

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

EYESMATCH, INC.,
Patent Owner

IPR2024-00810
Patent 8,982,110

**PETITIONERS' REPLY
TO PATENT OWNER'S RESPONSE**

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UPDATED EXHIBIT LIST

EX	Description
1001	U.S. Patent No. 8,982,110 (“’110 Patent”)
1002	Prosecution File History of the ’110 Patent
1003	Expert Declaration of Dr. Lina J. Karam, Ph.D.
1004	Curriculum Vitae of Dr. Lina Karam, Ph.D.
1005	U.S. Patent Pub. No. 2011/0298910 to De Haan et al. (filed February 15, 2010 and published December 8, 2011) (“Haan”)
1006	U.S. Patent Pub. No. US 2007/0040033 to Rosenberg (filed September 26, 2006 and published February 22, 2007) (“Rosenberg”)
1007	U.S. Patent Pub. No. 2011/0246329 to Geisner et al. (filed April 1, 2010 and published October 6, 2011) (“Geisner”)
1008	WO Patent Pub. No. 2006/108279 to Lizée et al. (filed April 11, 2006 and published October 19, 2006) (“Lizée”)
1009	Institute for Robotics and Intelligent Systems, Alexandre R.J. Francois, <i>Software Architecture for Computer Vision: Beyond Pipes and Filters</i> (July 2003) (“Francois”)
1010	Hartley et al., <i>Multiple View Geometry in Computer Vision</i> (2nd ed., published 2004) (“Hartley”)
1011	U.S. Patent Pub. No. 2007/0065039 to Park et al. (filed September 22, 2006 and published March 22, 2007) (“Park”)
1012 - 1017	[Reserved]
1018	Excerpts from EyesMatch Ltd.’s and Memomi Labs Inc.’s Objections and Responses to First Set of Interrogatories of Meta Platforms, Inc., Instagram, LLC, and WhatsApp Inc. (Nos. 1-4) in <i>EyesMatch Ltd. v.</i>

EX	Description
	<i>Facebook, Inc.</i> , No. 1:21-cv-00111-RGA-JLH (D. Del.) (“Excerpts from Patent Owner’s Infringement Contentions in the Meta Litigation”)
1019	Excerpts from Plaintiffs EyesMatch Ltd.’s Disclosure of Asserted Claims and Infringement Contentions in <i>EyesMatch Ltd. v. Samsung Electronics America, Inc.</i> , No. 2:23-cv-00363-JRG-RSP (E.D. Tex.)
1020	<i>EyesMatch Ltd. v. Samsung Electronics America, Inc.</i> , No. 2:23-cv-00363-JRG-RSP (E.D. Tex.), Docket Control Order, Dkt. No. 27
1021	U.S. Patent No. 8,982,109 to Nissi Vilcovsky and Ofer Saban (filed March 15, 2013 and issued March 17, 2015) (the “’109 Patent”)
1022	File History of U.S Patent No. 8,982,109 (App. No. 13/843,001) (“’109 Patent File History”)
1023	U.S. Provisional Patent Application No. 61/738,957 (filed December 18, 2012)
1024	File History of U.S. Provisional Patent Application No. 13/088,369 (filed April 17, 2011)
1025	U.S. Provisional Patent Application No. 60/656,884 (filed March 1, 2005)
1026	U.S. Provisional Patent Application No. 60/656,885 (filed March 1, 2005)
1027	James D. Foley et al., <i>Computer Graphics: Principles and Practice</i> (2nd ed. in C, published 1995) (“Foley”)
1028	Excerpts from Alan Watt, <i>3D Computer Graphics</i> (3rd ed., published 2000) (“Watt”)
1029	Declaration of Sylvia D. Hall-Ellis, Ph. D. (“Hall-Ellis Declaration”)
1030	Patent Owners EyesMatch Ltd., Memomi Labs Inc.’s Preliminary Response in <i>Meta Platforms, Inc., Instagram, LLC, and WhatsApp Inc. v. EyesMatch Ltd., Memomi Labs Inc.</i> , IPR2022-00490, Paper 9 (“Patent Owner’s Preliminary Response in the Meta IPR2022-00490”)

EX	Description
1031	Email to EyesMatch Counsel, September 24, 2024
1032	[Reserved]
1033	Second Expert Declaration of Dr. Lina J. Karam, Ph.D.
1034	Transcript of Dr. David A. Forsyth, May 21, 2025
1035	Alexandre R.J. François et al. <i>A handheld mirror simulation</i> , 2003 International Conference on Multimedia and Expo. ICME '03. Proceedings (Cat. No.03TH8698), Baltimore, MD, USA, 2003, pp. 1-4, doi: 10.1109/ICME.2003.1221724 (“François II”)
1036	<i>EyesMatch Ltd. v. Samsung Electronics America, Inc.</i> , No. 2:23-cv-00363-JRG-RSP (E.D. Tex.), Order, Dkt. No. 60 (granting stay of case)
1037	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 (“Straka”)

I. INTRODUCTION

EyesMatch’s position boils down to the argument that claim constructions adopted by a Magistrate in a parallel district court proceeding, which is stayed, are inconsistent with the Petition. Paper 27 (“POR”), 1. To the contrary, the Magistrate’s constructions, as evidenced by the ’110 Patent, Petitioners’ expert, and EyesMatch’s expert, merely reflect the ordinary meaning of the claim terms to a skilled artisan. And the prior art that forms the grounds of unpatentability use those (and related) terms in the same, consistent way.

