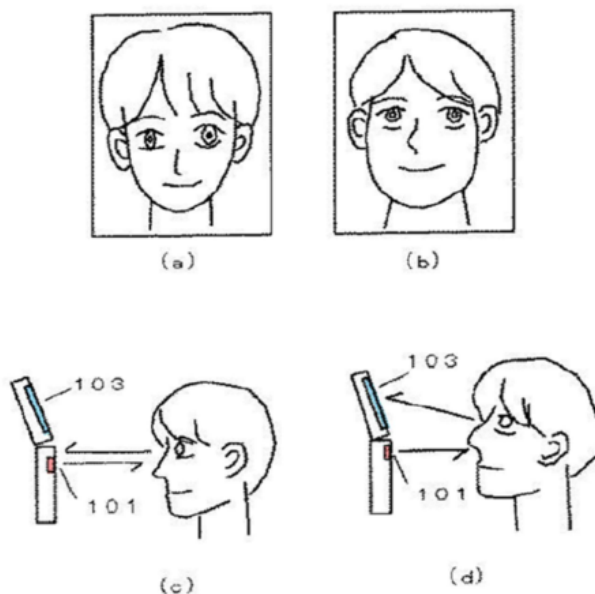
- d. 1[c]: “*applying a transformation mapping to the image to modify the image such that it appears to mimic a reflection of a mirror;*”

*Rosenberg* and *Nakazawa* render obvious this limitation. Decl. ¶¶124–129.

*Rosenberg* discloses flipping video images about a vertical axis and scaling them so the user has the impression of viewing a mirror (“*mimic a reflection of a mirror*”). Sections V.A.1, V.A.4.c, V.A.4.e; *Rosenberg*, [0003], [0026]–[0027], [0035], [0041], [0061], [0068], [0077], [0083]. A POSITA would have understood *Rosenberg*’s flipping and scaling are “*transformation mapping*,” for each maps the position of each pixel to a position of a corresponding pixel of a modified image. Decl. ¶125. Indeed, the ’109 Patent explains “*transformation mapping*” includes left-right flipping and scaling (’109 Patent, 22:1–13, 23:60–24:9, 24:51–53, 29:22–58). *Id.*

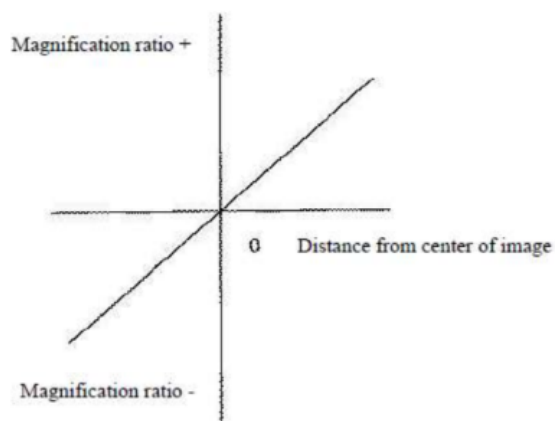
If the claims require additional transformations, this limitation would have been obvious over *Nakazawa*. Decl. ¶¶126–129. *Nakazawa* discloses correcting image distortion when the camera is above/below the display, and the user looks at the display during capture. *Nakazawa*, [0001]–[0003], [0008], [0032], [0034]. If a user looks at the **display** (not the **camera**) during capture (Figure 2(d)), a distorted image (Figure 2(b)) is captured. *Id.*, [0031]–[0032].

[FIG. 2]



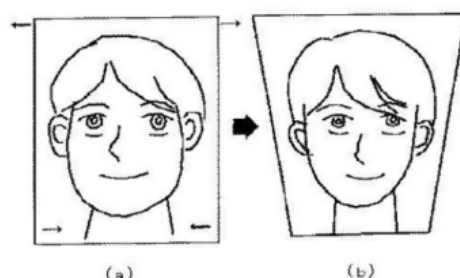
*Id.*, Fig. 2. To correct the distortion, and achieve a front orientation, *Nakazawa* discloses adjusting the size of different regions across the image's field by changing the magnification ratio of the image. *Id.*, [0033]–[0035], Figs. 3–4; Decl. ¶¶126–127.

[FIG. 4]



*Nakazawa*, Fig. 4; *id.*, [0033]–[0035], Fig. 3. This adjusts the distorted image, as in Figure 3(b):

[FIG. 3]



*Id.*, Fig. 3.

A POSITA would have understood *Nakazawa*'s correction is a perspective transformation because it corrects the image point-of-view to match the user point-of-view. Decl. ¶127. A POSITA would have recognized such transformation discloses “*applying a transformation mapping to the image*” because it requires mapping the positions of the pixels in an image with distortion (Figure 3(a)) to positions of corresponding pixels in a corrected image (Figure 3(b)). *Id.*, [0001]–[0003], [0008], [0032]–[0034], Figs. 2–3. Indeed, *Nakazawa*'s image correction performs the tilt and elevation transformations of the '109 Patent. Sections V.A.2, V.A.5–V.A.7; Decl. ¶127.

A POSITA would have understood *Rosenberg*'s above-screen, downward-aimed camera would cause the camera's point-of-view to be at an angle from the user's point-of-view, causing perspective distortion. *Park*, Fig. 1(c), [0007]. In

*Rosenberg-Nakazawa*'s transformation mapping, this distortion would have been corrected so the modified image would appear to be "from a vantage point perfectly straight ahead," ***resulting in "a more realistic replication"*** of a mirror ("to mimic a reflection of a mirror"). *Rosenberg*, [0028], [0075]; Section V.A.3; Decl. ¶128.

A POSITA would have been motivated to use *Nakazawa*'s transformation mapping in *Rosenberg* to correct the unnatural distortion in the image captured by *Rosenberg*'s camera with a reasonable expectation of success. Section V.A.3; Decl. ¶129.

e. **1[d]: "resizing the image to reduce variations caused by changes in object's distance to the camera;"**

*Rosenberg* discloses or at least renders obvious this limitation. Alternatively, *Rosenberg* and *Nakazawa* render obvious this limitation. Decl. ¶¶130–134.

Like the '109 Patent, *Rosenberg* discloses scaling real-time video images so they appear like life-size mirror images. *Rosenberg*, [0077]; '109 Patent, 2:4–48, 23:60–65, 17:19–23, 21:57–60, 23:65–24:9, 25:46–48, 30:3–11. A POSITA would have understood *Rosenberg*'s scaling would have adjusted the size of the image ("***resizing the image***") to mimic a mirror reflection even if the size of the image from the camera would vary with the user's distance to the camera ("***to reduce variations caused by changes in object's distance to the camera***"). Decl. ¶¶131–132.

A POSITA would have understood *Rosenberg*'s optical and/or digital zoom functions would also be suitable for resizing the camera image. *Id.*, [0050], [0100].

This is like the '109 Patent using the camera's zoom to compensate for distance changes. '109 Patent, 14:29–39, 16:17–29, 19:51–52; Decl. ¶133.

Further, *Rosenberg* and *Nakazawa* render obvious this limitation. *Nakazawa* discloses changing the user's image to a prescribed size (“**resizing the image**”). *Nakazawa*, [0027], [0042]. A POSITA would have understood this would “**reduce variations caused by changes in object's distance to the camera**” because it was known that the user's image size varies with distance. And a POSITA would have changed the image size in *Rosenberg* to a prescribed size, as in *Nakazawa*, so the image is like the size of a user in a traditional mirror. Decl. ¶134; Section V.A.3.

- f. 1[e]: “**displaying the image on the monitor after performing the flipping, transformation mapping, and resizing;**”

*Rosenberg* and *Nakazawa* render obvious this limitation. Decl. ¶¶135–139.

*Rosenberg* displays real-time video images after performing left-right inversion (“**flipping**”) and scaling/zooming (“**resizing**”):

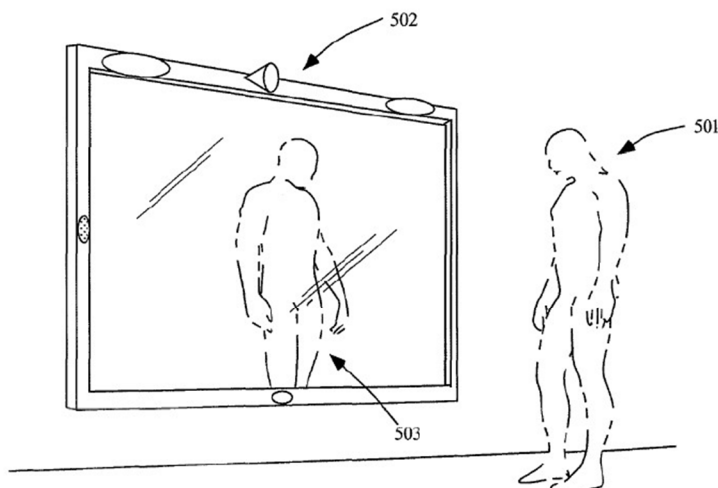
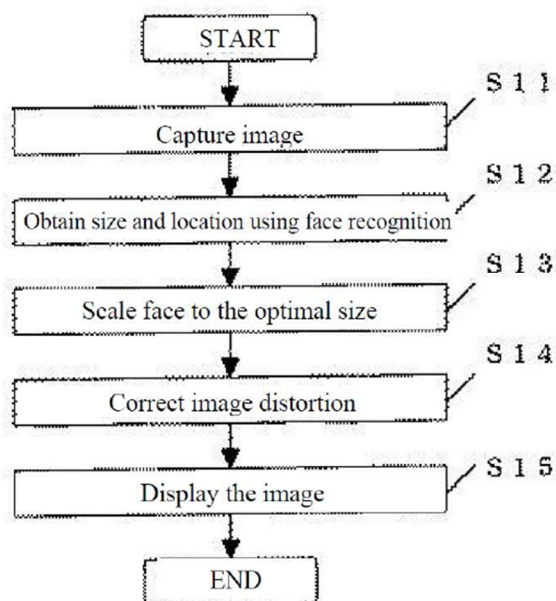


Fig. 5

*Rosenberg*, Fig. 5, [0026], [0035], [0038], [0050]–[0052], [0077]; Sections V.A.1, V.A.4.c, V.A.4.e; Decl. ¶136. *Nakazawa* also displays the image after resizing and distortion correction (“*transformation mapping*”):

[FIG. 7]



*Nakazawa*, Fig. 7, [0027], [0041]–[0042]; Sections V.A.2, V.A.4.d; Decl. ¶137.

When *Rosenberg* incorporates *Nakazawa*'s correction ("***transformation mapping***"), a POSITA would have understood that *Rosenberg*'s system would display the image after it has been flipped, transformed, and resized so the user would appear to be looking straight ahead, replicating a mirror image. *Rosenberg*, [0028], [0077]. A POSITA would have been motivated to implement *Nakazawa*'s correction in *Rosenberg*'s system with a reasonable expectation of success. Decl. ¶¶138–139; Section V.A.3.

g. 1[f]: "***wherein the non-ordered steps are performed on a series of images of a live video feed from the camera;***"<sup>8</sup>

*Rosenberg* and *Nakazawa* render obvious this limitation. Decl. ¶¶140–143.

The '109 Patent's digital camera captures live-video images. '109 Patent, 3:2–7, 5:26–29, 6:1–5, 22:4–13, 22:36–51, 24:22–34, 25:1–7, 28:5–37, 29:10–11, Figs. 9, 11–12. The processor obtains the video images from the camera, applies transformation mapping, and displays the modified images on the monitor in real-time ("***non-ordered steps***"). *Id.*, 22:36–51, 24:22–34, 28:5–15, Figs. 9, 11–12; Decl. ¶141.

Like the '109 Patent, *Rosenberg*'s processor obtains real-time video images from the digital camera ("***series of images of a live video feed from the camera***")

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<sup>8</sup> To the extent this limitation has discernible meaning, it at least includes obtaining images, modifying those images, and then displaying the modified images. '109 Patent, 3:2-7, 5:26-29, 6:1-5, 22:4-13, 22:36-51, 24:22-34, 25:1-7, 28:5-37, 29:10-11, Figs. 9, 11-12. The prior art discloses such "non-ordered steps."

and performs “*non-ordered steps*” on those images, including left-right inversion (“*flipping*”), scaling (“*resizing*”), and displaying the modified images in real-time to give the impression of “standing before a traditional wall mirror” (“*displaying*”). *Rosenberg*, [0006]–[0007], [0026]–[0027], [0035], [0038], [0055], [0060]–[0061], [0077], [0083], [0106], [0113], Fig. 5; Sections V.A.1, V.A.4.c–V.A.4.f. When *Rosenberg* incorporates *Nakazawa*’s correction, a POSITA would have understood that correction (“*transformation mapping*”) would have been performed with the “*flipping*” and “*resizing*” such that realistic mirror images are generated and displayed. *Rosenberg*, [0025]–[0027], [0036], [0055], [0060], [0077], [0083]; Decl. ¶142.

A POSITA would have been motivated to incorporate *Nakazawa*’s correction in *Rosenberg* with a reasonable expectation of success. Decl. ¶143; Sections V.A.3, V.A.4.d.

h. 1[g]: “*determining distance to a user appearing in the live video feed; and*”

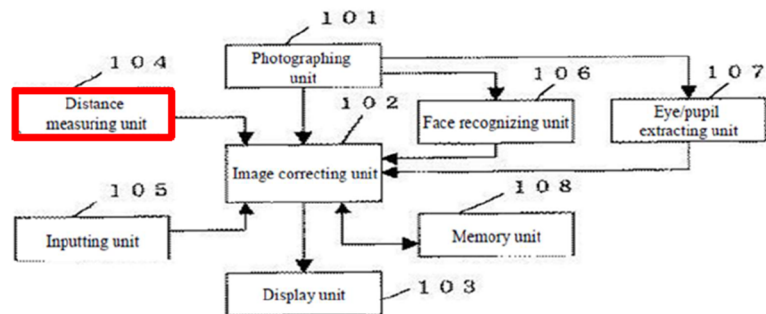
*Rosenberg* and *Nakazawa* render obvious this limitation. Decl. ¶¶144–148.

