UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD. AND SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioner,

v.

POWER2B, INC.,
Patent Owner.

IPR2021-01190
Patent 10,156,931 B2

Before BARBARA A. PARVIS, SHEILA F. McSHANE, and JOHN D. HAMANN, *Administrative Patent Judges.*

McSHANE, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
Denying Patent Owner's Motion to Exclude
35 U.S.C. § 318(a); *37 C.F.R. § 42.64(c)*

I. INTRODUCTION

We have jurisdiction to hear this *inter partes* review under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a). For the reasons discussed herein, we determine that Petitioner has shown by a preponderance of the evidence that challenged claims 1–3, 6–15, and 18–21 of U.S. Patent No. 10,156,931 B2 (Ex. 1001, "the '931 patent") are unpatentable.

A. Procedural Background

Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. ("Petitioner") filed a Petition requesting *inter partes* review of claims 1–3, 6–15, and 18–21 of the '931 patent, along with the supporting Declaration of Benjamin B. Bederson, Ph.D. Paper 3 ("Pet."); Ex. 1002. Power2B, Inc. ("Patent Owner") filed a Preliminary Response to the Petition. Paper 8. On January 6, 2022, pursuant to 35 U.S.C. § 314(a), we instituted *inter partes* review based on the following grounds:

Claims Challenged	35 U.S.C. §	Reference(s)
1, 3, 6–13, 15, 18–21	103(a)[1]	Gettemy,[2]
1, 3, 6–13, 15, 18–21	103(a)	Gettemy, Philipp[3]
2, 14	103(a)	Gettemy, Carstedt[4]
2, 14	103(a)	Gettemy, Philipp, Carstedt

Pet. 3–4; Paper 11 ("Inst. Dec."), 6.

Patent Owner filed a Request for Rehearing of the Decision on Institution. Paper 13. The Request was denied. Paper 14.

Patent Owner filed a Patent Owner Response ("PO Resp."), along with the Declaration of Darran R. Cairns, Ph.D. Paper 18; Ex. 2056. Petitioner filed a Reply ("Pet. Reply") to the Patent Owner Response, as well as the Reply Declaration of Benjamin B. Bederson, Ph.D. Paper 21; Ex. 1035. Patent Owner filed a Sur-reply ("PO Sur-reply"). Paper 27.

In addition, Patent Owner filed a Motion to Exclude Evidence (Paper 28 ("PO Mot. Exclude")), with Petitioner filing an Opposition (Paper 29 ("Pet. Opp. Mot. Exclude")). Patent Owner did not file a Reply in support of its Motion to Exclude.

An oral hearing was conducted on October 7, 2022. A transcript of the hearing is included in the record. Paper 38 ("Tr.").

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[1] The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) ("AIA"), amended 35 U.S.C. § 103, and was effective on March 16, 2013. Although Petitioner takes no position on the priority date for each claim of the '931 patent, the Petition uses the September 8, 2005 date of the earliest provisional patent application, Provisional Application No. 60/734,027. *See* Pet. 10. We therefore refer to the pre-AIA version of 35 U.S.C. § 103.
[2] U.S. Publication No. 2003/0156100 Al (published August 21, 2003). Ex. 1005.
[3] U.S. Patent No. 4,879,461 (issued November 7, 1989). Ex. 1006.
[4] WO 86/00447 (published January 16, 1986). Ex. 1007.