II. CLAIM CONSTRUCTION

Prior to institution, neither party proposed constructions for any terms. EyesMatch (“PO” or “EyesMatch”) agreed that no “resolution of any claim construction issue is necessary at this time.” Paper 17, 10. Subsequently the claim construction process began in the parallel district court proceeding, with both parties proposing constructions for various terms. EX1020; EX2008.

On December 11, 2024, the Magistrate issued a claim construction order (“Magistrate Order”). EX2008.¹ Below are the relevant ’110 constructions:

¹ Contrary to PO’s suggestion (POR, 12), Petitioners did not object to EyesMatch’s submission of the district court materials, but noted they should be submitted with PO’s Response. See Paper 24.

Term	Magistrate Order
“transformation mapping”	“selected set of image transformations”
“adaptive transformation mapping”	“continuously variable transformation mapping”
“mirror tracking mode”	“a mode of operation in which the user sees their reversed reflection appearing at roughly double the distance from the camera and the reflection maintains roughly the same size regardless of the user movement”

The parties have not submitted objections to the Magistrate Order, and the District Court has not reviewed or ruled on objections because the litigation was stayed pending resolution of this IPR and IPR2024-000856. EX1036.

A. “mirror tracking mode”

Limitation 1(f) recites a “*mirror tracking mode*” (“the mirror mode limitation”). EyesMatch argues that it is improper for “Samsung to advance a broad construction in this proceeding to invalidate the claims, and at the same time advance a narrow one in the district court to support a non-infringement case.” POR, 12. This argument is incorrect.

Petitioners were not required to construe the mirror mode limitation in the Petition, as it is not dispositive to the invalidity issues presented therein. *Samsung Elecs. Co. v. Celect, LLC*, IPR2020-00476, Paper 14, 12-13 (Jul. 31, 2020) (“the proposed constructions in the district court litigation need not be adopted in the Petition”). Moreover, Petitioners’ proposed constructions in the litigation are

consistent with the mappings submitted in the Petition as intrinsic properties of a mirror.

1. The Petition is not improper because another construction is at issue in the District Court proceeding.

The Petition explained that the Board need not construe any claim term, including the mirror mode limitation, because the prior art discloses each limitation under any reasonable construction. Paper 1 (“Pet.”), 13. It is well established that a Petition may do that, and EyesMatch did not argue that any constructions were necessary prior to institution. PTAB’s Consolidated Trial Practice Guide (Nov. 2019) (“Practice Guide”), 44; Paper 17, 10. Further, there was no claim construction *determination* prior to institution (or at all) that Petitioners withheld.^{2 3} Both parties engaged in claim construction proceedings, and Samsung later offering of a construction for the district court to consider, under different circumstances, a different record, and for a proceeding ultimately decided by a jury of laypersons,

² EyesMatch’s invocation of 37 C.F.R. § 42.100(b) is unavailing. POR, 12. Section 42.100(b) pertains to “prior claim construction *determination[s]* 37 C.F.R. § 42.100 (emphasis added). There was no *determination* as to any claim term *prior to institution* and the district court judge has not yet adopted the constructions.

³ Unless otherwise noted, all emphases have been added.

was not improper. *Samsung Elecs.*, Paper 14, 12-13; EX1020.

Petitioners’ proposal that the Board need not construe this limitation because the prior art discloses each limitation under any reasonable construction still stands. Despite PO’s suggestion, the Board need not adopt the Magistrate Order if the Board believes the claims would be unpatentable regardless of the construction. *Google LLC v. Virentem Ventures, LLC*, No. IPR2019-01247, Paper 34, 11-14 (Mar. 5, 2021) (construing “presentation rate” differently from the district court because different records and the claims were unpatentable under either construction); *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017); *Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (Board need not expressly construe a phrase because it found the prior art disclosed all steps).

Regardless, and as explained below, the grounds *expressly* disclose a “mirror tracking mode” under any reasonable construction. EX1006, Abstract, claims 1, 19, 23, [0025]-[0028], [0036]-[0039], [0061]-[0062], [0074]-[0077], [0083], [0109], [0113]-[0115], Figs. 3, 5; EX1005, Abstract, claims 1-13, [0001]. [0006], [0101]-[0102], *passim*; EX1007, Fig. 9, [0126], [0130]; EX1008, Abstract, [0008], [0012]-[0013], [0088]; EX1034, 20:4-8 (“... Rosenberg describes a form of virtual mirror... Haan describes a form of virtual mirror ... Francois describes a form of virtual mirror.”). Thus, even if the Board were to adopt the Magistrate’s Order, it would

not impact the outcome.

2. The Board need not construe the mirror mode limitation

EyesMatch does not articulate what it considers to be the proper construction for the mirror mode limitation. POR, 9-14; EX1034, 86:2-92:4. It provides no analysis of the claims, specification, prosecution history, or extrinsic evidence. Rather, EyesMatch contends that because the Magistrate adopted a construction he believed would assist a lay jury,⁴ the Board should hold Samsung to the same construction here for *consistency*.⁵ *Id.*, 12-14. But the Board is not bound by a district court’s construction, much less a non-final one. *Google LLC*, Paper 34, 11; *Immunex Corp. v. Sanofi-Aventis U.S. LLC*, 977 F.3d 1212, 1223 (Fed. Cir. 2020); 37 C.F.R. § 42.100(b).