*Rosenberg*’s system includes proximity sensors. *Rosenberg*, [0025], [0032]–[0033], [0056], [0069]–[0073], [0109], [0114], Fig. 13. When the sensor detects a user within a proximity range, the system automatically engages its digital mirror functionality. *Id.* When the sensor detects the user is no longer before the mirror for a threshold amount of time, the system automatically switches to a digital picture

frame state or low power state. *Id.* The digital camera can be used alone or with other sensors to provide this functionality. *Id.*, [0034], [0069], [0073], [0109], Fig. 13; Decl. ¶145.

*Nakazawa* discloses a distance measuring unit that measures the distance between the camera and user, and outputs the measured distance to the image-correcting unit:

[FIG. 1]



*Id.*, Fig. 1, [0015], [0030], [0038]. *Nakazawa* determines a degree of magnification for image correction based on measured distance. *Id.*, [0038]; Decl. ¶146.

A POSITA would have found it obvious to incorporate *Nakazawa*'s distance measurement into *Rosenberg* because (i) *Rosenberg*'s proximity sensing encompasses a distance measurement, and (ii) determining distance allows *Rosenberg*'s proximity sensing to engage/disengage the digital mirror functionality. Decl. ¶147.

A POSITA would have also understood *Rosenberg*'s camera and processor would be suitable for implementing *Nakazawa*'s distance measurement. Methods for

measuring the distance between the camera and user, such as by identifying user features and estimating distance based on the features' sizes in images, were known (*Haan*, [0074]; *Lizee*, [0043]–[0046]; *Ooi* (Ex. 1039), [0074]; '109 Patent, 18:44–57, 24:63–25:7). Decl. ¶¶146–148.

When *Rosenberg*'s digital camera and processor are used to implement the distance measurement, a POSITA would have understood the user would appear in *Rosenberg*'s images (“*live video feed*”). A POSITA would have understood *Rosenberg*'s camera would capture the video images (“*live video feed*”) and send them to the processor for determining the user's distance to engage/disengage the digital mirror functionality. *Rosenberg*, [0025], [0056], [0061]–[0062], [0072], [0114]; Decl. ¶148.

- i. [h]: “*varying rate at which the non-ordered steps are performed on the series of images according to the distance.*”

*Rosenberg* and *Nakazawa* render obvious this limitation. Decl. ¶¶149–155. The '109 Patent discloses performing transformation mapping based on the user's distance to the camera. '109 Patent, 6:1–5, 15:4–58, 22:36–51, 24:22–34, 26:1–7. For example, the transformation mapping can be triggered when a user is detected in front of the camera or moving towards or away from the camera. *Id.*, 18:40–57, 23:18–23, 27:49–28:1; Figs. 9, 12. A POSITA would have understood this distance-dependent transformation mapping is “*varying [the] rate*” at which this step is

performed. A POSITA would have understood “*rate*” is the frequency of performing the mapping. ’109 Patent, 27:41–56 (“every x seconds”); *Rosenberg*, [0038] (update at rate of 60 Hz). And a POSITA would have understood, because determining whether to perform the transformation mapping is based on distance, the rate of performing the transformation would vary over a period of live video images as distance varies. Decl. ¶¶150–151.

*Rosenberg* in view of *Nakazawa* discloses such “*varying rate*.” *Rosenberg*’s system switches between operational modes/states based on distance. *Rosenberg*, [0025], [0032]–[0034], [0054]–[0056], [0069]–[0073], [0083], [0109], [0114]. Like the ’109 Patent, *Rosenberg*’s system automatically engages the digital mirror state if the user approaches or is in front of the display at a certain distance. *Rosenberg*, [0025], [0032]–[0033], [0054]–[0056], [0069]–[0073], [0109], [0114], Fig. 13. In the digital mirror state, a real-time image emulating a traditional mirror image is displayed. *Id.*, [0025]–[0027], [0035], [0077], [0082]. If the user is not in front of the display for a certain amount of time, *Rosenberg*’s system switches to a digital picture frame state, where the screen displays digital pictures. *Id.*, [0054]–[0056], [0112]–[0114]; Decl. ¶152.

*Rosenberg* and *Nakazawa* render obvious determining distance to the user in the live video feed to engage or disengage the digital mirror state. Section V.A.4.h. *Rosenberg* discloses, in the digital mirror state, the processor performs steps like

“*obtaining*” a digital image, performing left-right inversion (“*flipping*”), scaling (“*resizing*”), and displaying modified images in real-time (“*displaying*”). Sections V.A.1, V.A.4.b–V.A.4.c, V.A.4.e–V.A.4.f. A POSITA would have understood when *Rosenberg*’s digital mirror switches between the digital mirroring and digital picture frame states, the rate at which *Rosenberg*’s steps (“*the non-ordered steps*”) are performed on the real-time video images (“*the series of images*”) would vary. This is because *Rosenberg*’s steps are not performed at every set time interval over a period of the real-time video images, but rather depending on the distance of the user to the camera/screen (“*according to the distance*”). Decl. ¶¶153–154.

When *Rosenberg* incorporates *Nakazawa*’s correction (“*transformation mapping*”), a POSITA would have understood the combined steps would include *Nakazawa*’s transformation mapping. Sections V.A.4.d; V.A.3. A POSITA would have understood the combined steps would be performed on the real-time video images captured by *Rosenberg*’s digital camera at a rate varying according to distance. Decl. ¶155.

5. **Claim 2**

- a. “*The method of claim 1, wherein the transformation mapping renders an image appearing to have been taken from a camera positioned at eye-level height and pointing horizontally.*”

*Rosenberg* and *Nakazawa* render obvious this limitation. Decl. ¶¶156–163. The ’109 Patent explains above-display cameras cause projection distortion:

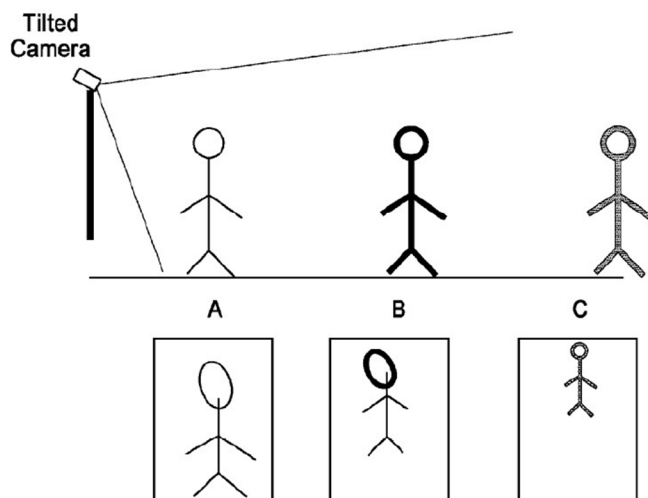
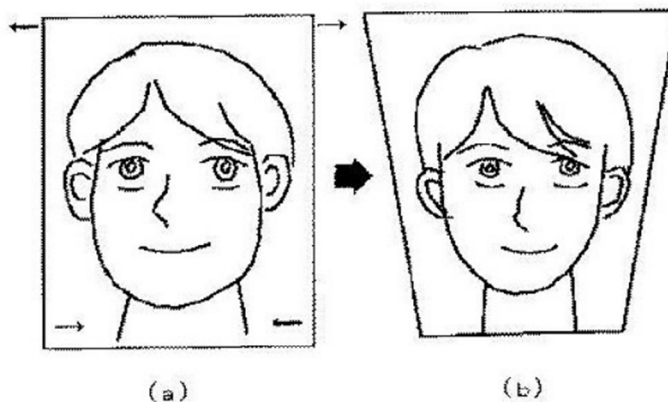


FIG. 8

'109 Patent, Fig. 8, 15:30–35. The '109 Patent discloses transformation mapping, e.g., tilt transformation, to correct distortion so the modified image appears as if the camera was pointed straight horizontally. *Id.*, 23:41–51, 25:52–59, 29:22–42. It also describes transformation mapping, e.g., elevation transformation, to modify the offset in the image and transform the image to appear as if it was taken at the user's eye level. *Id.*, 23:52–58, 29:22–42; Decl. ¶157.

*Nakazawa* similarly teaches when the camera is positioned above or below the display, the orientation of the face captured by the camera appears “unnatural.” *Nakazawa*, [0002]–[0003]. *Nakazawa*'s correction (“**transformation mapping**”) fixes the deviation and obtains a “corrected image appearing to be captured with front orientation.” *Id.*, [0007]–[0008], [0019], [0030], [0033]–[0035], [0038].



*Id.*, Fig. 3. A POSITA would have understood *Nakazawa*'s corrected image appears to have been taken from a camera “***pointing horizontally***” because the user in the corrected image appears to be looking straight. Decl. ¶¶158–159. Indeed, *Rosenberg*'s downward-facing camera creates an image that appears wider in parts closer to the camera and narrower in parts further from the camera. *Rosenberg*, [0062]; *Park*, Fig. 1(c), [0007]. To correct this, a POSITA would have increased a magnification ratio of parts narrower than normal and decreased a magnification ratio of parts wider than normal, as *Nakazawa* discloses. And a POSITA would have understood that, after the correction, the point of view of the image would be corrected to match that of the user. *Rosenberg*, [0027]. When *Rosenberg* is combined with *Nakazawa*, the image captured by the camera would be corrected as if the user is looking straight at a vertical display and the image were captured from a camera “***pointing horizontally***.” Decl. ¶159.

A POSITA would have understood when *Rosenberg* is modified with *Nakazawa*'s correction (“***transformation mapping***”), the transformation would

include a tilt transformation because it would correct the projective distortion in the image caused by the camera tilt angle. Decl. ¶160. A POSITA would have also understood that the transformation would include an elevation transformation because *Rosenberg* and *Nakazawa* both disclose obtaining an image aligning with the user's eye level. *Id.* ¶¶161–162; *Rosenberg*, [0027]–[0028]; *Nakazawa*, [0001]–[0003], [0008], [0032], [0034]. A POSITA would have mapped a vertical position of each pixel of the image to a vertical position of a corresponding pixel of a modified image to align with the user's eye level. Decl. ¶162. A POSITA would have understood this corrected image “*appear[s] to have been taken from a camera positioned at eye-level height.*” *Id.*

A POSITA would have been motivated to incorporate *Nakazawa*'s correction in *Rosenberg* and expect success. Sections V.A.4.d; V.A.3; Decl. ¶163.

## 6. Claim 3

- a. “*The method of claim 1, wherein the transformation mapping comprises at least a tilt transformation and an elevation transformation.*”

*Rosenberg* and *Nakazawa* render obvious this limitation. Decl. ¶¶164–167.

A POSITA would have understood *Nakazawa*'s correction (“*transformation mapping*”) would include a “*tilt transformation*” and “*elevation transformation,*” as discussed for claim 2. *Id.*; Section V.A.5.

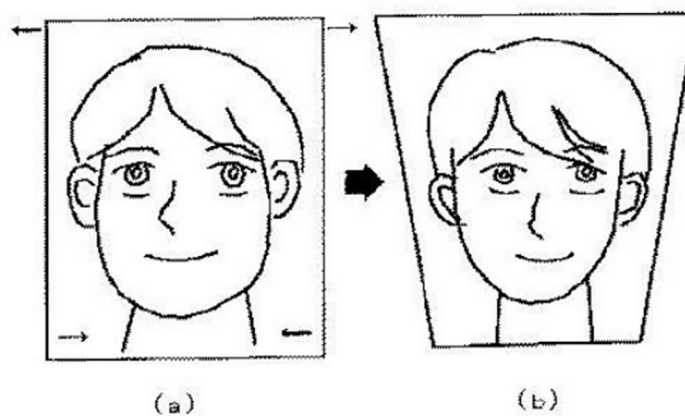
7. **Claim 4**

- a. ***“The method of claim 3, wherein the tilt transformation modifies an input image taken with a non-horizontally pointing camera and transforming the image to appear as if the camera was pointed straight horizontally.”***

*Rosenberg* and *Nakazawa* render obvious this limitation. Decl. ¶¶168–170.

*Rosenberg* discloses a downward-facing camera, and the image captured by the camera is ***“an input image taken with a non-horizontally pointing camera.”*** *Rosenberg*, [0027], Fig. 3. As discussed in claims 2 and 3, a POSITA would have understood performing *Nakazawa*’s correction in *Rosenberg* would perform a ***“tilt transformation”*** on that image. Sections V.A.5–V.A.6. As explained in claim 2, a POSITA would have understood *Nakazawa*’s corrected image would ***“appear[] as if the camera was pointed straight horizontally”***:

[FIG. 3]



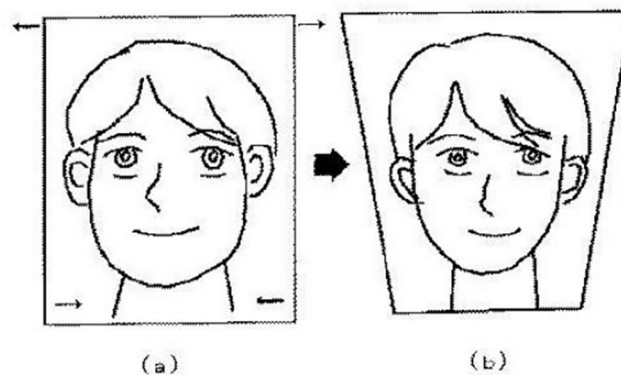
*Nakazawa*, Fig. 3; Section V.A.5; Decl. ¶¶169–170.