B. Related Matters

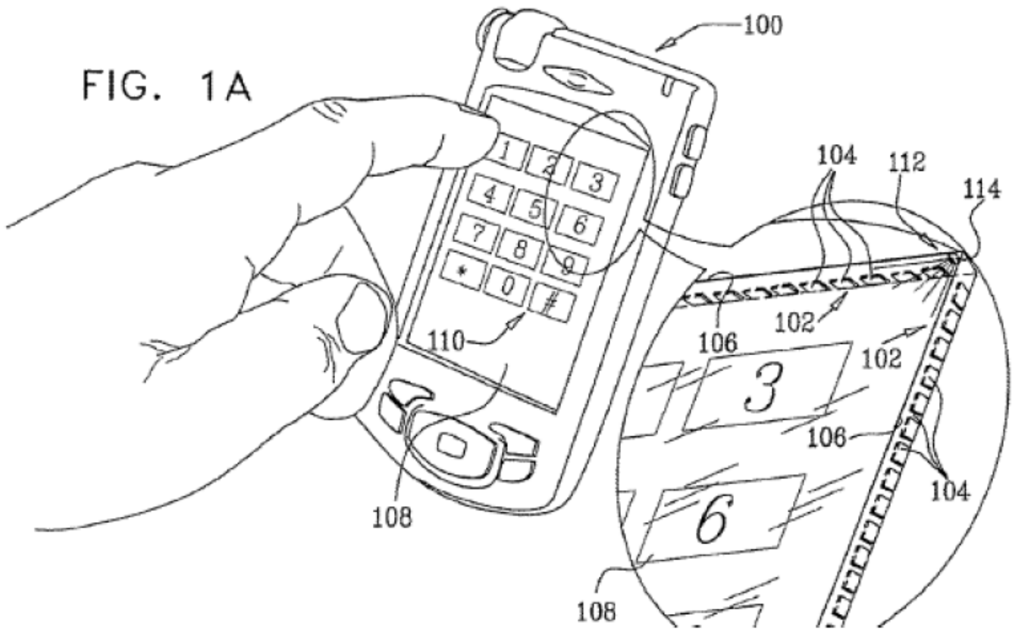
The parties identify a related litigation, *Power2B, Inc. v. Samsung Electronics Co., Ltd.*, Case No. 6:20-cv-01183-ADA (W.D. Tex.). Pet. 2; Paper 5, 2.

C. The ’931 Patent

The ’931 patent is titled “Displays and Information Input Devices” and issued on December 18, 2018, from an application filed on November 3, 2016. Ex. 1001, codes (22), (45), (54). The application for the ’931 patent is a continuation of U.S. Patent Application No. 12/066,238, now U.S. Patent No. 9,494,972, and Provisional Applications No. 60/734,027 and No. 60/715,546. *See id*. at codes (60), (63).

The ’931 patent is directed to an integrated display and input device such as, for instance, a mobile telephone having a touch responsive input functionality utilizing light reflection. Ex. 1001, code (57), 1:37–38, 7:58–61, 8:26–29. More specifically, the ’931 patent describes devices with a display having a light beam with responsive input functionality. *Id*. at 7:58–61. Figure 1A, reproduced below, depicts an embodiment of an integrated display and input device. *Id*. at 6:11–14.

FIG. 1A



As shown in Figure 1A, above, this embodiment is a mobile phone with arrays 102 of light detector elements 104 arranged along edge surfaces 106 of a viewing plain overlaying keyboard template display 110. Ex. 1001, 7:61–64. Light, including in the infrared (IR) band, is reflected from a user's finger or stylus, that is, for instance, touching or located in propinquity to plate 108. *Id*. at 8:7–10. The source of the light to be reflected may be from sources external to the mobile phone, such as sunlight, or may be an illumination subassembly, such as single IR emitting LED 114. *Id*. at 8:13–20.

Figure 2A, reproduced below, illustrates an embodiment depicting an integrated display and input device. Ex. 1001, 6:16–17.