⁴ EX2011, 39:15-20 (“The fact that [a reflection] appears double the distance or that it maintains the same size, those are things I think the specification is describing that most [lay] people don’t know.”); EX2008, 18 (“some construction of the disputed claim language will assist the jury...”).

⁵ PO argued against the construction that it is advancing here. EX2008, 38-40. *Netflix, Inc. v. GoTV Streaming, LLC*, IPR2023-00757, Paper 18, 9 (Dec. 21, 2023) (party may not “expressly disagree” with claim construction and advance that disagreed-with construction).

The record reveals that there is no need to construe the mirror mode limitation. Dr. Karam opined that the district court’s construction is *consistent* with the meaning of “mirror tracking mode” as applied in her first declaration (EX1003) and the Petition. EX2012, 44:4-10, 49:1-4, 49:23-50:1, 50:10-11, 51:1-3, 51:13-15, 51:19-52:1, 83:13-16, 85:7-15, 86:21-23, 87:22-25, 182:3-8, 189:20-190:1, 190:13-19, 191:5-13, 191:18-20, 193:8-22, 253:24-254:2, 254:22-255:8, 258:5-8, 258:13-21, 259:19-21 (repeatedly explaining her understanding of mirror mimicking/mirror mode and the prior art consistent with the Magistrate Order).

Petitioners’ positions in district court were not “inconsistent”⁶ like in *Kiosoft Techs., LLC v. PayRange, Inc.*, No. IPR2021-00086, Paper 12, 16 (Mar. 22, 2021); a “rejected” construction like in *Google LLC*, Paper 34, 10-11, 13 (Mar. 5, 2021); or a non-construed means-plus-function limitation, like in *OrthoPediatrics Corp. v. K2M, Inc.*, IPR2018-01548, Paper 9, 6-11 (Mar. 1, 2019)—all cases PO relies upon.

Further, to the extent that PO’s argument is based on the doctrine of judicial estoppel (POR, 12-14), it is unavailing because the district court has not finally adopted the Magistrate’s claim constructions, and the case is stayed pending resolution of this IPR. *Cf. New Hampshire v. Maine*, 532 U.S. 742, 750–51 (2001);

⁶ Practice Guide at 47: “[A] prior claim construction determination is mandatory ... if it is ‘relevant information that is *inconsistent*’”

SkyHawke Techs., LLC v. Deca Int’l Corp., 828 F.3d 1373, 1376 (Fed. Cir. 2016). Moreover, PO has shown no bad faith here. *Sequoia Tech., LLC v. Dell Inc.*, No. 18-1127-LPS-CJB, 2021 WL 2010448, at *3 (D. Del. May 20, 2021) (finding the defendant not judicially estopped from arguing narrower construction than what proposed in IPR because no showing of bad faith), *aff’d in part*, 66 F.4th 1317, 1325 (Fed. Cir. 2023).

B. “adaptive transformation mapping”/ “transformation mapping”

Similar to the mirror mode limitation, PO argues that the Magistrate’s construction should apply here. POR, 14. But, for the same reasons above, no construction is necessary. Nevertheless, the Petition and Dr. Karam’s declaration show how the prior art discloses “adaptive transformation mapping” and “transformation mapping” under the Magistrate’s constructions.

III. THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. GROUND 1: Obvious in View of Haan and Francois

1. Haan-Francois combination teaches or renders obvious element 1[f].

PO argues that the Petition did not address limitation 1[f] under the Magistrate’s construction. POR, 15. This is incorrect.

a) The Petition shows how Haan-Francois teaches mirror tracking.

Haan discloses the mirror mode under any reasonable construction. Pet., 13,

44-46. As an initial matter, PO only disputes whether Haan discloses “mirror tracking mode” under its the Magistrate’s construction. However, Dr. Forsyth admits Haan and François concern a virtual mirror when applying the Magistrate’s construction. EX1034, 86:14-17 (“I applied the construction that [] the district judge supplied.”); 20:4-8 (“I believe Haan describes a form of virtual mirror. ... I think Francois describes a form of virtual mirror.”); 108:13-14.

There is no dispute, as the Petition states, Haan discloses—and is—a “mirror device.” Pet., 14-16; EX1005, Abstract; [0101]; claims 1-13. Further, Haan discloses its mirror device operating in various modes, including: a reflective mode, *where the device functions as a conventional mirror*; and a dual mode, where the device transitions between *a conventional mirror* and an exaggerated mirror. EX1005, [0090]-[0093]; *id.* at [0101]-[0102] (describing the device as converting a regular TV or PC into a mirror device). The reflective mode and the conventional mirror period in the dual mode both meet the mirror tracking limitation. Pet., 14-16.