8. **Claim 5**

- a. ***“The method of claim 3, wherein the elevation transformation modifies an input image taken with a camera positioned at arbitrary height and transforming the image to appear as if the camera was positioned at a user’s eye level.”***

*Rosenberg* and *Nakazawa* render obvious this limitation. Decl. ¶¶171–172. A POSITA would have understood the height of *Rosenberg*’s camera would be “*at arbitrary height*” because it would vary based on the size and height of the display or the average or median height of the intended “typical user[.]” *Id.*, [0027]–[0028], [0061]–[0062], [0077], Figs. 3, 5. As discussed in claims 2 and 3, a POSITA would have understood performing *Nakazawa*’s correction in *Rosenberg* would perform an “*elevation transformation*” on that image. Sections V.A.5–V.A.6. As explained in claim 2, a POSITA would have understood *Nakazawa*’s corrected image would “*appear as if the camera was positioned at a user’s eye level,*” emulating a mirror:

[FIG. 3]



*Nakazawa*, Fig. 3; Section V.A.5; Decl. ¶172.

9. **Claim 6**

- a. ***“The method of claim 1, wherein the step of resizing the image is performed integral to the step of applying the transformation mapping.”***

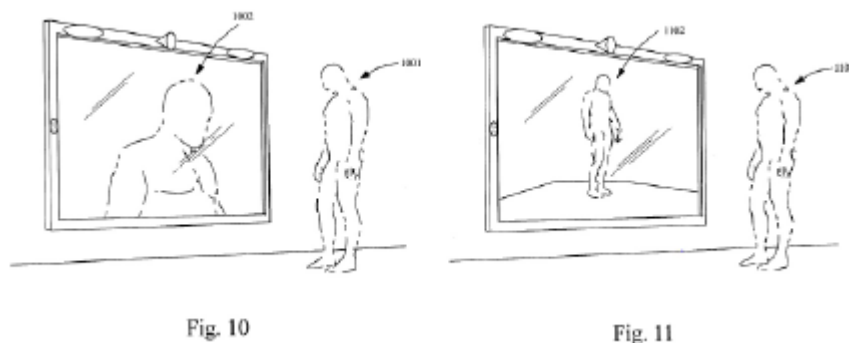
*Rosenberg* and *Nakazawa* render obvious this limitation. Decl. ¶¶173–175. *Rosenberg* discloses, or in view of *Nakazawa*, renders obvious ***“resizing the image,”*** and a POSITA would have understood this “resizing” would have been a ***“transformation mapping.”*** Section V.A.4.e. If additional transformations are required, a POSITA would have understood *Rosenberg*’s resizing would have been performed in real-time with the additional transformations in *Rosenberg* combined with *Nakazawa* (flipping (Section V.A.4.c), tilt (V.A.5–V.A.6), elevation (V.A.5–V.A.6)), to obtain real-time images for display. When *Rosenberg* is modified with *Nakazawa*, a POSITA would have understood resizing is ***“integral to the step of applying the transformation mapping”*** because it would have been performed as part of the combined transformations on the real-time video images. ’109 Patent, 22:1–13, 23:45–24:9, 24:51–53, 29:22–58; Decl. ¶¶174–175.

10. **Claim 8**

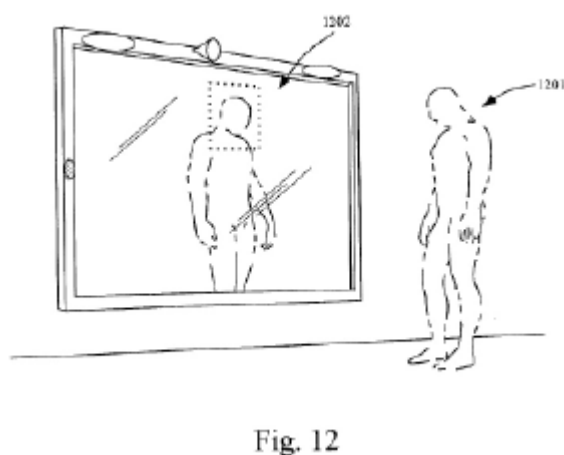
- a. ***“The method of claim 1, further comprising applying a translation transformation to move the image within display area of the monitor.”***

*Rosenberg* discloses this limitation. Decl. ¶¶176–179.

*Rosenberg* discloses real-time zoom functions. *Rosenberg*, [0050]–[0051], [0099]–[0105], Figs. 10–11.

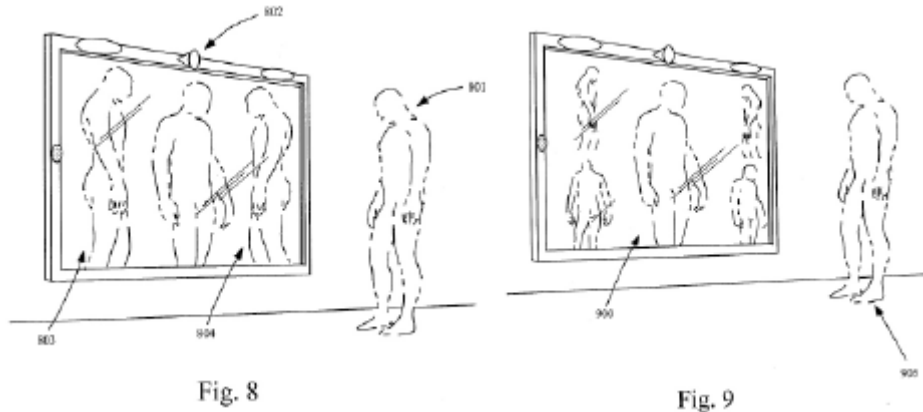


*Id.*, Figs. 10–11. The user can command the zoom guide to move left, right, up, or down, whereupon the mirror image is zoomed:



*Id.*, Fig. 12 (zoom guide 1202), [0052], [0106]. A POSITA would have understood zooming translates the image within the screen (“*translation transformation to move the image within display area*”) because the pixel numbers and positions would need to be changed to implement the zoom functions. Decl. ¶177.

*Rosenberg* also teaches freezing an image and moving the frozen image to the left or right side of the display while displaying a real-time image in the center:



*Rosenberg*, Figs. 8–9, [0048], [0093]–[0098], [0110]. A POSITA would have understood moving the image to the left or right of the display would “*apply[] a translation transformation to move the image within display area,*” for it shifts the position of the image left or right on the display. Decl. ¶¶178–179.

#### 11. Claim 17

- a. 17[pre]: “*The method of claim 1, storing the live video feed in a digital storage device and selectively operating the system in one of a mirror mode or display mode,*”

*Rosenberg* discloses a traditional mirror emulation mode (“*mirror mode*”), where the digital mirror displays real-time images. *Rosenberg*, [0025]–[0027], [0035], [0077], [0082]. It also discloses user-selectable functions, like a mirror image-buffering feature (“*display mode*”) (*id.*, [0044]–[0047], [0068], [0078], [0089]–[0093]). The user can command the digital mirror to selectively engage the mirror buffering feature or traditional mirror mode. *Id.*, [0027], [0039]–[0044], [0069], [0081], [0084], [0089]. With the mirror-buffering feature, *Rosenberg* discloses displaying previously stored real-time images, allowing a user to see views

at different orientations. *Id.*, [0044]–[0048], [0088], [0091], [0093]. The previously stored real-time video images (“*storing the live video feed*”) are stored in memory (“*digital storage device*”). *Id.*, [0044]–[0046], [0053], [0074], [0089]–[0091]; Decl. ¶¶180–182.

b. 17[a]: “*wherein during mirror mode displaying on the monitor transformed images of what the camera sees at that particular moment*”

*Rosenberg* discloses in the traditional mirror emulation mode, the processor obtains real-time video images from the digital camera (“*what the camera sees at that particular moment*”), performs image processing, like left-right inversion and scaling, on those images, and displays modified images:

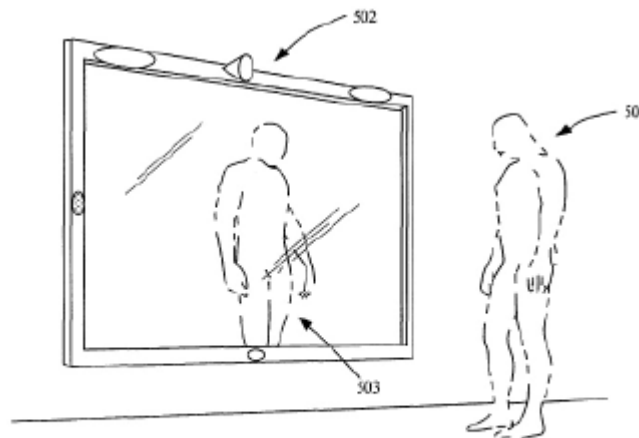


Fig. 5

*Rosenberg*, Fig. 5, [0025]–[0027], [0035], [0077], [0082]. When *Rosenberg* is modified by *Nakazawa*, the real-time video images would have been additionally corrected by *Nakazawa*’s correction (“*transformed*”) before display. Sections V.A.4.d, V.A.4.f; Decl. ¶¶183–184.

- c. 17[b]: “*while during display mode displaying on the monitor a transformed images of what the camera saw in the past and obtained from the digital storage device.*”

*Rosenberg* discloses that when the user engages the mirror-image buffering feature, the previously stored real-time images from the camera (“*what the camera saw in the past*”) are displayed on the mirror. *Rosenberg*, [0045]–[0046], [0068], [0089]–[0091], Figs. 8–9; Decl. ¶¶185–186.

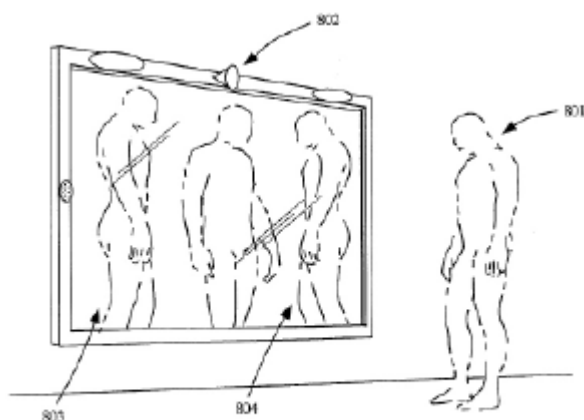


Fig. 8

*Rosenberg*, Fig. 8, [0080], [0091]. When *Rosenberg* is modified by *Nakazawa*, the stored video images would have been corrected by *Nakazawa*’s correction before being stored in memory (“*digital storage device*”). Sections V.A.4.d, V.A.4.f. A POSITA would have understood *Rosenberg*’s processor would access memory to obtain and transform the images before sending them to the display. *Rosenberg*, [0077], [0089]–[0091], Fig. 13; Decl. ¶187.

**B. Ground 2: *Rosenberg, Nakazawa, and Hatanaka* Render Obvious Claims 1–6, 8, 11, and 17**

**1. Independent Claim 1**

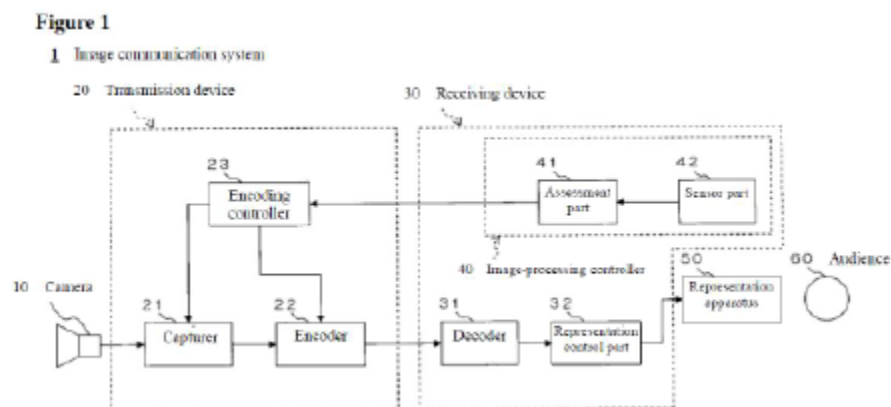
**a. 1[pre]–1[g]**

*Rosenberg* and *Nakazawa* render obvious these limitations. Sections V.A.4.a–V.A.4.h; Decl. ¶¶200.

**b. 1[h]: “varying rate at which the non-ordered steps are performed on the series of images according to the distance.”**

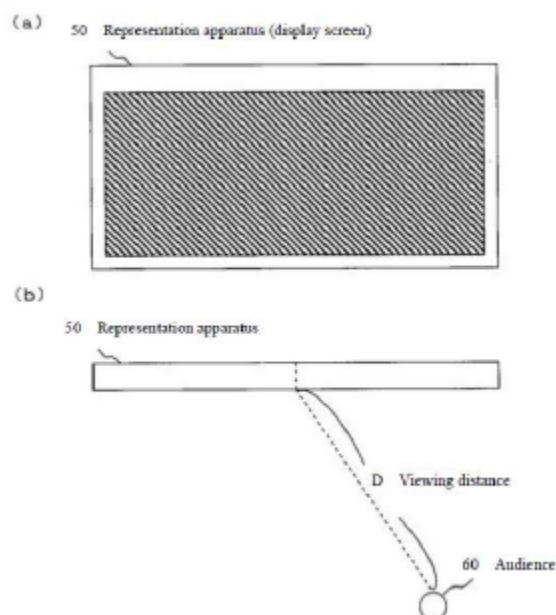
*Rosenberg, Nakazawa, and Hatanaka* render obvious this limitation. Decl. ¶¶201–204.