FIG. 2A

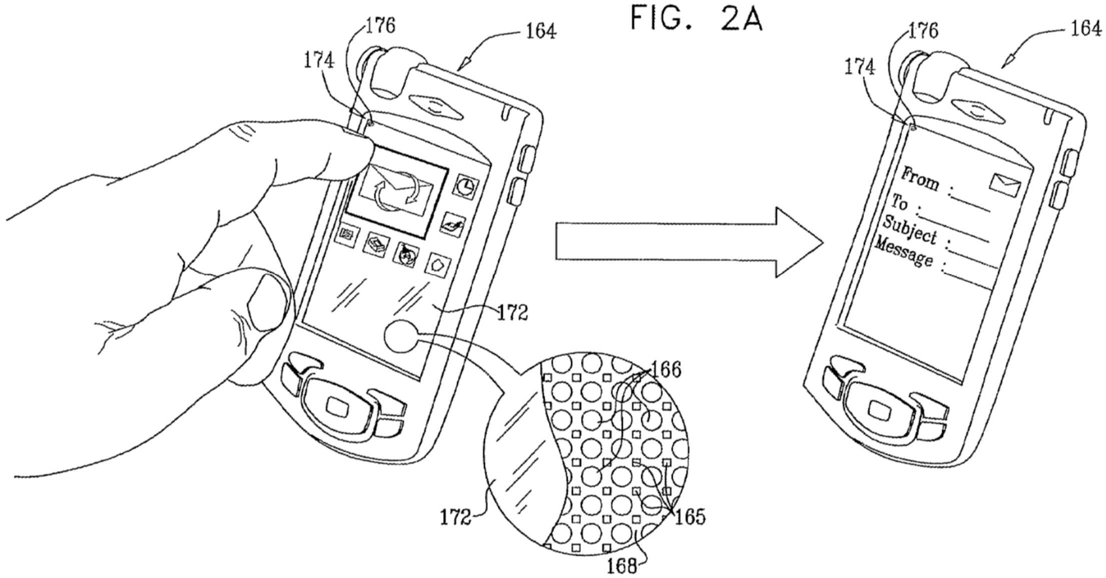


Figure 2A, above, illustrates launching an application, such as an e-mail application, by employing object detection functionality. Ex. 1001, 9:32–35. Figure 2A depicts light detector elements 165 interspersed among light emitters 166 arranged in plane 168. *Id*. at 9:39–41. Light reflected by the user's finger propagates through cover layer 172 and is detected by detector elements 165. *Id*. at 9:45–48. Detector analyzing processing circuitry operates to receive detector outputs of individual detectors in the arrangement and determines whether the amount of radiation detected exceeds a threshold. *Id*. at 2:60–64. "The outputs of detector elements 165 are processed to indicate one or more of the X, Y, or Z positions and/or angular orientation of the user's finger." *Id*. at 9:48–51. The detected position is used to launch an application or control other functionalities. *Id*. at 9:51–54.

Challenged claims 1, 13, and 21 are independent. Claim 1 of the '931 patent is illustrative and is reproduced below, with bracketed letters added to the limitations for reference purposes.

1. A device comprising:

[a] a display panel having a pixel array that defines a display area, the pixel array is configured to visually present digital content;

[b] an Infra-Red (IR) emitter positioned proximate to the display area, the IR emitter illuminating one or more objects in proximity to the device;

[c] a position sensing array positioned proximate to at least one edge of the display area, the position sensing array is configured to receive, through at least one layer of the display panel, at least a portion of light reflected by an object in proximity to the device and generate an output signal that represents an amount of the portion of light; and

[d] a processing unit configured to:

receive the output signal from the position sensing array;

[e] determine the output signal exceeds a predetermined threshold;

[f] calculate, based on the output signal, a position of the object relative to the device when the output signal exceeds the predetermined threshold; and

[g] execute input functionality corresponding to the position of the object.

Ex. 1001, 45:44–67 (brackets added).

II. ANALYSIS OF PATENTABILITY OF CLAIMS 1–3, 6–15, AND 18–21

A. The Parties' Arguments

In our Decision on Institution, we concluded that the arguments and evidence advanced by Petitioner demonstrated a reasonable likelihood that at least one claim of the '931 patent would have been obvious. Inst. Dec. 23–37. Here, we must consider whether Petitioner has established by a preponderance of the evidence that claims 1–3, 6–15, and 18–21 of the '931 patent would have been obvious. 35 U.S.C. § 316(e). We previously instructed Patent Owner that "Patent Owner is cautioned that any arguments not raised in the response may be deemed waived." Paper 12, 9; *see also In re NuVasive, Inc.*, 842 F.3d 1376, 1379–82 (Fed. Cir. 2016) (holding patent owner waived an argument addressed in the preliminary response by not raising the same argument in the patent owner response). Additionally, the Board's Trial Practice Guide states that the Patent Owner Response "should identify all the involved claims that are believed to be patentable and state the basis for that belief." Consolidated Trial Practice Guide (Nov. 2019)[5] ("TPG"), 66.

Patent Owner has chosen not to address certain arguments and evidence advanced by Petitioner to support its unpatentability contentions. In this regard, the record contains persuasive arguments and evidence presented by Petitioner regarding the manner in which the prior art discloses the corresponding limitations of claims 1–3, 6–15, and 18–21 of the '931 patent and the rationale for combining the asserted references.

B. Level of Ordinary Skill in the Art

Petitioner asserts that a person of ordinary skill in the art at the time of the invention would have had "a bachelor's degree in electrical engineering, computer engineering, computer science, or a related field, and at least two years of industry experience in research, design, development, and/or testing of touch and/or proximity sensors, human-machine interaction and interfaces, and related firmware and software, with additional education substituting for experience and vice versa." Pet. 9–10 (citing Ex. 1002 ¶ 45).

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[5] *Available at* https://www.uspto.gov/sites/default/files/documents/tpgnov.pdf?MURL=.