As noted, the Magistrate’s construction describes the intrinsic optical properties of a mirror. EX1003, ¶¶53-57, 68. Dr. Karam opined that a POSITA would have understood the prior art’s teachings of displaying camera-captured images to emulate a mirror to mean that the images would be transformed to have a “mirror effect.” *Id.*, ¶¶36-52. A POSITA considering Haan would have recognized the intrinsic properties of a mirror and known that when Haan describes emulating

a conventional mirror, it is describing the mirror effect well-known to POSITAs, including appearing at roughly the same size, double the distance, and left/right inverted. EX1005, [0002] (Background section) (“[m]irror devices have been know [sic] for a very long time, in fact since Roman times and before”); EX2012, 205:9-206:2 (“You need to keep it such that the user intuitively perceive it as using a normal mirror. So the user is seeing the same size.”); EX1034, 108:13-18; EX1021, 2:4-46. Thus, even if Dr. Karam did not predict and recite verbatim the Magistrate’s construction in her declaration—Dr. Karam explained how Haan discloses a mirror tracking mode having the claimed mirror effect, entirely consistent with the Magistrate order. *Id.*, ¶¶41-52, 119, 122-25.

Indeed, Dr. Karam repeatedly testified that a POSITA’s understanding of Haan’s teaching of mirror-mimicking was within the scope of the Magistrate’s constructions, as it was nothing more than the plain meaning of “mirror.” EX2012, 44:3-10, 49:1-5, 50:10-51:3, 51:13-52:2, 52:22-23, 85:7-15, 174:21-175:1, 182:3-8, 189:20-24, 190:13-19, 191:5-20, 205:24-206:3, 252:18-23, 258:5-15, 259:19-21.

The Petition and Dr. Karam’s testimony also show how Haan teaches “double the distance” (i.e. displaying the image in accordance with the user’s distance from the mirror/camera). Pet., 36, 45; EX1003, ¶99. Therefore, a POSITA would have understood that Haan teaches displaying an image with the optical properties of a mirror, which require the image to maintain the same size and double the distance.

b) It is well known in the art that simulating a mirror requires doubling the distance and maintaining the same size.

PO does not contest that in a conventional mirror, a user sees their reversed reflection appearing at approximately double the distance and maintaining approximately the same size. EX1003, ¶65 (“As is also commonly known, a reflection of a user in a traditional mirror appears, to the user, to be the same size regardless of the user’s point of view.”); EX1021, 2:4-27; EX1034, 31:19-32:2. In fact, a reversed reflection of the same size and double the distance was well-known functionality of a mirror, and emulating that effect in a digital mirror was also well-known. EX1003, ¶¶65-66; *see also* EX1010 (Hartley) at 166-67; Figs. 6.7, 6.8; EX1021, 2:19-23; EX1033, ¶¶7-11, 23-30.

Both experts, the prior art, and the background of the patent, all agree that the well-known “mirror effect” includes appearing at roughly the same size, double the distance, and left/right inverted. EX1003, ¶¶41-47; EX2013, ¶¶67-70; *id.*, ¶86 (Dr. Forsyth admitting that “these optical properties of conventional mirrors likely have been known for millennia”); EX1034, 32:13-14. These intrinsic properties of a mirror are well-established within the foundational understanding of digital mirror systems. EX1033 ¶¶7-11, 13-14, 19-20, 23-30. A POSITA would therefore understand that, to achieve conventional mirror properties with a digital mirror, a simple transformation equation would simulate these optical properties. EX1033,

¶¶20-24.

In short, a POSITA would understand that the prior art relied on in the Grounds teaches emulating a conventional mirror with a digital mirror, as is consistent with the Magistrate’s “mirror tracking mode” construction, EX1033, ¶30.

c) The Haan-Francois combination renders obvious double the distance and maintaining the same size.

In addition to expressly teaching the mirror mode limitation under the Magistrate’s construction, Haan-Francois also renders it obvious. As an initial matter, in a “reflective mode,” the device operates as a simple mirror, which results in implementing the intrinsic features recited in the Magistrate’s construction. EX1005, [0076] (“the magnification is kept at a fixed value of, in this example 1. This can be done for instance by using the device as a simple mirror”). Additionally, Haan discloses that the device *smoothly* “transitions between reflective mode and display mode are preferred....” EX1005 [0080]; [0076]. Thus, a POSITA would have found it obvious to maintain the traditional and expected optical mirror properties while carrying out the preferable “smooth transition,” resulting in the monitor displaying an image that matches the reflection as closely as possible, with images appearing approximately double the distance and of the same size.

d) There are no “gaps” that need to be filled.

Contrary to EyesMatch’s argument, there are no “gaps” in the Petition, and Dr. Karam’s deposition testimony is not a “new” argument.⁷ POR, 18-20. The Petition and Dr. Karam opined how a POSITA would interpret the prior art disclosures. Pet., 44-46; EX1003, ¶¶ 4, 7, 68, 198-206. Dr. Karam provided an overview of the background knowledge a POSITA would have, including the conventional understanding of mirror tracking mode in the art. EX1003, ¶¶36-52. Moreover, Dr. Karam explained how transformations are performed to camera-captured images to mimic mirror reflections that have the “mirror effect,” exactly as required by the Magistrate’s construction. EX1033, ¶¶15-22 (“Transforming Camera-Captured Images to Mimic Mirror Reflections Was Well Known”).⁸

⁷ Even if Petitioners are raising new arguments, which they are not, Petitioners are allowed to “respond to any such new claim construction issues raised by the patent owner.” Practice Guide at 45; *Axonics, Inc. v. Medtronic, Inc.*, 75 F.4th 1374, 1381 (Fed. Cir. 2023).