*Hatanaka* discloses a method for reducing image-data-related processing throughput for an image communication system that displays video images. *E.g.*, *Hatanaka*, [0008], [0012]. *Hatanaka*’s system includes a camera and display. *Id.*, [0018], [0021], [0032]–[0036], Figs. 1, 2.



*Id.*, Fig. 1.

Figure 2



*Id.*, Fig. 2. It also includes a transmission device that transmits video image data from the camera to a receiving device. *Id.*, [0016], [0019], [0022]–[0026]. The transmission device includes an encoding controller and encoder. *Id.* The encoder performs video-image encoding under the control of the encoding controller. *Id.* The receiving device includes a decoder and image processing control device. *Id.*, [0025]–[0026], [0028]–[0029], [0042]. The decoder receives and decodes encoded video image data and provides the decoded image data to the display. *Id.*, [0026], [0042]; Decl. ¶¶81–82.

*Hatanaka's* image processing control device has a proximity sensor and assessment part. *Hatanaka*, [0028]–[0029]. The sensor measures viewing distance between the viewer and display. *Id.*, [0032]–[0036]. The assessment part provides instructions to the encoding controller to reduce encoding throughput as the viewing

distance increases, such as by adjusting frame rate and/or resolution. *Id.*, [0008], [0012], [0018], [0023], [0037]–[0039]. A POSITA would have understood reducing the frame rate and/or resolution of the video image would reduce image-data-related processing throughput because reducing resolution reduces the number of pixels in each image and reducing frame rate reduces the number of images in a video of a fixed length. *Id.*, [0012]. Decl. ¶¶83–85.

A POSITA would have been motivated to modify *Rosenberg* (as modified by *Nakazawa*) in view of *Hatanaka* to reduce the rate of steps performed on real-time video images from the camera (“*varying rate*”) when the user moves away from the display (“*according to the distance*”) to have “efficient processing of images.” *Hatanaka*, [0051]; Decl. ¶¶188–197.

As an initial matter, these references are analogous art, in the same field of endeavor as each other and the ’109 Patent. Decl. ¶188. Moreover, *Rosenberg* recognizes the need to conserve power, including by turning off the mirror or switching to a low power state when a user is not in front of the camera/display. *Id.* ¶¶189–191; *Rosenberg*, [0025], [0032], [0056], [0069]–[0072], [0112]–[0115]. A POSITA would have found *Hatanaka*’s teaching of reducing image-related-data processing throughput as viewing distance increases, such as by reducing frame rate and/or resolution, a suitable alternative for conserving power when the user is no longer in the vicinity of the display. Decl. ¶¶191–193; *Intel Corp. v. PACT XPP*

*Schweiz AG*, 61 F.4th 1373, 1381 (Fed. Cir. 2023); *Elekta*, 81 F.4th at 1374. Also, *Rosenberg* discloses a digital mirror “installed upon a living room wall may not be desirably configured to turn itself off when a user is not standing directly before it.” *Rosenberg*, [0054], [0112]. Reducing frame rate or resolution after detecting a user is no longer there allows *Rosenberg*’s digital mirror to continue to appear like a traditional mirror while conserving power. Decl. ¶¶194–197, 202–204.

A POSITA would have understood how to reduce the rate of the steps of *Rosenberg* (as modified by *Nakazawa*) and how to reduce the resolution of the digital mirror image in view of *Hatanaka* because doing so would require no more than ordinary skill. Decl. ¶¶198–199. It would have been applying a known technique to improve a similar device in the same way to yield the predictable result of efficient image processing. *Id.*

## **2. Claims 2–6 and 8**

*Rosenberg* and *Nakazawa* render obvious the additional limitations in these claims. Decl. ¶205; Sections V.A.5–V.A.10.

## **3. Claim 11**

### **a. 11[pre]: “*The method of claim 1, further comprising:*”**

*Rosenberg* and *Nakazawa* (Section V.A.4) or *Rosenberg*, *Nakazawa*, and *Hatanaka* (Section V.B.1) render obvious claim 1. Decl. ¶206.

b. **11[a]: “determining distance to a user appearing in the image; and”**

*Rosenberg* and *Nakazawa* render obvious this limitation. Sections V.A.4.h, V.B.1.a; Decl. ¶207.

c. **11[b]: “varying resolution of the image according to the distance.”**

*Rosenberg*, *Nakazawa*, and *Hatanaka* render obvious this limitation. Decl. ¶208–211. *Hatanaka* discloses reducing image-data-related processing throughput by reducing the resolution as viewing distance increases. *Hatanaka*, [0008], [0012], [0018], [0023], [0037]–[0039]. Because the viewer is not always near the display when images are displayed, encoding/decoding at a lower resolution when there is no viewer enables efficient processing. *Id.*, [0039], [0051]. *Hatanaka* also teaches reducing the resolution to reduce image-data-related processing to the extent the viewer cannot recognize the image. *Id.*, [0049]. *Hatanaka* notes that there are no restrictions how to adjust resolution according to viewing distance. *Id.*, [0039]; Decl. ¶¶83–85, 209.

*Rosenberg* shares the same efficiency concerns and teaches not to “wast[e] power by continually displaying mirroring imagery when there is nobody looking.” *Rosenberg*, [0025], [0032], [0056], [0069]–[0072], [0112]–[0115]. A POSITA would have been motivated to modify *Rosenberg* by reducing the resolution of the image (“*varying resolution of the image*”) when the user steps out of the vicinity of

the display (“*according to the distance*”) and has less visual acuity to improve energy efficiency. Section V.B.1.b; Decl. ¶¶188–197, 210. A POSITA would have programmed the processor to reduce the resolution of the real-time video images from the camera, such as by downsampling, before other steps of *Rosenberg* as modified by *Nakazawa*, and would have had a reasonable expectation of success. Section V.B.1.b; Decl. ¶¶198–199, 211.

#### 4. Claim 17

*Rosenberg* and *Nakazawa* render obvious the additional limitations of claim 17. Decl. ¶212; Section V.A.11.

### C. Ground 3: *Rosenberg*, *Nakazawa*, and *Tripathi* Render Obvious Claims 1–6, 8, and 17

#### 1. Independent Claim 1

##### a. 1[pre]–1[g]

*Rosenberg* and *Nakazawa* render obvious these limitations. Sections V.A.4.a–V.A.4.h; Decl. ¶220.

##### b. 1[h]: “*varying rate at which the non-ordered steps are performed on the series of images according to the distance.*”

*Rosenberg*, *Nakazawa*, and *Tripathi* render obvious this limitation. Decl. ¶¶221–224.

*Tripathi* discloses an electronic device that includes a display, processing circuitry, memory, and camera. *Tripathi*, 1:6–15, 3:35–61, 4:36–68, 5:1–5, 6:20–27,

11:54–57, 12:6–15. The device displays video images captured by the camera. *Id.*, 10:20–24, 11:54–65, 12:6–10, 12:15–17. *Tripathi* discloses adjusting the display frame rate (refresh rate) in response to content type (static/dynamic) or power supply. *Id.*, 1:23–2:8, 3:49–52, 5:8–12, 5:42–56, 6:7–9, 7:64–9:34, 10:1–24, Figs. 2, 5, 10. Specifically, *Tripathi* discloses reducing display frame rate to reduce power consumption, and increasing display frame rate to improve display resolution and/or performance. *Id.*, 5:65–6:3, 9:24–34, Figs. 2, 3, 10, 11; Decl. ¶¶86–88, 222–223.

A POSITA would have been motivated to modify *Rosenberg* (as modified by *Nakazawa*) in view of *Tripathi* to reduce the rate of steps performed on real-time video images from the camera (“**varying rate**”) when the user moves away from the display (“**according to the distance**”). Decl. ¶¶213–219. These references are analogous art, in the same field of endeavor as each other and the ’109 Patent. Decl. ¶213.

Moreover, a POSITA would have been motivated to implement *Tripathi*’s design in *Rosenberg*’s system to reduce power consumption providing the benefits disclosed in *Tripathi* without degrading user experience. *Ogino*, [0007], [0027], [0059]; *Tripathi*, 2:1–8, 5:36–57, 5:65–6:3, 6:29–39. Like *Tripathi*, *Rosenberg* seeks to reduce power consumption. *Rosenberg*, [0025], [0032], [0056], [0069]–[0072], [0112]–[0115]. And *Rosenberg* discloses a low power state, and its display content can be static (out of vicinity) or dynamic (e.g., moving back and forth). *Rosenberg*,

[0069]–[0072]. A POSITA would have found *Tripathi*’s teaching of decreasing display frame rate a suitable option for improving power efficiency in *Rosenberg* when the user is stationary or outside the mirror’s vicinity. Decl. ¶¶214–216; e.g., *Tripathi*, Fig. 10. When a user moves within the vicinity of the display, a POSITA would have increased the display frame rate to emulate a real mirror and improve user experience. Decl. ¶¶217, 223; e.g., *Tripathi*, Fig. 11. A POSITA would have understood this modification would improve *Rosenberg*’s display performance and achieve its express goal of replicating a real mirror. Decl. ¶¶217, 223.

A POSITA would have also been motivated to adjust the rate of the other steps of *Rosenberg* (as modified with *Nakazawa*)—obtaining video images, left-right inversion, transformation mapping—in view of *Tripathi*. For example, a POSITA would have reduced the rate of the other steps with the display frame rate to conserve power, and would have increased the rate of the other steps with the display frame rate so mirror images would be displayed to the user at the higher rate. Decl. ¶218.

A POSITA would have known how to change the rate of steps of *Rosenberg* (as modified by *Nakazawa*) in view of *Tripathi* because it would require ordinary skill. *Tripathi* discloses monitoring the device operation using software running on the processor. *Tripathi*, 5:28–36. *Rosenberg* combined with *Nakazawa* discloses determining distance. Section V.A.4.h. A POSITA would have used *Rosenberg*-*Nakazawa*’s determined distance to monitor the power supply state and/or display

content (e.g., user out of vicinity [static] or user moving back and forth [dynamic]). Also, a POSITA would have known how to adjust display frame rate and the rate of the steps of *Rosenberg* (as modified by *Nakazawa*), such as by adjusting clock speed (*Tripathi*, 7:29–31), or programming the frames to be skipped (*Rosenberg*, [0035]). Decl. ¶¶219, 224.

**2. Claims 2–6, 8, and 17**

*Rosenberg* and *Nakazawa* render obvious the additional limitations in these claims. Sections V.A.5–V.A.11; Decl. ¶225.

**D. Ground 4: *Rosenberg*, *Nakazawa*, *Tripathi*, and *Hatanaka* Render Obvious Claim 11**

**1. Claim 11**

**a. 11[pre]: “*The method of claim 1, further comprising:*”**

*Rosenberg*, *Nakazawa*, and *Tripathi* render obvious claim 1. Section V.C.1; Decl. ¶226.

**b. 11[a]: “*determining distance to a user appearing in the image; and*”**

*Rosenberg* and *Nakazawa* render obvious this limitation. Sections V.A.4.h, V.B.1.a; Decl. ¶227.

**c. 11[b]: “*varying resolution of the image according to the distance.*”**

*Rosenberg*, *Nakazawa*, *Tripathi*, and *Hatanaka* render obvious this limitation. Decl. ¶228. *Hatanaka* discloses reducing image-data-related processing throughput

by reducing the resolution of encoded video image data as viewing distance increases. *Hatanaka*, [0008], [0012], [0018], [0023], [0037]–[0039]. A POSITA would have been motivated to modify *Rosenberg* by reducing resolution of the mirror image (“*varying resolution of the image*”) as the user moves away from the display and has less visual acuity to improve energy efficiency and would have a reasonable expectation of success doing so. Section V.B.3.c; *Hatanaka*, [0049]. Section V.B.3.c; Decl. ¶228.

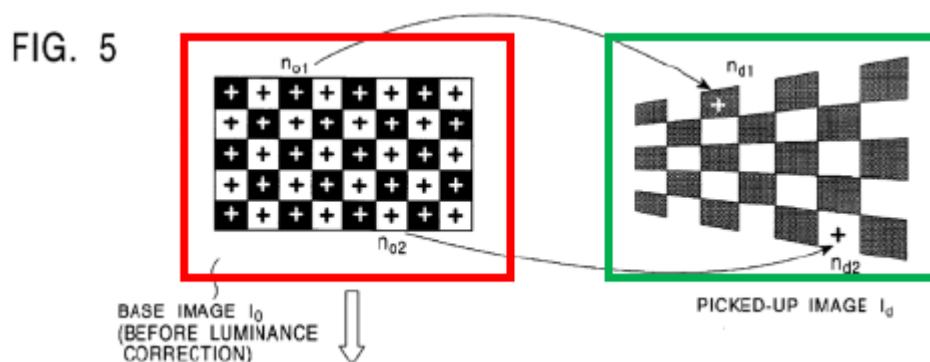
## **E. Grounds 5–7 Demonstrate Claim 7 Is Unpatentable**

### **1. Overview of *Iwai***

*Iwai* discloses a method for calibrating a digital camera. *Iwai*, 1:9–33, 10:29–37. Specifically, it discloses estimating a “projective transformation parameter” to resolve projection distortion (*id.*, 1:47–55, 2:4–54, 4:46–58, 5:10–31, 6:16–38), by performing “registration between a picked-up image . . . and a base image” (*id.*, 7:11–54, 9:65–10:3, 14:1–15:21). The base image has a predetermined geometrical pattern and is stored in memory. *Id.*, 4:52–65, 5:66:6:5, 7:23–38, 9:60–64, 10:24–28, Figs. 2A–2B, 4–5. The picked-up image is obtained by taking a photograph of the base image and is stored in memory. *Id.*, 5:5–9, 6:5–9, 7:16–21, 7:38–47, 10:62–65, Figs. 4–5. Parameters are calculated based on the correspondence in pixels between the base image and picked-up image, minimizing brightness error between

pixels. *Id.*, 4:42–58, 5:10–24, 6:10–24, 7:48–54, 11:1–3, 12:1–4, 13:1–15:21.