Patent Owner alternatively contends that a person of ordinary skill in the art at the time of the invention would have had "a bachelor's degree in electrical engineering, computer engineering, physics, or a related field, and at least three years of experience relating to research, design, and/or development of sensor systems, circuits and signal processing algorithms, or the equivalent, with education substituting for experience and vice versa." PO Resp. 7 (citing Ex. 2056 ¶¶ 17–18). Patent Owner further states that although Petitioner proposes a different level of qualifications, this does not affect "the flaws in Samsung's obviousness" analysis. *Id*. at 7.

In determining the level of ordinary skill in the art, various factors may be considered, including the "type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field." *In re GPAC Inc*., 57 F.3d 1573, 1579 (Fed. Cir. 1995) (citation omitted). The level of ordinary skill in the art is also reflected by the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

In large part, we agree with Petitioner's proposed qualifications, except for the use of the term "at least" because it introduces vagueness. Additionally, Patent Owner's inclusion of "physics" in the educational background accords with the technology at issue and prior art. Thus, we determine that one of ordinary skill in the art would have had a bachelor's degree in electrical engineering, computer engineering, computer science, physics, or a related field, and two years of industry experience in research, design, development, and/or testing of touch and/or proximity sensors, human-machine interaction and interfaces, and related firmware and software, with additional education substituting for experience and vice versa. Additionally, as Patent Owner notes, regardless of whether its level of qualifications or Petitioner's level is adopted, the outcome on the merits would remain the same.

C. Claim Construction

For petitions filed after November 13, 2018, the Board interprets claim terms in accordance with the standard used in federal district court in a civil action involving the validity or infringement of a patent. 37 C.F.R. § 42.100(b) (2019). Under the principles set forth by our reviewing court, the "words of a claim 'are generally given their ordinary and customary meaning,'" as would be understood by a person of ordinary skill in the art in question at the time of the invention. *Philipps v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). "In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence." *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Philipps*, 415 F.3d at 1312–17).

Patent Owner asserts that claim construction is required for the terms "position sensing array" in view of "pixel array," and for the term "through" in the phase "through at least one layer of the display panel." PO Resp. 8–30. Petitioner argues that no constructions of the terms are needed. Pet. Reply 1, 9. We address these terms below.

1. position sensing array and display panel/pixel array

Patent Owner argues that "the 'position sensing array' and 'display panel'/'pixel array' are distinct structures." PO Resp. 8. Patent Owner contends that the claim language, the '931 patent Specification, and the prosecution history support its proposed construction. *Id*. at 8–20.

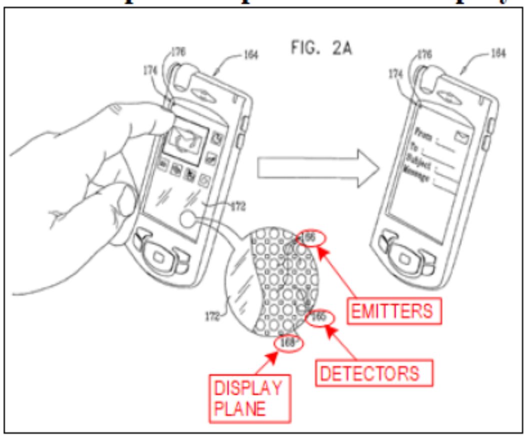
As to the claim language, Patent Owner asserts that exemplary independent claim 1 separately lists "a position sensing array" and "a display panel" and this makes "clear these elements represent distinct structures." PO Resp. 9–11 (citing *Becton, Dickinson & Co. v. Tyco Healthcare Group, LP*, 616 F.3d 1249, 1254 (Fed. Cir. 2010)) ("Where a claim lists elements separately, the clear implication of the claim language is that those elements are distinct component[s] of the patented invention." (citations and quotation marks omitted)); *Kyocera Senco Indus. Tools Inc. v. ITC*, 22 F.4th 1369, 1382 (Fed. Cir. 2022) (stating that where "claims list . . . elements separately," there is "a presumption that those components are distinct"). Patent Owner contends that the surrounding claim language also confirms that the "position sensing array" and "display panel" are distinct based on the claim 1 recitations of "'a display panel having a pixel array that defines a display area,' while the 'position sensing array' is 'positioned proximate to at least one edge of the display area.'" *Id*. at 12.