⁸ PO improperly focuses on an analogy Dr. Karam proffered to suggest her declaration analysis is inconsistent with the Magistrate. POR, 18. During deposition, Dr. Karam explained (by virtue of her analogy) that the POSITA would understand

It is well-established that prior art is to be understood in view of the knowledge held by an ordinarily skilled artisan. *Koninklijke Philips v. Google, LLC*, 948 F.3d 1330, 1337-39 (Fed. Cir. 2020). This background knowledge can also be shown based on the patentee’s own admissions as they can “provide a factual foundation as to what a skilled artisan would have known....” *Qualcomm Inc. v. Apple Inc.*, 24 F.4th 1367, 1376 (Fed. Cir. 2022). That Petitioners highlight how a POSITA would understand the prior art with their background knowledge is not gap filling. *Randall Mfg. v. Rea*, 733 F.3d 1355, 1362 (Fed. Cir. 2013).

Here, the Background section of the ’109 Patent (incorporated by reference into the ’110 Patent) describes optical properties of the “conventional mirror” (EX1021, 1:61-65), including appearing at double the distance from the mirror and maintaining the same size regardless of the user movement (*id.*, 2:4-27). *See also* Figs. 5A-5B. It is entirely appropriate and permissible for the public (and Petitioner) to rely on these admissions establishing the background knowledge that would shape the POSITA’s understanding of the prior art.

mirror mimicking to include the basic features of reversal, double the distance, and same size and *additional* enhancements. EX2012, 50:13-52:2, 191:5-13, 193:7-22, 257:14-258:25.

e) PO's alleged distinction based on the "occlusion effect" is not supported.

PO attempts to distinguish Haan and Francois using the occlusion effect by arguing that "[c]hanging the position of a camera does change the point of view, but magnifying or zooming in on an image does not change point of view." POR, 22, (emphasis original). PO even broadly alleges that "no pure transformation of an image [] can reproduce the effect of moving a camera focal point ... absent detailed 3D geometric information." *Id.* at 23.

However, these assertions are not supported and are inconsistent with the patent specification, a POSITA's understanding, and the Magistrate's construction. EX1033, ¶¶31-35. First, PO ignores that Haan-Francois explicitly discloses using a processing means to generate an image signal from a "virtual viewpoint." EX1005, [0058]. Moreover, Dr. Forsyth admits that neither the '109 nor the '110 Patent mention the occlusion effect or acquiring detailed 3D information to overcome it. EX1034, 64:17-19 ("I have no active recall of the detailed description of 3D geometric information in either patent.), 61:18-20, 60:6-14, 62:9-16, 63:5-10, 64:5-12. Contrary to Dr. Forsyth's assertion, the '110 and '109 Patents teach changing point of view through transformations without measuring detailed 3D geometric information or accounting for occlusion effects. EX1021, 15:48-57, 16:25-21, 16:63-7:17, 17:21-23. The '109 Patent says reversion, tilt, elevation, and scale transformations without more would provide "a rather convincing image" that "very

effectively mimic a mirror reflection.” EX1021, 24:3-9. Haan-Francois teach at least this much. Pet., 44-46, EX1003, ¶¶205-210. And the Magistrate’s construction only requires the user see their mirror reflection, and not mirror reflections of the objects in the background potentially subject to “occlusion effect.” Ex. 2008, 19. EX1033, ¶35.

2. There is motivation to combine Haan and Francois for the limitation 1(f).

PO argues Haan teaches away “from having a user’s image appear at roughly the same size.” POR, 26. This is incorrect. Pet., 21-29. While Haan discloses a feature exaggerating the user’s movement by increasing the size of the user image, Haan also teaches a reflective mode, in which the device acts as a mirror. EX1005, [0092]. Additionally, Haan teaches that the exaggeration is an additional feature of the dual mode, which comprises two stages: a reflective stage (i.e., a conventional mirror) and an exaggerated mirror stage. *Id.* at [0093]. The exaggeration is an optional feature in Haan. EX1005, [0072]. A reference does not teach away if it “merely expresses a general preference for an alternative invention but does not ‘criticize, discredit or otherwise discourage’ investigation into the invention claimed.” *UCB, Inc. v. Actavis Lab’ys UT, Inc.*, 65 F.4th 679, 692 (Fed. Cir. 2023) (quoting *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed. Cir. 2009)).

3. PO does not dispute that Haan discloses limitation 1(c) and 1(e).

PO argued that “Francois does not disclose ‘adaptive transformation mapping.’” POR, 27. However, PO does not contest that Haan discloses limitations 1(c) and 1(e) which the Petition relied on. Pet., 35-37, 39-44. The Petition did not rely on Francois for limitations 1(c) and 1(e). Thus, PO’s arguments on motivation to combine regarding these elements, including PO’s arguments on handheld device, are misplaced and moot.