Examples of *Iwai*’s **base image** and **picked-up image** are below:



*Id.*, Fig. 5 (modified); Decl. ¶¶89–90, 231.

## 2. Rationale to Combine

A POSITA would have been motivated to combine *Rosenberg* as modified by *Nakazawa*, or *Nakazawa* and *Hatanaka* or *Tripathi*, and *Iwai*. Decl. ¶¶229–234. The references are analogous art, in the same field of endeavor as each other and the ’109 Patent. Decl. ¶229.

Moreover, a POSITA would have found it obvious to use *Iwai*’s method to obtain *Nakazawa*’s transformation parameter (degree of magnification) in advance to automatically perform *Nakazawa*’s transformation mapping in *Rosenberg*. *Nakazawa*’s correction changes the magnification ratio based on face orientation. *Nakazawa*, [0033]–[0034], Figs. 3–4. The specific degree of correction is based on the “degree of magnification,” which would vary based on the user’s distance to the camera/display (*id.*, [0035]), and can be predetermined and stored in memory (e.g., a table) and automatically applied ([0037]–[0038]). To the extent *Nakazawa* does

not expressly disclose details of how to predetermine this parameter in advance, a POSITA would have recognized *Iwai*'s method provides a suitable option. Decl. ¶230.

A POSITA would have understood *Iwai*'s method can be repeated for a plurality of distances, storing degrees of magnification in a table, because *Iwai* discloses its method is not limited based on distance. *Iwai*, 7:55–65. A POSITA would have recognized using *Iwai*'s calibration method to obtain the degrees of magnification in advance would allow automatic performance of *Nakazawa*'s transformation mapping (*Nakazawa*, [0038]), reduce lag time between capture and display (*Rosenberg*, [0038]), and achieve “stab[ility] and high[ ]accuracy” (*Iwai*, 1:15–18 4:42–45, 7:52–54, 12:59–64). Decl. ¶¶232–233.

A POSITA would have understood that when *Rosenberg* is modified with *Nakazawa* (or *Nakazawa* and *Hatanaka* or *Nakazawa* and *Tripathi*), the calibration method would be implemented using *Rosenberg*'s camera, memory, and processor. A POSITA would have expected success doing so because *Rosenberg*'s system is equipped for such modifications. Using *Iwai*'s calibration in *Rosenberg*'s system requires adding known operational steps to program code in *Rosenberg*'s memory. *Rosenberg*, [0109]; *Iwai*, 1:47–65, 3:47–54, 6:53–67, 10:11–17, 12:30–35, Fig. 11. A POSITA would have understood the modification would predictably obtain

parameters of degrees of magnification for performing *Nakazawa's* correction (transformation mapping). Decl. ¶234.

3. **Claim 7**

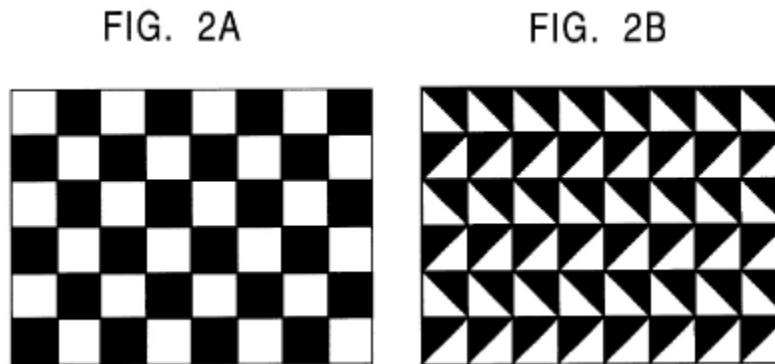
- a. 7[pre]: “*The method of claim 1, further comprising the steps:*”

*Rosenberg* and *Nakazawa* (or *Rosenberg, Nakazawa, and Hatanaka*, or *Rosenberg, Nakazawa, and Tripathi*) render obvious claim 1. Sections V.A.4, V.B.1, V.C.1; Decl. ¶235.

- a. 7[a]: “*obtaining a reference image;*”

*Rosenberg* and *Nakazawa* (or *Rosenberg, Nakazawa, and Hatanaka*, or *Rosenberg, Nakazawa, and Tripathi*) and *Iwai* render obvious this limitation. Decl. ¶¶236–238.

*Iwai* discloses creating a base image with a predefined geometrical pattern:



*Iwai*, Figs. 2A–2B, 4:42–65, 5:66:6:5, 7:22–37, 9:60–64, 10:24–28, 11:26–29, 12:36–40. A POSITA would have understood this is “*obtaining a reference image*” since the base image contains a calibration pattern without distortion to be used for

calibration. *Id.*, 11:7–23, 12:8–21, Figs. 2A–2B. It was known calibration patterns comprise reference points for calculating a camera’s distortion parameters. *Id.*, 3:55–67; Decl. ¶237.

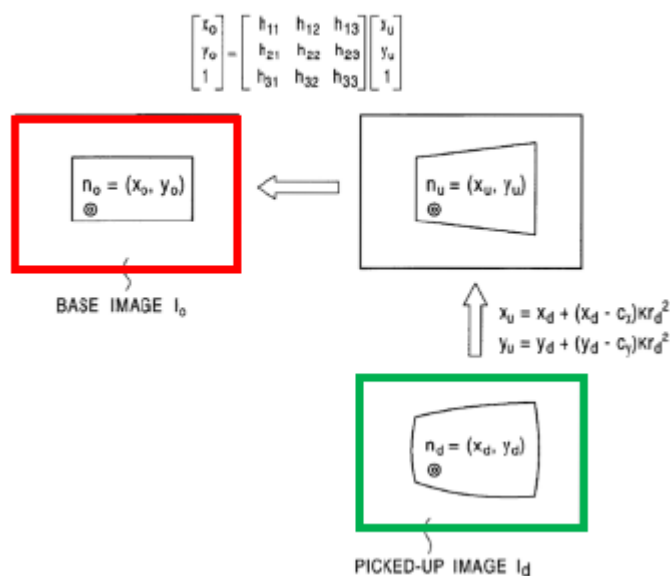
A POSITA would have been motivated to use *Iwai*’s calibration method using image registration to obtain the degrees of magnification for a plurality of distances in advance for automatically performing *Nakazawa*’s transformation mapping in *Rosenberg* and would have expected success doing so. Section V.E.2;. Decl. ¶238.

b. 7[b]: “*performing registration of the digital image with the reference image;*”

*Rosenberg* and *Nakazawa* (or *Rosenberg*, *Nakazawa*, and *Hatanaka*, or *Rosenberg*, *Nakazawa*, and *Tripathi*) and *Iwai* render obvious this limitation. Decl. ¶¶239–242.

*Iwai* discloses obtaining a **picked-up image** by taking a photograph of the **base image**. *Iwai*, 5:5–9, 6:5–9, 7:16–21, 7:38–47, 10:62–65, Figs. 4–5. A POSITA would have understood the **picked-up image** is a “*digital image*” for the image is captured by a digital camera and processed by computer applications. *Id.*, 1:21–33, 1:47–61. *Iwai* further discloses calculating parameters of a projection transformation matrix *H* by performing registration between the **base image** and **picked-up image** (“*performing registration of the digital image with the reference image*”). *Id.*, 4:42–58, 5:10–24, 6:10–24, 7:11–54, 9:65–10:3, 11:1–3, 11:67–12:4, 13:1–15:21, 14:1–15:21.

FIG. 4



*Id.*, Fig. 4. When *Rosenberg* and *Nakazawa* (or *Rosenberg*, *Nakazawa*, and *Hatanaka* or *Tripathi*) are modified in view of *Iwai*'s calibration method, *Iwai*'s projective transformation matrix  $H$  (above) would be replaced by *Nakazawa*'s correction (transformation mapping). The picked-up image containing distortion would be transformed by *Nakazawa*'s correction, and the parameter calculated would be the degree of magnification. Decl. ¶¶239–240.

A POSITA would have been motivated to use *Iwai*'s calibration method using image registration to obtain the degrees of magnification for a plurality of distances in advance for automatically performing *Nakazawa*'s transformation mapping in *Rosenberg* and would have expected success doing so. Section V.E.2; Decl. ¶¶229–234, 241–242.

c. 7[c]: “***using data obtained from the registration to generate the transformation mapping.***”

*Rosenberg* and *Nakazawa* (or *Rosenberg*, *Nakazawa*, and *Hatanaka*, or *Rosenberg*, *Nakazawa*, and *Tripathi*) and *Iwai* render obvious this limitation. Decl. ¶¶243–246.

A POSITA would have understood that the parameters of *Iwai*’s projection transformation matrix H would be “***data obtained from the registration***” because those parameters are calculated based on associating pixels of the picked-up and base images and minimizing brightness error over the images. *Iwai*, 4:42–58, 5:10–24, 6:10–24, 7:48–54, 11:1–3, 11:67–12:4, 13:1–15:21. *Iwai* discloses performing a projective transformation on other picked-up images using these parameters to fix distortion. *Id.*, 5:24–32, 6:25–38. A POSITA would have understood performing such projective transformation would first require using transformation parameters from the registration to generate the transformation mapping (“***using data ... to generate the transformation mapping***”). Decl. ¶244.

When *Rosenberg* and *Nakazawa* (or *Rosenberg*, *Nakazawa*, and *Hatanaka* or *Tripathi*) are modified in view of *Iwai*’s method, *Iwai*’s projective transformation matrix H would be replaced by *Nakazawa*’s correction, and “***data obtained from the registration***” would be parameters of the degree(s) of magnification used during *Nakazawa*’s correction (“***using data ... to generate the transformation mapping***”) to remove distortion in *Rosenberg*’s image. Sections V.A.3, V.A.4.d; Decl. ¶245.

A POSITA would have been motivated to use *Iwai*'s calibration method using image registration to obtain the degrees of magnification for a plurality of distances in advance for automatically performing *Nakazawa*'s transformation mapping in *Rosenberg* and would have expected success doing so. Section V.E.2; Decl. ¶¶230–234, 246.

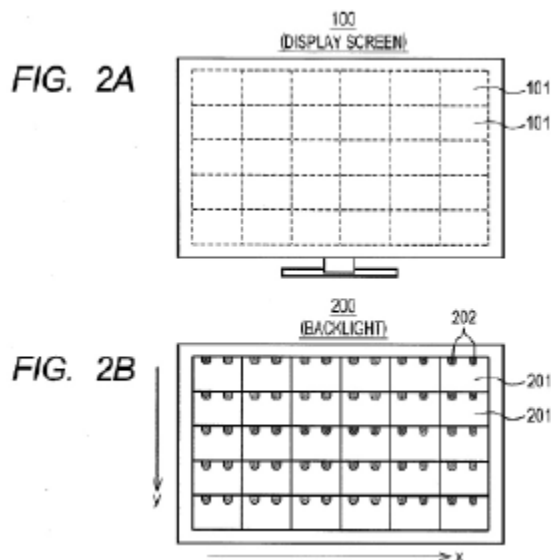
**F. Grounds 8–10 Demonstrate Claim 9 Is Unpatentable**

**1. Claim 9**

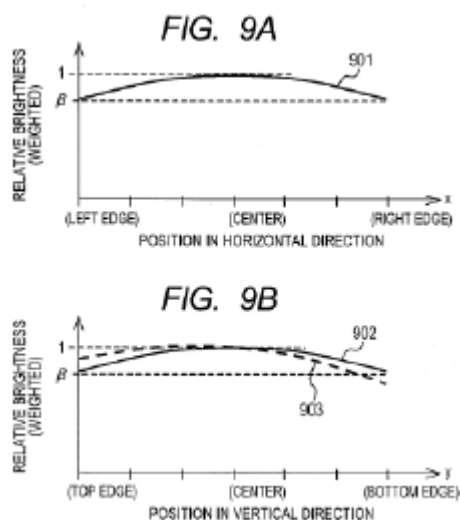
- a. ***“The method of claim 1, further comprising changing illumination intensity of individual or groups of pixels of the monitor, so as to enhance shading or illumination in the image.”***

*Rosenberg* and *Nakazawa* (or *Rosenberg*, *Nakazawa*, and *Hatanaka*, or *Rosenberg*, *Nakazawa*, and *Tripathi*) and *Kubota* render obvious claim 9. Decl. ¶¶247–255.

*Kubota* discloses a liquid crystal panel with a display screen and a backlight comprising a matrix of backlight cells. *Kubota*, [0004]–[0006], [0030]–[0031]. The display screen is segmented into areas 101, each including a plurality of pixels and a pair of backlight cells 201 that illuminate corresponding areas 101:



*Id.*, Figs. 2A–2B, [0030]–[0031]. *Kubota*’s LCD device has a shading process that reduces light control values of backlight cells for a peripheral part of the screen to lower the brightness in that peripheral part of the screen compared to a central part of the screen. *Id.*, [0009], [0013], [0027], [0029], [0038], [0050], [0053], [0066], Fig. 5.