Patent Owner also refers to the claims in the parent application to the '931 patent, U.S. Patent No. 9,494,972 ("the '972 patent"), contending that claim 1 does not separately list "detectors" and "pixel array," and instead refers to the "pixel array" and "detectors" as the same structure ("a pixel array having a plurality of detectors"). PO Resp. 12 (citing Ex. 2013, claim 1). Patent Owner argues that this contrasts with the separate recitals in the

’931 patent, and a person of ordinary skill in the art “applying common sense would have readily appreciated the different claim language used . . . in the parent ’972 patent refers to an integrated structure while the claim language in the challenged ’931 patent refers to distinct structures.” *Id*. at 12–13 (citing Ex. 2056 ¶ 29). Patent Owner further asserts that the parent ’972 patent claim 1 relates to the “pixel array” “receiving electromagnetic radiation” whereas the ’931 patent describes the “distinct operations” of the pixel array visually presenting digital content and the position sensing array receives “through at least one layer of the display panel, at least a portion of light,” which is alleged to support the distinct nature of the structure. *Id*. at 13 (citing Ex. 2056 ¶¶ 30–31).

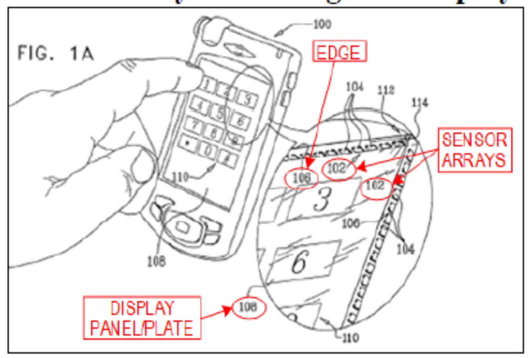
As to the Specification of the ’931 patent, Patent Owner refers to disclosures of “the different embodiments and corresponding structures [which] include (1) a *display* having detector elements ‘*interspersed*’ among pixels and (2) sensor arrays ‘*arranged along edges of a display element*.’” PO Resp. 14 (citing Ex. 1001, 6:16–20 (Fig. 2A), 34:5–67, 34:47–51 (Figs. 17A-C), 6:27–31 (Fig. 4), 6:59–64 (Fig. 10A); Ex. 2056 ¶¶ 34–35). Patent Owner presents, for example, annotated Figures 2A and 1A, which are reproduced below. *Id*. at 15.

"interspersed" pixels in the display



Ex. 1001, Fig. 2A (annotated)

sensor array at an "edge" of display



Ex. 1001, Fig. 1A (annotated)

Figures 2A and 1A above, as annotated by Patent Owner, are alleged to be examples of a representation of a display having detector elements interspersed among pixels (Fig. 2A) and a structure with sensor arrays arranged along edges of a display element. PO Resp. 14–15. Patent Owner contends that a person of ordinary skill in the art "would have understood that the consistent and different descriptions and embodiments make it clear that a position sensing 'array' positioned proximate to an 'edge' of a display requires a different structure than individual detector elements 'interspersed' inside 'a pixel array.'" *Id*. at 16 (citing Ex. 1001, 8:38–43 (Fig. 1C), 10:20–22 (Fig. 2B), 12:27–30 (Fig. 4), 13:20–24 (Fig. 5), 14:22–26 (Fig. 6); Ex. 2056 ¶¶ 34–35). Patent Owner argues that the '931 patent Specification "aligns with and confirms the claimed 'position sensing array' in the challenged independent claims refers to a distinct structure from the 'display panel having a pixel array.'" *Id*. at 16–17 (citing Ex. 2056 ¶ 38).

Patent Owner also argues its proposed claim construction based on the prosecution history of the '931 patent. PO Resp. 17–20. Patent Owner refers to an amendment prior to the allowance of the '931 patent claims that

Patent Owner alleges a skilled artisan would have understood to add different structures and specify the relative placement of a display panel and a position sensing array. *Id*. at 17–18 (citing Ex. 1004, 597; Ex. 2056 ¶¶ 41–42). There the applicant deleted some prior recitals of "detectors that form a detector plane substantially parallel to the display plane," and added the term "position sensing array." *Id*. at 18 (citing Ex. 2056 ¶ 42). Patent Owner also points to the applicant's arguments to distinguish Omura, a prior art reference, with the applicant stating that the amended recital was a "fundamentally different principle of operation" than Omura. *Id*. at 18–19 (citing Ex. 1004, 606[6]; Ex. 2056 ¶¶ 43–44).