B. GROUND 2: Obvious in View of Rosenberg and Park

1. Rosenberg-Park renders obvious limitation 1(f).

PO contends that Rosenberg and Park do not disclose limitation 1(f). POR, 31. As discussed in the Petition, the combination discloses the “mirror tracking mode” at least because Rosenberg discloses a digital mirror system that replicates the properties of a traditional mirror. Pet., 18-19, 56, 64-67; EX1006, Abstract (“A digital mirror system ...that *emulates a traditional mirror* ...”); EX1006, [0003] (Background) (“One of the oldest pieces of technology known to humankind is the mirror....the basic operation of the mirror has remained largely unchanged for thousands of years.”), [0075], [0077]; EX1034 at 142:21-143:1 (“Q So Rosenberg discloses a digital mirror system. Correct? A That’s correct.”). A POSITA would further understand that emulating a traditional mirror includes the reverse-reflection, double-distance, same-size features recited in the Magistrate’s construction, even if

the Board were to apply that construction here. *See supra* § 0; *see also* EX1034 at 143:8-12; 145:13-20.

a) The Rosenberg-Park combination renders obvious limitation 1(f).

Rosenberg’s digital mirror combined with Park’s transformation mapping (perspective transformation) to correct distortion in Rosenberg’s image captured by above-screen camera gives the user the impression of “standing before a traditional wall mirror” and provides “a highly realistic mirror replication image,” which a POSITA understands satisfies the Magistrate’s construction, as explained above. Pet., 58-67; EX1003, ¶¶253-276; Rosenberg, [0061], [0077]. Further, a POSITA would have been motivated to use the techniques for emulating a mirror taught in Rosenberg-Park to faithfully replicate the optical properties of a mirror as would be expected based on experiences with traditional mirrors. *See supra* §III.A.1.b; EX1033, ¶¶10, 13-14; EX2012, 205:9-206:2; *see also id.*, 60:10-15, 62:2-6, 63:13-22, 70:24-71:5 (“[T]he POSITA would understand that Rosenberg is teaching mirror-mimicking with the camera placed on top and with the computer doing the rendering”); 72:6-24 (when mimicking a mirror, one has to have “approximately the characteristic that belongs to a traditional mirror”).

Additionally, a POSITA would have understood Rosenberg to display user images at a doubled distance and same size. EX2012, 61:8-12; 60:16-20. Rosenberg discloses a digital mirror system “with a displayed size and scaling such that it

appears like *a traditional life-size mirror image*.” EX1006, [0077]. A POSITA would have understood that to display a user image appearing “like a traditional life-size mirror image,” Rosenberg/Park’s image would be scaled to maintain the same size of the user reflection. EX1033, ¶10. The scaled image would also appear to the user as it were positioned at a virtual location behind the display, at a distance twice that from the user to the screen. EX1033, ¶12, 14; *see also* EX1034, 52:11-18, 55:11-56:6 (both scaling and changing point of view of camera changes image size); *see supra* § III.A.1.e. Therefore, Rosenberg discloses, or at least renders obvious, displaying a user image at double the distance while maintaining the same size of the image.

b) PO’s alleged distinction based on the “occlusion effect” is not supported by the specification.

As discussed above, the alleged distinction of zooming/scaling and moving the point of view due to the “occlusion effect” and lack of “3D geometric information” is not supported by the specification or required by the Magistrate’s construction. *See supra* § III.A.1.e.

c) PO mischaracterized Rosenberg.

PO argues that “Rosenberg discloses only a rudimentary form of mirror-mimicking—flipping the image on its axis.” POR, 32. This is incorrect. Rosenberg at least discloses resizing/scaling as well in the sentence just before it discusses “left-right inverted.” EX1006, [0077] (“A representation ...is then displayed ...*with a*

displayed size and scaling such that it appears like a traditional life-size mirror image”); EX2012, 63:9-22; 71:6-13. To do this, a POSITA would understand the image has to maintain the same size and appear at double the distance to the mirror. EX1033, ¶10.

PO argues that “Rosenberg does not want the view to change” because it is “undesirable, “inconvenient,” “discouraging.” POR, 33-35 (discussing Rosenberg’s image freeze, buffering, and zooming features). This misrepresents Rosenberg. Rosenberg’s disclosure of other optional modes/features does not detract from its disclosure of the traditional mirror mode achieved by *flipping and scaling* a camera-captured image.

2. There is motivation to combine Rosenberg with Park for the limitation 1(f).

PO contends Rosenberg teaches away from the double-distance feature. POR, 38. As discussed above, this mischaracterizes Rosenberg and lacks merit. Additionally, PO offers no argument regarding why a POSITA would deviate from Rosenberg’s express disclosure of replicating a conventional mirror. *Id.* Moreover, PO’s statements with respect to the mirror-image freeze and buffering features disclosed in Rosenberg are not relevant because Petitioners do not rely on freezing or buffering for limitations 1(c) and 1(e). *See also* Pet., 52-55.

3. Rosenberg-Park renders obvious limitations 1(c) and 1(e).

PO argues that “Rosenberg does not disclose ‘adaptive transformation

mapping.” POR, 39. As an initial matter, this argument does not address the combination and improperly attacks the references individually. PO does not contest that Park discloses limitations 1(c) and 1(e). *Id.* Dr. Forsyth admits that his declaration does not discuss Park regarding this section. EX1034, 159:21-160:6 (“That’s correct, I see no discussion of Park. That’s Rosenberg only.”)

Regardless, Rosenberg/Park renders obvious “adaptive transformation mapping.” Pet., 58-64; EX1003, ¶¶253-268. PO’s argument is premised on the assertion that a POSITA would not regard resizing or zooming as transformation. *Id.* But this assumption is contradicted by the ’109 specification, which considers resizing as one type of transformation. EX1021, 17:17-23.