*Id.*, Figs. 9A–9B. A POSITA would have understood reducing brightness in a peripheral area would require reducing the intensity of backlight cells illuminating those areas (*id.*, [0012], [0031]) (“***changing illumination intensity***”), and those areas include a plurality of pixels (*id.*, [0030]) (“***individual or groups of pixels of the monitor***”). Decl. ¶¶92–95, 252–254.

A POSITA would have been motivated to combine *Rosenberg* as modified by *Nakazawa*, or *Nakazawa* and *Hatanaka* or *Tripathi*, and *Kubota*. *Id.* ¶¶247–250. The references are analogous art, in the same field of endeavor as each other and the ’109 Patent. *Id.*, ¶247.

Moreover, a POSITA would have been motivated to improve *Rosenberg*’s LCD display to have *Kubota*’s shading to enhance the display. *Rosenberg* displays images at the center of its display. *Rosenberg*, [0094], Fig. 5. A POSITA would have understood implementing *Kubota*’s shading in *Rosenberg* would enhance the user’s image by placing the user’s effective visual field in the central part of the screen. *Kubota*, [0066]. A POSITA would have understood a user may zoom and/or re-center to view areas (eyelashes, makeup) close up (*Rosenberg*, [0003], [0099]) or hairstyles/clothing (*id.*, [0003], [0108]). Implementing *Kubota*’s shading would enhance these areas to facilitate close-up views. Additionally, *Kubota* and *Rosenberg* are concerned with power efficiency, and a POSITA would have been

motivated to implement *Kubota*'s shading in *Rosenberg* to reduce power consumption. *Kubota*, [0066]; Decl. ¶¶248–249.

A POSITA would have understood when *Rosenberg* (when combined with *Nakazawa* or *Nakazawa* and *Hatanaka* or *Tripathi*) is modified to implement *Kubota*'s shading, *Rosenberg*'s display would have subregions of pixels and a matrix of backlight cells, and shading would be implemented in the processor of the combined system. A POSITA would have expected success in implementing *Kubota*'s shading in *Rosenberg* because it would have been using a known technique to improve a similar device in the same way and predictably enhance displays and reduce power consumption. Decl. ¶250.

**G. Grounds 11–13 Demonstrate Claim 10 Is Unpatentable**

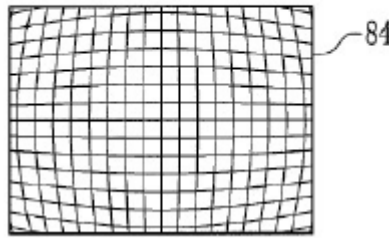
**1. Claim 10**

- a. ***“The method of claim 1, further comprising applying at least one of a barrel-effect transformation and a fish-eye transformation.”***

*Rosenberg* and *Nakazawa* (or *Rosenberg*, *Nakazawa*, and *Hatanaka*, or *Rosenberg*, *Nakazawa*, and *Tripathi*) and *Cho* render obvious claim 10. Decl. ¶¶256–260.

*Cho* discloses a digital camera capable of correcting wide-angle distortion (barrel effect):

FIG. 5C



*Cho*, Figs. 5C, 7, [0006], [0008], [0011], [0015], [0017]–[0018], [0059]–[0060], [0065], [0071]–[0074], [0078]–[0081], [0088]–[0089]. Specifically, *Cho* discloses obtaining focal length data, determining the magnitude of wide-angle distortion, selecting a coefficient to correct the distortion, and correcting the distortion. *Cho*, [0011], [0017], [0060]–[0066], [0071], [0073], [0078]–[0079], Figs. 3, 7. A POSITA would have understood *Cho* is “*applying ... a barrel-effect transformation*,” for it transforms the coordinates of pixels in the image using a coordinate transformation function to fix wide-angle (barrel) distortion. Decl. ¶¶97–98, 260.

A POSITA would have been motivated to combine *Rosenberg* as modified by *Nakazawa*, or *Nakazawa* and *Hatanaka* or *Tripathi*, and *Cho*. Decl. ¶¶256–258. These references are analogous art, in the same field of endeavor as each other and the '109 Patent. Decl. ¶256.

Further, a POSITA would have understood images captured by *Rosenberg*'s digital camera contain wide-angle distortion. *Rosenberg*, [0062]. *Cho* provides a solution for such distortion. *Id.*, [0011], [0015], [0018], [0078]–[0079]. A POSITA would have been motivated to use *Cho*'s solution to address this problem, effecting

*Rosenberg's* goal of emulating a mirror. *Rosenberg*, [0026]–[0028]; Decl. ¶¶257–258.

A POSITA would have also expected success in making this modification because it would have been using a known technique to improve a similar device in the same way. *Cho* explains its correction is applicable to digital video cameras, like *Rosenberg's*. *Cho*, [0149]. A POSITA would have understood *Rosenberg's* system—digital video camera, processor, and memory—is equipped to implement *Cho's* correction function. Using *Cho's* calibration method in *Rosenberg* requires adding known operational steps to the program code and adding a coefficient table in *Rosenberg's* memory. *Id.*, [0059]; *Rosenberg*, [0109]. A POSITA would have understood this would generate the predictable result of an image without wide-angle (barrel) distortion. Decl. ¶258.

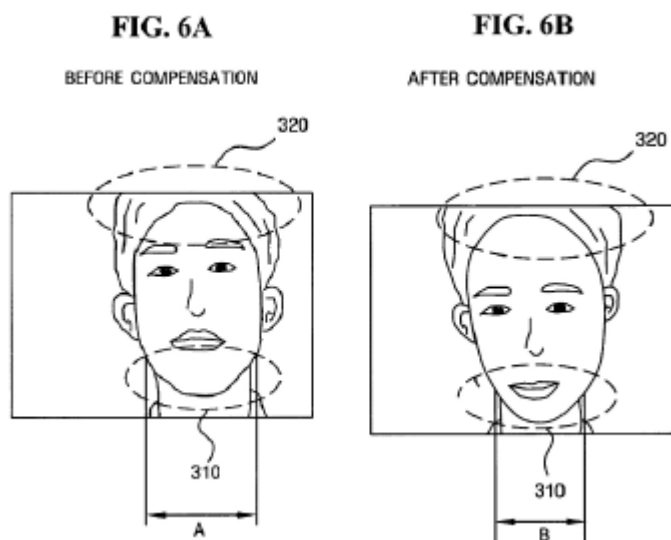
## **H. Grounds 14–16 Demonstrate Claim 12 Is Unpatentable**

### **1. Claim 12**

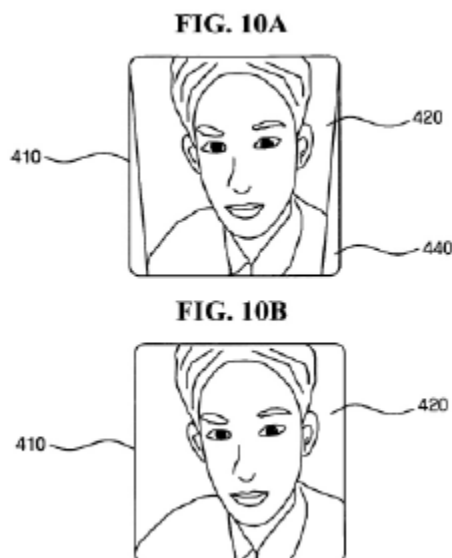
- a. ***“The method of claim 1, further comprising a step of pixel filling, wherein pixel image is extrapolated into empty pixels left after applying the transformation mapping.”***

*Rosenberg* and *Nakazawa* (or *Rosenberg*, *Nakazawa*, and *Hatanaka*, or *Rosenberg*, *Nakazawa*, and *Tripathi*) and *Park* render obvious claim 12. Decl. ¶¶261–267.

*Park* discloses performing matrix-based perspective transformation to compensate for image distortion. *Park*, [0034]–[0037], [0050]–[0053], [0059]–[0062].



*Id.*, Figs. 6A–6B. A POSITA would have understood that this is a transformation mapping because it is a matrix-based transformation that changes the coordinates of the pixels in the image. *Id.*, [0060]–[0062]. During this transformation, empty regions form when the sizes of the compensated image region and display region are different. *Id.*, [0054]–[0056]. *Park* discloses filling the pixels of these empty regions after transformation and before display (“*empty pixels left after applying the transformation mapping*”). *Id.*



*Id.*, Figs. 10A–10B. In particular, the “empty region is filled with pixel values of the compensated image existing at the closest position.” *Id.*, [0054]–[0056]. A POSITA would have understood this is having a “*pixel image ... extrapolated into empty pixels*” because the pixel values inside the boundary of the transformed image are used to obtain values for filling the empty pixels outside the boundary of the transformed image. Decl. ¶¶105–106, 265–266.

A POSITA would have been motivated to combine *Rosenberg* as modified by *Nakazawa*, or *Nakazawa* and *Hatanaka* or *Tripathi*, and *Park*. Decl. ¶¶261–263, 267. They are analogous art, in the same field of endeavor as each other and the ’109 Patent. Decl. ¶261.

Moreover, a POSITA would have been motivated to implement *Park*’s solution in *Rosenberg*’s system. A POSITA would have recognized when *Rosenberg* is modified with *Nakazawa*’s transformation, if the sizes of the display screen and

image are different after the transformation, empty regions would form. A POSITA would have been motivated to implement *Park*'s pixel-filling solution in *Rosenberg* (as modified by *Nakazawa* or *Nakazawa and Hatanaka* or *Tripathi*) to address this and prevent the user "rejecti[ng]" "the empty region." *Park*, [0054]; Decl. ¶262.

A POSITA would have expected success in doing so because it would have been using a known technique to solve a known problem in a similar device in the same way. Implementing *Park*'s solution in *Rosenberg* (as modified by *Nakazawa* or *Nakazawa and Hatanaka* or *Tripathi*) would require adding known program code to memory for execution by the processor of the combined system. *Rosenberg*, [0109], Fig. 13; *Park*, [0015], [0087], [0088]. A POSITA would have understood this would generate the predictable result of a transformed image displayed without an empty region. Decl. ¶263.

**I. Grounds 17–19 Demonstrate Claims 13–15 Are Unpatentable**

**1. Claim 13**

- a. **13[pre]:** "*The method of claim 1, further comprising the steps:*"

*Rosenberg* and *Nakazawa* (or *Rosenberg*, *Nakazawa*, and *Hatanaka*, or *Rosenberg*, *Nakazawa*, and *Tripathi*) render obvious claim 1. Sections V.A.4, V.B.1, V.C.1; Decl. ¶271.

- b. 13[a]: “*obtaining a second digital image from a second camera;*”
- c. 13[b]: “*flipping the second image about a vertical axis so as to reverse right and left sides of the second image;*”
- d. 13[c]: “*applying a transformation mapping to the second image to modify the second image such that it appears to mimic a reflection of a mirror;*”
- e. 13[d]: “*resizing the second image to reduce variations caused by changes in object’s distance to the second camera;*”

*Rosenberg* alone, or in view of *Nakazawa*, renders obvious these limitations.

Decl. ¶¶272–276.

First, *Rosenberg* discloses its system can include multiple digital cameras. *Rosenberg*, [0057]. A POSITA would have found it obvious to use two or more cameras with overlapping image areas as an alternative to wide-angle lenses for extended image areas. Decl. ¶273; *infra* Section V.I.1.f.

Second, *Rosenberg* or *Rosenberg* and *Nakazawa* render obvious performing flipping, transformation mapping, and resizing steps on a first digital image from the first camera to obtain a mirror image. Sections V.A.4.b–V.A.4.e. A POSITA would have understood these steps would also be performed on “*a second digital image from a second camera*” to obtain a joint image with extended image area. *Rosenberg* (or *Rosenberg* and *Nakazawa*) renders obvious performing these steps on the second digital image. Sections V.A.4.b–V.A.4.e; Decl. ¶¶274–275; *infra* Section V.I.1.f.

- f. 13[e]: “*stitching the image and the second image after performing the flipping, transformation mapping, and resizing, to thereby obtain a stitched image;*”

*Rosenberg* and *Nakazawa* (or *Rosenberg*, *Nakazawa*, and *Hatanaka*, or *Rosenberg*, *Nakazawa*, and *Tripathi*) and *Kuranov* render obvious this limitation. Decl. ¶¶277–279.

*Kuranov* discloses stitching multiple video images captured from different locations, angles, and viewpoints (“*stitching the image and the second image*”). *Kuranov*, [0005], [0030]–[0031], [0042]–[0043], [0061], Figs. 2A–2B, 1C. This stitching includes configuration and rendering. *Id.*, [0061]. During configuration, pairs of features extracted from source images representing the same object are identified and used to estimate an initial mapping that specifies the position of each source image point in the final joined image. *Id.*, [0065]–[0069], Fig. 2B. Additional feature correlation and matching is performed to identify corresponding features in source images and obtain a more accurate mapping. *Id.*, [0070]–[0071], Fig. 2B. During rendering, source images are stitched based on the mapping and rendered into one image (“*obtain a stitched image*”). *Id.*, [0073], Fig. 3; Decl. ¶¶100, 278.

When two cameras with overlapping image areas in *Rosenberg* are stitched to obtain a wide-angle image (Section V.I.1.e; Decl. ¶273), a POSITA would have understood “*the flipping, transformation mapping, and resizing*” would be performed on the image captured by each camera to obtain two mirror images before

stitching them into a wide-angle image. This is because performing these steps on each image would simplify the stitching process. For example, after performing these steps on both images, both would appear to have a similar orientation (e.g., facing straight, Section V.A.5.a) and elevation (align with eye levels, *id.*), and would be without distortion (e.g., projective distortion, Section V.A.4.d). *Deguchi*, [0028], [0041]–[0045]; Decl. ¶278.