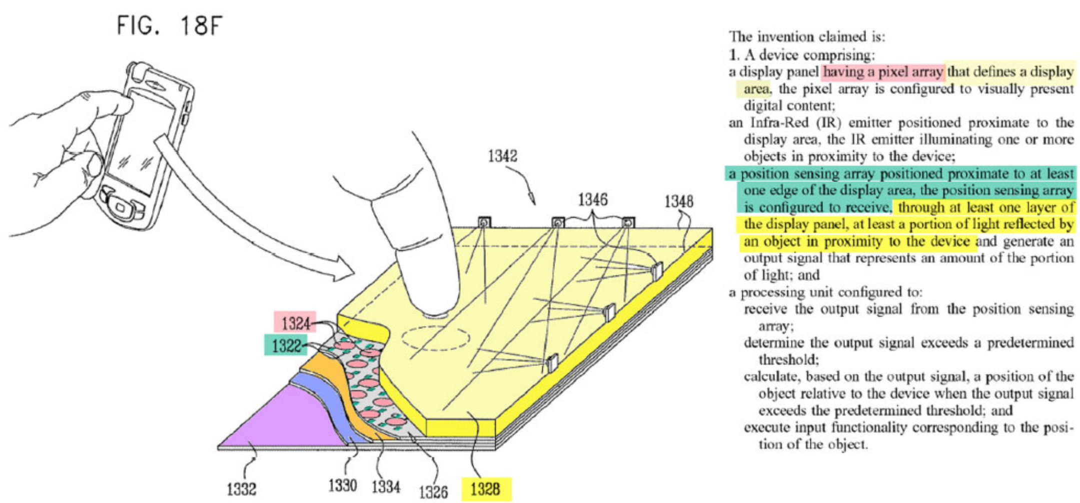
Patent Owner also asserts that the prosecution history of the parent '972 patent is relevant, where the Patent Office issued a restriction requirement that identifies 21 distinct invention species. PO Resp. 19 (citing Ex. 2051, 755–761; Ex. 2056 ¶ 46). Patent Owner argues that the Patent Office "understood and restricted prosecution claims directed to 'a pixel array of detector elements' from claims directed to a 'detector assembly' or array arranged at an 'edge' of a display because the concepts represented a '*different structure and arrangement*.'" *Id*. The applicant elected a species without traverse. PO Resp. 19–20 (citing Ex. 2051, 836).

Petitioner's position is that the plain meaning of the terms applies and there is no requirement that "a position sensing array" be separate or distinct from "a display panel." Pet. Reply 1–9; *see also* Ex. 1035 ¶¶ 7–20. Petitioner asserts that this was Patent Owner's position during litigation,

[6] Patent Owner's citation to this portion of the prosecution history is not correct (PO Resp. 19). Based on the portion of the history text included in Patent Owner's Response, we provide a corrected reference.

where neither party thought that construction was required for these terms. *Id*. at 1 (citing Ex. 1034). Petitioner argues that Patent Owner is attempting to import a narrowing limitation that is not found in the claims, Specification, or prosecution history. As to the claim language, Petitioner contends that the case law Patent Owner relies on still requires "specific support from the claims and specification to create such a distinct structures requirement." *Id*. at 1–2. Petitioner distinguishes *Becton, Dickinson* because, unlike here, in that case a limitation required a "spring means" to be "connected to" a "hinged arm" and if these elements were construed to be the same component, this would render the claim "nonsensical." *Id*. at 2 (citing *Becton, Dickinson*, 616 F.3d at 1255–61). Petitioner distinguishes *Kyocera Senco* because the two terms at issue were described in the specification as referring to different structures. *Id*. (citing *Kyocera Senco*, 22 F.4th at 1382). Petitioner additionally argues that under the claim language, the "position sensing array" must be "proximate to at least one edge of the display area" and "receive, through at least one layer of the display panel, at least a portion of light," so that does "not suggest that the position sensing array is separate from the display panel," and "allows for the position sensing array to be sandwiched within a multilayer display panel." *Id*. at 2–3 (citing Ex. 1035 ¶¶ 9–10). Petitioner contends that "reciting two different claim elements does not imply a physical separateness requirement between them." *Id*. at 3 (citing *Retractable Tech., Inc. v. Becton, Dickinson and Co*., 653 F.3d 1296, 1303 (Fed. Cir. 2011)).

As to the Specification, Petitioner argues that Patent Owner's contention is that the sensor array must refer to a distinct structure, but absent lexicography or disclaimer, it is improper to read limitations from a preferred embodiment into the claims. Pet. Reply 4 (citing *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 913 (Fed. Cir. 2004)). Petitioner asserts that Patent Owner's expert, Dr. Cairns, admitted there is no disclaimer or lexicography. *Id*. (citing Ex. 1037, 18:11–24). Petitioner asserts that the claim is broader than Patent Owner contends, and refers to Figure 2A, which is an "*integrated* display and input device[s] having touch responsive input functionality," where the display device includes light detector elements interspersed among the light emitters. *Id*. at 5–6 (citing Ex. 1001, 9:22–23, 9:39–40, Abstract). In particular, Petitioner refers to annotated Figure 18F of the '931 patent, reproduced below. *Id*. at 6–7.