Additionally, a POSITA would understand that Rosenberg teaches transformations other than resizing to account for the tilt of the camera. EX2012 at 63:13-22 (“You have to adjust the tilt of the camera so that you have the same size and all these characteristics we are talking about.”); *id.* at 111:13-21 (“transformation needs to be done -- like the computer emulation. Emulation includes processing, includes transformation.”). PO fails to address Park’s perspective transformation and incorporating Park’s transformation would result in the image to appear to be captured from a different point of view, corresponding to an image taken from a different angle. Pet., 58-64; EX1003, ¶¶253-268.

4. There is motivation to combine Rosenberg and Park with regard to limitations 1(c) and 1(e).

PO argues that there is no motivation to combine Rosenberg and Park with regards to limitations 1(c) and 1(e). POR, 40. In particular, PO argues that a POSITA would regard Park as presenting a wholly computer-processing-based solution, while Rosenberg relies on the physical placement of a camera to replicate a traditional mirror. *Id.*, 40-45.

However, PO failed to explain why a mirror device with a physical solution cannot be combined with computer-based techniques. Moreover, Rosenberg does not reject software-based solutions. Pet., 53-54; EX1003, ¶247. Indeed, Rosenberg heavily involves software configurations, as Rosenberg's digital mirror displays images after "rendering" these images, applying transformations, and/or other computer-implemented processes. *Id.*; EX1006, [0077].

Additionally, Rosenberg recognizes drawbacks of a physical solution. EX1006, [0027], [0061] (acknowledging that a camera placed on top of the display is not the ideal solution); Pet., 53-54; EX1003, ¶ 247. It is well-known that placing a camera behind the screen is costly and a software-based solution would generally be cheaper than a physical behind screen camera. Pet., 54-55; EX1003, ¶¶ 247-248. Therefore, a POSITA would have been motivated to improve Rosenberg's solution with a computer-based approach to enhance the quality of the image and reduce the cost of manufacturing. *Id. Allied Erecting v. Genesis Attachments*, 825 F.3d 1373,

1381 (Fed. Cir. 2016) (quoting *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed Cir. 2006) (“[A] given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine.”)).

Further, while Rosenberg teaches image transformations, it does not explicitly discuss how to implement them. *See, generally*, EX1006. This would prompt a POSITA to seek references that provide details of the implementation. EX2012, 64:4-9; 112:2-6. Park is such a reference; it provides details regarding how to apply transformations to adjust the angle of the virtual camera. EX1003, ¶276.

C. GROUND 3: Obvious Over Geisner and Lizée

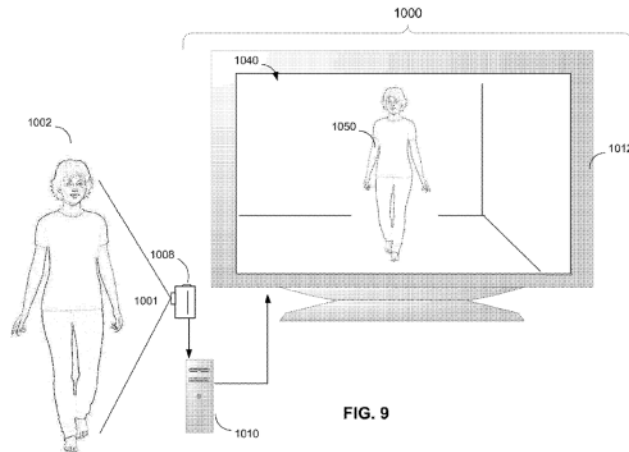
1. Geisner-Lizée discloses limitation 1(f).

Contrary to PO’s arguments (POR, 46-47), the Petition and Dr. Karam’s declaration explain how Geisner-Lizée discloses this limitation, and there were no new arguments raised in Dr. Karam’s deposition. Pet., at 89-91. PO’s arguments are misplaced for several reasons.

First, PO argues that Geisner does not disclose the reversed reflection because the on-screen representation is an avatar. POR, 47-49. However, PO and Dr. Forsyth agree the ’110 patent contemplates a user’s avatar (EX1034, 131:1-9; EX1001, Abstract) and falsely relied on the presumption that claim 1 excludes avatars with no basis. EX1034, 131:14-132:13 (“I think [avatars] are excluded....”).

Further, as explained in the Petition, both Geisner and Lizée disclose images

of the user. Pet., 76-78. For example, Figure 9 of Geisner “illustrates a user 1002 and an on-screen representation of the user 1050” EX1007, [0013], Fig. 9. Like Geisner, the ’110 Patent (and ’109 Patent incorporated by reference) also teaches using 3D models of the user. EX1021, 17:65-18:1; EX1001, 14:24-29.



Lizee similarly teaches a reversed reflection of a user or a “mirrored silhouette.” EX1008, Abstract, [0008], [0034].⁹ PO argues that the virtual representation of the user is not the claimed reversed reflection because the images are silhouette images. POR, 49. Again, the claim does not preclude this. It is known in the art that a silhouette is an actual user image with reduced details. EX2012, 245:9-12; 247:22-248:8. Therefore, the silhouette in Lizee is nothing more than a user reflection with reduced details. EX2012, 243:24-244:2; 245:9-12; 247:22-248:8.