A POSITA would have been motivated to combine *Rosenberg* as modified by *Nakazawa*, or *Nakazawa* and *Hatanaka* or *Tripathi*, and *Kuranov*. Decl. ¶¶268–270. They are analogous art, in the same field of endeavor as each other and the ’109 Patent. Decl. ¶268.

Moreover, a POSITA would have been motivated to implement *Kuranov*’s stitching in *Rosenberg*’s system. *Rosenberg* discloses its system can include more than one digital camera. *Rosenberg*, [0057]. While *Rosenberg* discloses using a wide-angle lens to “provide extended image capture areas,” *id.*, [0062], it was known that connecting images from cameras with overlapping image areas was a suitable alternative. *Deguchi*, Abstract, [0003], [0009], [0011]. *Kuranov*’s image stitching provides a suitable alternative that advantageously creates a relatively large image from multiple cameras without requiring a special lens and correction of distortions associated with that lens. *Kuranov*, [0066]–[0071], [0077]–[0094], [0098], [0107]; *Deguchi*, [0004]–[0008]; Decl. ¶269.

A POSITA would have expected success doing so, for it would have been using a known technique to solve a known problem in a similar device in the same way. *Kuranov* explains its stitching applies to video streams like in *Rosenberg* (*id.*, [0002], [0005], [0031], [0045]–[0048], [0052], [0061], [0103]), and can be in hardware (processors and memory) and/or computer code (*id.*, [0033]–[0035], [0039], [0043]). Implementing *Kuranov*’s stitching in *Rosenberg* as modified by *Nakazawa* (or *Nakazawa* and *Hatanaka* or *Tripathi*) would require adding known program code to memory for execution by *Rosenberg*’s processor. *Rosenberg*, [0109], Fig. 13. A POSITA would have understood that the modification would successfully generate the predictable result of having a wide-angle image with an extended image area. Decl. ¶270.

**g. 13[f]: “displaying the stitched image on the monitor.”**

*Rosenberg* and *Nakazawa* (or *Rosenberg*, *Nakazawa*, and *Hatanaka*, or *Rosenberg*, *Nakazawa*, and *Tripathi*) and *Kuranov* render obvious this limitation. Decl. ¶¶280–282.

*Rosenberg* discloses displaying the image after flipping, transformation mapping, and resizing. Section V.A.4.f. *Kuranov* similarly discloses displaying the stitched image. *Kuranov*, [0005], [0075], [0105]. When *Rosenberg* (as modified with *Nakazawa* or *Nakazawa* and *Hatanaka* or *Tripathi*) implements *Kuranov*’s stitching, the stitched image would be displayed as a mirror image. Decl. ¶281.

A POSITA would have been motivated to use *Kuranov*'s stitching in *Rosenberg* (as modified with *Nakazawa* or *Nakazawa* and *Hatanaka* or *Tripathi*) to obtain and display a stitched image, emulating a traditional mirror with extended image area, and would have had a reasonable expectation of success doing so. Section V.I.1.f; Decl. ¶¶268–270, 282.

2. **Claim 14**

- a. ***“The method of claim 13, wherein field of views of the camera and of the second camera overlap, and further comprising the step of overlay decision to determine best location in overlapping parts of the field of views to perform the stitching.”***

*Rosenberg* and *Nakazawa* (or *Rosenberg*, *Nakazawa*, and *Hatanaka*, or *Rosenberg*, *Nakazawa*, and *Tripathi*) and *Kuranov* render obvious this limitation. Decl. ¶¶283–287.

A POSITA would have understood the area imaged by a camera is that camera's field of view. A POSITA would have found it obvious to use *Kuranov*'s stitching to connect images from two or more cameras with overlapping imaging areas (***“field of views of the camera and of the second camera overlap”***) to provide extended image areas. *Rosenberg*, [0062]; Section V.I.1.f; Decl. ¶284.

*Kuranov* recognizes the problem of overlapped areas (***“overlapping parts of the field of views”***) when estimating the mapping to perform the stitching. And it explains different alignments can be performed together or alternatively to address

this. *Kuranov*, [0043], [0065]–[0067], [0077]–[0093]. After alignment, *Kuranov* “determines which image better represents [the] overlapping area.” *Id.*, [0094]. Specifically, it discloses adjusting the depth of one or more images (or the order of stitching) in the overlapping areas so “some overlapping images can be pushed forward” and “[o]ther images may be pushed back (and obscured from view).” *Id.* This can “select the preferred order of viewing and obtain[] the stitched image that the user likes the best.” *Id.*; Decl. ¶285.

A POSITA would have understood *Kuranov*’s process aligns and joins images at seam locations where image representation switched between images. A POSITA would have understood this is “*determin[ing] best location . . . to perform the stitching*” because the seam locations are determined based on “better” image representation among the overlapping images. *Kuranov*, [0070], [0090], [0094]; Decl. ¶286.

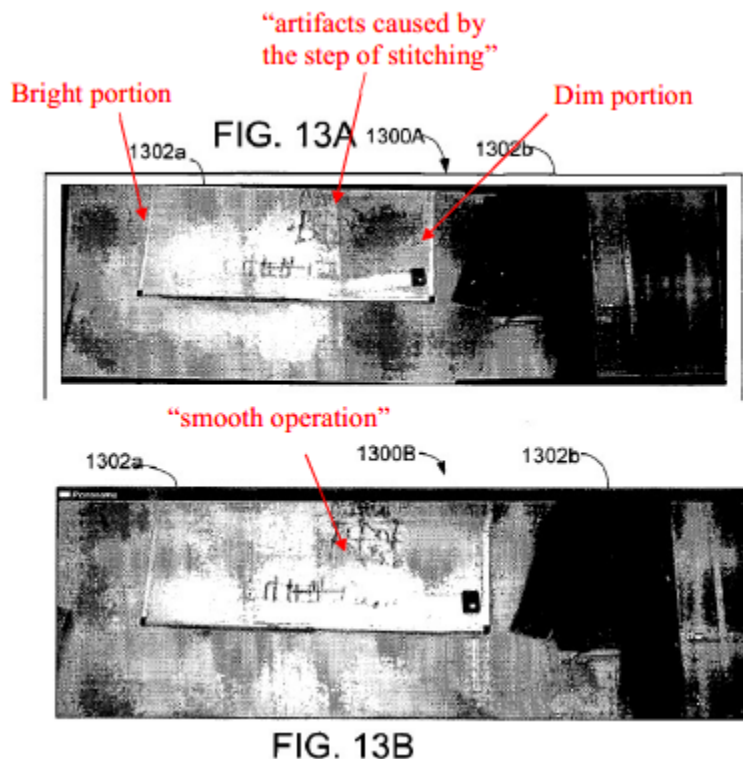
A POSITA would have found it obvious to use *Kuranov*’s stitching, including the overlay decision to determine the best location in overlapping areas to perform stitching, in *Rosenberg* (as modified with *Nakazawa* or *Nakazawa* and *Hatanaka* or *Tripathi*), and would have done so with a reasonable expectation of success. Section V.I.1.f; Decl. ¶¶268–270, 287.

3. **Claim 15**

- a. ***“The method of claim 14, further comprising a smoothing operation to correct artifacts caused by the step of stitching.”***

*Rosenberg* and *Nakazawa* (or *Rosenberg*, *Nakazawa*, and *Hatanaka*, or *Rosenberg*, *Nakazawa*, and *Tripathi*) and *Kuranov* render obvious this limitation. Decl. ¶¶288–290.

*Kuranov* discloses, during rendering, “seams are blended and smoothened at the seams and interior for better realism” (“***smoothing operation***”). *Kuranov*, [0073], [0106], [0107]. This includes adjusting the brightness and/or contrast to “remove the jagged edge effect and may provide a smooth transition” between frames (“***to correct artifacts caused by the step of stitching***”). *Id.*, [0107], Fig. 3. *Kuranov* illustrates this below:



*Id.*, Figs. 13A–13B, [0109]–[0112]; Decl. ¶289.

A POSITA would have found it obvious to use *Kuranov*’s stitching, including smoothing operation, in *Rosenberg* (as modified with *Nakazawa* or *Nakazawa* and *Hatanaka* or *Tripathi*), and would have done so with a reasonable expectation of success. Section V.I.1.f; Decl. ¶¶268–270, 290.

## J. Grounds 20–22 Demonstrate Claim 16 Is Unpatentable

### 1. Claim 16

- a. 16

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[pre]: “The method of claim 1, further comprising the steps:”
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*Rosenberg* and *Nakazawa* (or *Rosenberg*, *Nakazawa*, and *Hatanaka*, or *Rosenberg*, *Nakazawa*, and *Tripathi*) and *Chang* render obvious claim 1. Sections V.A.4, V.B.1, V.C.1; Decl. ¶294.

- b. 16[a]: “*obtaining a second digital image from a second camera;*”
- c. 16[b]: “*flipping the second image about a vertical axis so as to reverse right and left sides of the second image;*”
- d. 16[c]: “*applying a transformation mapping to the second image to modify the second image such that it appears to mimic a reflection of a mirror;*”
- e. 16[d]: “*resizing the second image to reduce variations caused by changes in object’s distance to the second camera;*”

*Rosenberg* alone, or in view of *Nakazawa*, renders obvious these limitations.

Decl. ¶¶295–298.

First, *Rosenberg* discloses its system can include multiple digital cameras. *Rosenberg*, [0057]. A POSITA would have found it obvious to arrange two digital cameras left and right with parallax in *Rosenberg* to capture parallax image signals for rendering a 3D image. Decl. ¶296; *infra* Section V.J.1.f.

Second, *Rosenberg* or *Rosenberg* and *Nakazawa* render obvious performing flipping, transformation mapping, and resizing a first digital image from the first camera to obtain a mirror image. Sections V.A.4.b–V.A.4.e. A POSITA would have understood these steps would also be performed on the “*second digital image from a second camera.*” *Rosenberg* or *Rosenberg* and *Nakazawa* render obvious performing these steps on the second image. Sections V.A.4.b–V.A.4.e; Decl. ¶¶297–298; *infra* Section V.J.1.f.

- f. 16[e]: “***displaying the image and the second image after performing the flipping, transformation mapping, and resizing, to thereby obtain a three-dimensional image on the monitor.***”

*Rosenberg* and *Nakazawa* (or *Rosenberg*, *Nakazawa*, and *Hatanaka*, or *Rosenberg*, *Nakazawa*, and *Tripathi*) and *Chang* render obvious this limitation. Decl. ¶¶299–302.

*Chang* discloses a system displaying 2D or 3D images on an LCD display. *Chang*, [0003], [0014]–[0015], [0039], [0078]–[0089], [0099], Figs. 1, 5. To do this, *Chang* teaches: (i) applying parallax image signals to the display (*id.*, [0018], [0043]–[0045], [0052], [0056]–[0058], [0065]–[0068], [0075]–[0076], Figs. 2A–3A); (ii) performing sampling and multiplexing to form parallax images (*id.*, [0024]–[0025], [0080], [0092]); (iii) determining the display mode (*id.*, [0024]–[0025], [0037], [0056], [0065], [0082]); (iv) forming a predetermined barrier pattern in the filter to separate the parallax images (*id.*, [0024]–[0025], [0047]–[0049], [0059], [0069], [0076], [0082], [0089], [0094]–[0095], Figs. 3A, 3B, 4B); and (v) implementing a 2D or 3D image on the display (*id.*, [0024]–[0025], [0059], [0069], [0082]). *Chang* discloses “***displaying the image and the second image ... to thereby obtain a three-dimensional image on the monitor.***” Decl. ¶¶102–103, 300.

A POSITA would have been motivated to combine *Rosenberg* as modified by *Nakazawa*, or *Nakazawa* and *Hatanaka* or *Tripathi*, and *Chang*. Decl. ¶¶291–293.

They are analogous art, in the same field of endeavor as each other and the '109 Patent. Decl. ¶291.

A POSITA would have been motivated to capture parallax images with two cameras arranged left and right with parallax and display the two images on the LCD screen as taught in *Chang* to obtain a 3D image on the display. While *Rosenberg* teaches emulating a traditional mirror, it also notes the need to provide greater functionality than traditional mirrors. *Rosenberg*, [0003]–[0005], [0025]–[0027], [0057]. A POSITA would have been motivated to modify *Rosenberg*'s two-camera design to implement *Chang*'s 3D method to improve functionality and user experience, including allowing a user to selectively display a 2D or 3D image without wearing 3D glasses. *Chang*, [0006], [0008], [0024]–[0025], [0037], [0056], [0065], [0082]–[0083], [0087]–[0089], Fig. 5; Decl. ¶¶103, 291–293, 296, 300, 302.

A POSITA would have understood “*the flipping, transformation mapping, and resizing*” would be performed on images captured by each camera before displaying the 3D image because doing so would improve the accuracy of the 3D image. As discussed in Section V.I.1.f, after performing these steps on both images from both cameras, both modified images would have similar orientation and elevation and no distortion, which would preserve accurate visual perspectives in the left-eye image and right-eye image on the screen. Decl. ¶301.

A POSITA would have understood when *Rosenberg* is modified to implement *Chang*'s 3D display, its cameras would be arranged to capture parallax image signals. Indeed, it was well known to use images synchronously captured by a pair of cameras, arranged left and right with parallax, to obtain 3D image display. Nakamura, [0004]; *Chang*, [0006]. And a POSITA would have understood *Rosenberg*'s LCD display would have been modified to include a filter for forming a predetermined barrier pattern as taught in *Chang*. A POSITA would have understood *Rosenberg*'s processor and LCD display would implement needed image signal processing and filter and render a 3D image. A POSITA would have expected success in doing so as it would have been using a known technique to improve a similar device in the same way and yield the predictable result of displaying 3D images on *Rosenberg*'s LCD. Decl. ¶293.