Petitioner argues that annotated Figure 18F, above, shows multiple layers in a display, with light detector elements 1322 "*interspersed* among light emitters 1324." Pet. Reply 6 (citing Ex. 1001, 42:53–55). Petitioner contends that "Figure 18F aligns with the plain and ordinary meaning of the claims," where the pixel array (red) defines the display area (light yellow) and may overlap with the position sensing array (green) that must receive "a portion of light" "through at least one layer of the display panel" (yellow), where outermost sensors 1322 are proximate to the edges of the display area.

Id. (citing Ex. 1035 ¶¶ 15–17). Petitioner contends that it is "'rare[], if ever, correct' to construe claim terms to exclude preferred embodiments disclosed in the specification," but Patent Owner admits it is excluding the embodiments with detector elements interspersed among pixels. *Id*. at 7 (citing *SynQor, Inc. v. Artesyn Techs., Inc*., 709 F.3d 1365, 1378–79 (Fed. Cir. 2013); PO Resp. 14; Ex. 1037, 31:24–32:5, 39:17–40:13, 41:18–42:5).

As to the prosecution history, Petitioner argues that there is nothing in the claim amendments that suggests "there is some 'distinctness' or 'separateness' requirement in the claim language as it issued." Pet. Reply 7–8 (citing Ex. 1035 ¶ 18). As to the restriction requirement, Petitioner contends that it is ambiguous and there is nothing to lead to a conclusion that the detector and pixel arrays must be separate or distinct. *Id*. at 8 (citing Ex. 1035 ¶ 19).

Petitioner additionally argues that Patent Owner's proposed construction that requires the position sensing array be a "distinct structure" makes the claim more ambiguous. Pet. Reply 8. Petitioner contends that "it is unclear whether 'distinct' requires the elements to be separately identifiable, or whether it requires some unknown degree of spatial separateness." *Id*. Petitioner asserts that a person of ordinary skill in the art "would not know the metes and bounds of the invention under this construction." *Id*. (citing Ex. 1035 ¶ 20).

In Sur-Reply, Patent Owner argues that Petitioner ignores the presumption that separately listed elements in a claim are distinct. PO Sur-reply 10 (citing *Kyocera Senco*, 22 F.4th at 1369). Patent Owner argues that Petitioner's argument that "display panel"/"pixel array" structures can incorporate the "position sensing array" results in the "position sensing array" becoming part of the display panel and "proximate" to itself. *Id*. at 10–11. Patent Owner asserts that this is akin to *Becton, Dickinson*, where the spring means and hinged arm cannot be connected to itself and "the claimed 'position sensing array' cannot be 'proximate to' itself here." *Id*. at 11 (citing *Becton, Dickinson*, 616 F.3d at 1254; PO Resp. 22–23). Patent Owner contends that in Figure 18F "the detector elements inside the display area are not 'proximate to at least one edge of the display area.'" *Id*. Patent Owner asserts that Petitioner's attempt to eliminate distinctions between the claimed components renders the positional "proximate to" language superfluous. *Id*.

Patent Owner additionally replies that Petitioner "refuses to acknowledge the claims are directed to a subset of the disclosed inventions and do not cover every embodiment." PO Sur-reply 11 (citing *Schoenhaus v. Genesco, Inc.*, 440 F.3d 1354, 1359 (Fed. Cir. 2006)). Patent Owner argues that Petitioner's assertions regarding Figure 4 support Patent Owner's construction. *Id*. at 11–12. Patent Owner then asserts that Petitioner's arguments regarding Figures 2A and 18F acknowledge the "integrated display" embodiment with interspersed pixels and sensors. *Id*. at 12. Patent Owner contends that Petitioner's argument interpreting the scale and dimensions of the illustrated components arbitrarily creates a sub-class ("outermost sensors 1322"), without support in the Specification, and instead relies "on patent drawings to define precise proportions, sizes, and dimensions." *Id*. at 13 (citing *Hockerson-Halberstadt, Inc. v. Avia Grp. Int'l, Inc*., 222 F.3d 951, 956 (Fed. Cir. 2000)). Patent Owner argues that the Specification provides express descriptions of the claimed components and relative sensor array positions in relation to the edges of a display panel, which are proximate to the edges, but not inside, the display area. *Id*. at 13–14.