⁹ Dr. Forsyth recognizes that a silhouette is an image of the user with reduced details. EX1034 at 135:13-20.

Second, PO argues that the user image in Lizée is not the reversed reflection of a user because it is providing a rear view. POR, 50-51. However, a POSITA would have understood that as disclosed in Lizée the reversed image appears in substantially the same orientation to the image taken from the rear of the user. EX1003, ¶332.

Third, PO argues that Lizée and Geisner are silent regarding the optical property of a conventional mirror. This is incorrect. Lizée discloses maintaining the user image at the same size. *See, e.g.*, EX1008, [0051] (“as the user moves from position A to E in the real world (Figure 2A), the virtual camera 28 maintains a constant framing 34.”); Fig. 3; *see also* EX1034 at 137:10-16. Because the size of the user image remains unchanged, a POSITA would understand that the distance of the user image appearing on the screen is proportional to the distance from the user to the camera. EX1003, ¶338.

Fourth, as discussed above, PO’s alleged distinction of zooming/scaling and moving the point of view is not supported by the specification. *See supra* § III.A.1.e.

2. There is motivation to combine Geisner and Lizée.

PO argues that “a POSITA would understand that the rendering of a user avatar in a virtual environment would not be the same as rendering a user’s image to appear as if it were in a conventional mirror; it would be substantially different.”

POR, 52. This interpretation, however, is inconsistent with the specification of the '110 Patent. EX1001, Abstract (“The processor can also *generate an avatar* ...corresponding to body characteristics of a user appearing in the images.”). *See also* Pet., 73-76.

3. PO does not dispute that Lizée discloses limitation 1(c) and 1(e).

As explained in the Petition, Lizée discloses limitations 1(c) and 1(e). PO does not dispute this, but rather argues that “*Geisner* does not disclose ‘adaptive transformation mapping’ as construed in the District Court Litigation.” POR, 53. However, the Petition relies on Lizée, not Geisner, for these limitations. Pet., 81-83, 84-89. Further, as discussed above there is a motivation to combine Geisner and Lizée.

D. GROUNDS 4, 5: Obvious Over Cited References

PO has not presented any separate substantive arguments. As discussed above and in the Petition, claims 7–9, 13–15, and 18 are unpatentable in view of Haan, Francois, and Geisner. Additionally, claims 3–4, 7–9, and 11–18 are unpatentable in view of Rosenberg, Park, and Geisner.

E. DEPENDENT CLAIMS

For each ground, PO’s arguments focus on limitations 1(c), 1(e), and 1(f) and does not separately dispute Petitioners’ showing as to any dependent claim (2-18). *In re Nuvasive, Inc.*, 842 F.3d 1376, 1379–82 (arguments not in PO’s Response

waived). The Petition shows the prior art renders claims 2-18 obvious. Pet., 46-51, 68-72, 91-107.

IV. THE BOARD SHOULD GIVE DR. FORSYTH'S DECLARATION LITTLE WEIGHT

Dr. Forsyth's testimony lacks factual basis for adopting "given" constructions. 37 C.F.R. § 42.65(a). During deposition, Dr. Forsyth emphasized he "was given" the "correct construction," "did not analyze the construction," and "must adopt that construction." EX1034, 82:1-85:18.

Dr. Forsyth's testimony likewise contains inconsistencies. For example, his declaration focuses on the alleged "occlusion effect" of a pinhole camera and opines "3D geometric information" is required to transform an image to reproduce the effect of changing the point of view of the camera. EX2013, ¶74. But Dr. Forsyth ignores that such a requirement is inconsistent with Magistrate's construction of the mirror mode limitation, the specifications, and a POSITA's understanding. EX1033, ¶¶31-35. Indeed, Dr. Forsyth testified that neither the '109 nor '110 Patent describe the occlusion effect or transformations using 3D geometric information for mirror mimicking. EX1034, 56:7-60:20, 61:1-64:19. His testimony is also inconsistent with the prior art's express disclosures. E.g., EX2013, ¶78 (contending that Haan teaches away from a user appearing roughly the same size as the user moved toward or away from the mirror, ignoring Haan's teachings of a reflective mode in which a device acts as a mirror), (contending Rosenberg's mirror-image freeze and mirror-image

buffering features teach away from double the distance, same size, contradicting Rosenberg's express teaching of these features as optional).

Last, Dr. Forsyth confirms he did not provide any opinion under Petitioners' proposed level of skill, which PO adopted. Pet., 8; Decl. ¶¶53-54; POR, 9; EX1034, 68:1-69:20. Dr. Forsyth's declaration should thus be given little weight for supporting PO's positions under a different level of ordinary skill.

Dated: May 29, 2025

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CERTIFICATE OF COMPLIANCE

I hereby certify that this **Petitioner's Reply to PO's Response** complies with the type-volume limitations of 37 C.F.R. § 42.24(c)(1) because it contains 5,600 words (as determined by the Microsoft Word word-processing system used to prepare the petition), excluding the parts of the reply exempted by 37 C.F.R. § 42.24(c).

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), I certify that on this May 29, 2025, **Petitioner's Reply to PO's Response** and **Exhibits** were served by email on the following counsel for PO:

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