**K. Grounds 23–25 Demonstrate Claim 18 Is Unpatentable**

**1. Claim 18**

- a. ***“The method of claim 1, further comprising calculating distance to a user appearing in the image by identifying user’s shoes and triangulating to the shoes.”***

*Rosenberg* and *Nakazawa* (or *Rosenberg*, *Nakazawa*, and *Hatanaka*, or *Rosenberg*, *Nakazawa*, and *Tripathi*) and *Lizee* render obvious claim 18. Decl. ¶¶303–310.

*Lizee* discloses a system that captures a user’s image and transforms it to a mirrored silhouette. *Lizee*, [0012], [0034]–[0035]. [0051], [0063], [0084], [0088],

Fig. 3. The transformations (left-right inversion, scaling) are based on the distance between the user and image capture device. *Id.*, [0043]–[0046]. Specifically, *Lizee* discloses recognizing a user in an image and estimating that user’s distance to the image capture device based on the size of a portion of the user (“head, arm, hand, torso”) or object the user is carrying compared to the size of that portion or object at a known distance (“*calculating distance to a user*”). *Lizee*, [0043]–[0046]; Decl. ¶¶108, 308.

A POSITA would have been motivated to combine *Rosenberg* as modified by *Nakazawa*, or *Nakazawa* and *Hatanaka* or *Tripathi*, and *Lizee*. Decl. ¶¶303–306. They are analogous art, in the same field of endeavor as each other and the ’109 Patent. Decl. ¶303.

Moreover, *Rosenberg* discloses its camera has a proximity-sensing function, and a POSITA would have understood that *Rosenberg* in view of *Nakazawa* would determine the distance to a user in the real-time video images. *Rosenberg*, [0069], [0073], [0109], Fig. 13; *Nakazawa*, [0015], [0030], [0038], Fig. 1; Section V.A.4.h. While *Rosenberg* combined with *Nakazawa* does not disclose details for how the camera determines distance, a POSITA would have recognized *Lizee* offered a suitable option using a portion of the user or object carried by the user to determine distance. Decl. ¶¶304–305.

When *Rosenberg* (as modified by *Nakazawa* or *Nakazawa* and *Hatanaka* or *Tripathi*) is combined with *Lizee*, a POSITA would have understood the user for which distance is calculated is the user in *Rosenberg*'s video images (“***appearing in the image***”) using the digital mirror. A POSITA would have found it obvious to identify the user's shoes for estimating distance where the user uses the digital mirror image as a traditional mirror to view clothing choices. *Lizee*, [0043] (“any object carried by the user”); *Rosenberg*, [0053], [0108]. A POSITA would have understood that “conventional image recognition techniques” would be used for “***identifying***” the user and the portion or object of the user, as taught by *Lizee*, such as shoes. *Lizee*, [0043]–[0046]. Decl. ¶¶305, 308.

When shoes are used, a POSITA would have understood *Lizee*'s distance estimation is “***triangulating to the shoes***” because the distance between two points is determined using the position/orientation of the camera and a known distance. Decl. ¶309. For example, in *Rosenberg*, the camera sits above the screen and aims downwards. *Rosenberg*, [0062]. A POSITA would have recognized the camera's angle can be predetermined. *Park*, [0065]. And a POSITA would have been able to use basic geometric calculations using the predetermined angle of the camera, the known distance, the size of the shoes at the known distance, and the size of the shoes in the image to determine the user's distance to the camera/screen. Decl. ¶309.

A POSITA would have had a reasonable expectation of success doing so. *Id.* ¶¶306, 310. A POSITA would have understood *Rosenberg*'s processor, memory, digital camera, and hardware/software would be capable of performing *Lizee*'s estimation. And a POSITA would have expected success in implementing *Lizee*'s estimation in *Rosenberg* (as modified with *Nakazawa* or *Nakazawa* and *Hatanaka* or *Tripathi*) as because it would have been using a known technique to improve a similar device in the same way and yield the predictable result of estimating distance. *Id.*

## VI. Discretionary Denial is Not Appropriate

The Board's resources would be well-utilized in considering the substance of the unpatentability arguments raised in this petition. And there is no basis – under *General Plastic*, *Fintiv*, or 325(d) – for a discretionary denial, as is explained below.

### A. Under §314(a)

Petitioner respectfully submits that discretionary denial would be inappropriate under 314(a). A discussion of *General Plastic* (as applied to the Instituted IPR and, separately, the earlier Meta IPR) and then *Fintiv* follows below.

#### 1. General Plastic is not applicable to the present copycat Petition of IPR2024-00856 (the “Instituted IPR”)

Petitioner respectfully submits that a *General Plastic* analysis does not apply here. In *General Plastic*, the Board set forth a series of factors that may be analyzed for identifying follow-on petitions to help conserve the finite resources of the Board.

Here, the present Petition is not a “follow-on petition” to which *General Plastic* applies, especially as Petitioner has not previously challenged the ’109 Patent and seeks to join the Instituted IPR in a passive understudy role. As it has done before, the Board can and should find that this joinder petition “effectively neutralizes” a *General Plastic* analysis. *See, e.g., Apple Inc. v. Uniloc 2017 LLC*, IPR2018-00580, Paper 13 at 10 (PTAB Aug. 21, 2018) (instituting a copycat petition where the petitioner seeking joinder had previously filed a non-instituted IPR, stating that the petitioner’s joinder motion agreeing to a passive understudy role “effectively neutraliz[es] the *General Plastic* factors”); *see also Fortinet, Inc. et al. v. Lionra Technologies Ltd.*, IPR2024-00158, Paper 11 at 23-24 (agreeing that a joinder petition generally effectively neutralizes the *General Plastic* analysis).

**2. General Plastic is no bar to institution despite IPR2022-00489 (the “Meta IPR”).**

While Meta Platforms, Inc. and others filed a petition challenging claims 1-2, 6, 8-9, and 17, Ex. 1027, no *General Plastic* factor warrants denial. None of Petitioners here were co-petitioners with Meta or otherwise involved in the Meta IPR. *Unified Patents, Inc. v. Certified Measurement, LLC*, IPR2018-00548, Paper 7 at 7-8 (PTAB Sept. 5, 2018). Further, (i) this Petition challenges different claims than Meta’s IPR, (ii) this Petition asserts different grounds than Meta’s IPR including relying upon *Rosenberg* in a different way, and (iii) Meta’s IPR was dismissed before institution.

### 3. Fintiv is No Bar to Institution

The Board should not deny institution under *NHK Spring Co. Ltd v. Intri-Plex Technologies, Inc.*, IPR2018-00752, Paper 8 at 19–20 (PTAB Sept. 12, 2018) (precedential)<sup>9</sup> or *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential).

Google and Samsung have already submitted a *Sotera* stipulation. *Samsung Electronics Co. Ltd. et al v. EyesMatch Ltd.*, IPR2024-00856, Paper 13 at 1 (citing Ex. 1044). The Board found that effective in deciding to institute their IPR petition. *Id.*, Paper 15 at 12–13. The same is true here, because Samsung, the only petitioner in litigation with Patent Owner, has already submitted the *Sotera* stipulation. Moreover, the *EyesMatch v. Samsung* litigation has been stayed pending the final written decision in IPR2024-00810. *EyesMatch Ltd. v. Samsung Electronics America, Inc.*, No. 2:23-cv-00363-JRG-RSP (E.D. Tex.), Stay Order, Dkt. No. 60. Further, Patent Owner has not sued Petitioner. Thus, there is no reason to apply *Fintiv*.

### VII. Denial Under § 325(d) Is Improper

Section 325(d) denial would be improper because this Petition presents new prior art, grounds, and arguments not yet presented to the Office. *Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 (PTAB

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<sup>9</sup> Petitioner reserve objection to the Board’s application of *NHK-Fintiv*.

Feb. 13, 2020); see also, e.g., *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 (PTAB Dec. 15, 2017).

None of *Nakazawa*, *Hatanaka*, *Tripathi*, *Iwai*, *Kubota*, *Cho*, *Kuranov*, *Chang*, *Asakura*, or *Park* were before the Examiner during prosecution. Ex. 1002. Although *Rosenberg* was before the Examiner, it was cited in an IDS filed after the Notice of Allowance. *Id.* at 348-384, 412-420. *Rosenberg* was not part of a ground of rejection and is not a § 325(d) concern. *Amgen Inc. v. Alexion Pharm., Inc.*, IPR2019-00739, Paper 15 at 62 (PTAB Aug. 30, 2019). Even if *Rosenberg* had been considered, its combination with the other references herein was never considered by the Office. Ex. 1002.

Further, denial is improper because the art in this Petition is not substantially the same as or cumulative over the art considered during prosecution. The Examiner cited two patents as closely related to the '109 Patent and noted they do not teach “non-ordered steps.” *Id.* at 354-57. As discussed, however, these limitations would have been obvious in view of the grounds herein. Sections V.A.4, V.B.1, V.C.1. At least *Nakazawa*, *Tripathi*, and *Hatanaka* are not cumulative over or substantially the same as the art considered in prosecution.

Finally, Section V.A.4 shows the Examiner made a material error by not using *Rosenberg*. *Rosenberg* discloses numerous limitations, and when it is combined with the other references discussed herein, it renders the claims obvious.

## VII. Mandatory Notices

### A. Real Party-in-Interest

Microsoft Corporation is the real party-in-interest for this Petition.

### B. Related Matters

To the Petitioner's best knowledge, the '109 Patent is or has been involved in the following matters:

| Name                                                                             | Number        | Court     | Filed            |
|----------------------------------------------------------------------------------|---------------|-----------|------------------|
| <i>EyesMatch Ltd. et al. v. Facebook, Inc. et al</i>                             | 1:21-cv-00111 | D. Del.   | January 28, 2021 |
| <i>EyesMatch Ltd. v. Samsung Electronics Co., Ltd. et al.</i>                    | 2:23-cv-00363 | E.D. Tex. | August 8, 2023   |
| <i>Meta Platforms, Inc. f/k/a Facebook, Inc. et al. v. EyesMatch Ltd. et al.</i> | IPR2022-00489 | PTAB      | January 28, 2022 |

Petitioner is concurrently filing a petition challenging the claims in related U.S. Patent No. 8,982,110: IPR2025-00296.

### C. Lead and Back-Up Counsel, and Service Information

Petitioner provides the following designation of counsel.

| LEAD COUNSEL                                                                                                                                                                                  | BACK-UP COUNSEL                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Alexander Stein (Reg. No. 71,397)<br><b>Morgan, Lewis &amp; Bockius LLP</b><br>1301 Second Ave. Suite 3000<br>Seattle, WA 98101<br>(206) 274-6400<br>Microsoft-EyesMatch-IPRs@morganlewis.com | Timmy Lee (Reg. No. 79,856)<br><b>Morgan, Lewis &amp; Bockius LLP</b><br>1400 Page Mill Road<br>Palo Alto, CA 94304<br>(650) 843-4000<br>Microsoft-EyesMatch-IPRs@morganlewis.com |

In the filed Power of Attorney, Microsoft has granted Power of Attorney to Practitioners at Morgan, Lewis & Bockius LLP.

Please address all correspondence to lead and back-up counsel at the addresses shown above. Petitioner consents to electronic service by email.

### **VIII. Grounds for Standing**

Petitioner certifies that the '109 Patent is available for IPR and Petitioner is not barred or estopped from requesting an IPR on the grounds identified herein.

### **IX. Conclusion**

Petitioner respectfully request that *inter partes* review of the '109 Patent be instituted and that the Challenged Claims be cancelled as unpatentable.

Dated: December 20, 2024

Respectfully submitted,

/ Alexander B. Stein /  
Alexander B. Stein  
Reg. No. 71,397

**CERTIFICATION UNDER 37 C.F.R. §42.24(d)**

Pursuant to 37 C.F.R. §42.24(d), the undersigned hereby certifies that the word count under §42.24(a)(1) for the foregoing Petition for *Inter Partes* Review totals 13,724 words, within the 14,000 word limit allowed under §42.24(a)(1)(i), excluding the parts of this Petition that are exempted under 37 C.F.R. §42.24(a), as measured by the word-processing system used to prepare this paper.

Dated: December 20, 2024

/ Alexander B. Stein /  
Alexander B. Stein

## **CERTIFICATE OF SERVICE**

Pursuant to 37 C.F.R. §§42.6(e) and 42.105(a), the undersigned certifies that on December 20, 2024, a copy of the foregoing **Petition for *Inter Partes* Review of U.S. Patent No. 8,982,109, Exhibits, and Petitioner's Power of Attorney and Designation of Lead and Back-up Counsel** were served via Priority Mail Express on the Patent Owner at the following addresses of record.

Womble Bond Dickinson (US) LLP  
ATTN: IP Docketing  
P.O. Box 570489  
Atlanta GA 30357-0037

Womble Bond Dickinson (US) LLP  
ATTN: IP Docketing  
P.O. Box 7037  
Atlanta GA 30357-0037

Courtesy copies were also served via email on December 20, 2024 on Patent Owner's counsel of record in *EyesMatch Ltd. v. Samsung Electronics Co.*, No. 23-cv-00363 (E.D. Tex.):

josh@joshmaness.com;  
kurt@truelovelawfirm.com;  
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Dated: December 20, 2024

/ Alexander B. Stein /  
Alexander B. Stein