We agree with Patent Owner's assertion that the recitation of different elements in claim 1, that is, "position sensing array" and "display panel/pixel array," implicates that those elements are distinct components of the patented invention. *Becton, Dickinson*, 616 F.3d at 1254. The Specification and prosecution history provide support, however, that those structures may be integrated. The Specification states that

> Reference is now made to FIG. 18F, which shows *an integrated display and input device having touch responsive input functionality*. As seen in FIG. 18F, a multiplicity of light detector elements 1322 are interspersed among light emitters 1324 arranged in a plane 1326 underlying a viewing plane defining plate 1328.

Ex. 1001, 42:51–56; *see also id*. at 9:22–23. In view of this disclosure, which identifies the integrated nature of the light detectors (position sensing array) and light emitters (pixel array) in a plane, we agree with Petitioner that *Becton, Dickinson* and *Kyocera Senco* are distinguishable. In *Kyocera Senco*, in an infringement analysis, the claim recited "require[d] initiating . . . by pressing said exit end," and the record indicated that there was no identification of claim language or in the written description that indicated that a separate component "the safety contact element" was anything but a distinct component from the exit end.[7] *Kyocera Senco*, 22 F.4th at 1374,

[7] The Federal Circuit also found that there was support in the specification for the claim's recitation of the initiation function by the exit end, and the applicant was thus free to claim the function being performed by the exit end, even with the specification additionally describing that the function could also be performed by the safety contact switch. *Kyocera Senco*, 22 F.4th at 1382.

1382. Here, that is not the case—as discussed above, the Specification describes an integrated display with the position sensing array and light emitters in the same plane. Moreover, as we discuss below, an integrated display is consistent with the claim language, unlike *Becton, Dickinson*. *See Becton, Dickinson*, 616 F.3d at 1255.

As Petitioner argues, the integrated configuration of Figure 18F aligns with the plain and ordinary meaning of the claims, where the pixel array defines the display area where outermost sensors of the position sensing array are proximate to the edges of the display area, and the position array sensor receives a portion of light through one layer of the display panel. Although Patent Owner argues that if the "position sensing array" is part of the display panel, it cannot be proximate to itself, instead, as discussed above, the Specification supports that the pixel array defining the display area may be integrated with the position sensing array. Moreover, the claim language requires that the position sensing array be "positioned proximate to at least one edge of the display area," so the requirement is only a positional one where the position sensing array is required to be near a portion of the display area, i.e., the edge. So even if the pixel sensing array is part of a portion of the display panel, it still may be proximate to an edge. *Id*. Further, as to Patent Owner's argument that Petitioner is impermissibly interpreting the scale and dimensions of the illustrated components to identify "outermost sensors" without support in the Specification, we do not agree. Instead, Petitioner refers to elements of Figure 18F and the configuration of the elements and drawings may teach relative relationships between or among the depicted elements. *See* Reply 6–7; Ex. 1035 ¶ 16; *Vas–Cath, Inc. v. Mahurkar,* 935 F.2d 1555, 1566 (Fed. Cir. 1991).

We have reviewed the prosecution history and do not find that it supports that the position sensing array and pixel array have to be physically separated. The amendment prior to the allowance of the ’931 patent made certain changes to the claim limitations (Ex. 1004, 597), but they do not indicate disavowal of claim scope. Further, as discussed above, we have considered the issued claim language and Specification and find that it supports the integrated nature of the elements. We are also not persuaded by Patent Owner’s arguments related to the arguments made during prosecution to distinguish Omura. PO Resp. 18–19; Ex. 1004, 606. Although Patent Owner argues that the amended claims distinguished Omura, stating that it was a “fundamentally different principle of operation,” the issue under discussion was not directed to whether the position sensing array and pixel array were distinct structures—rather, the argument on Omura was directed to differences in light travel. *See* Ex. 1004, 604–606.

Patent Owner also asserts that in the prosecution history of the parent ’972 patent, the Patent Office issued a restriction requirement with 21 invention species, and, accordingly, a “detector assembly” or array arranged at an “edge” of a display were understood to be different structures and arrangements. PO Resp. 19; Ex. 2051, 757–758. There is one species identified “Group 1: Fig 1A–1D. Claims 1–4, 25, 26, 40–43 and 58–61,” however, which is the species that was elected by the applicant. Ex. 2051, 757, 836. This Group’s figures, 1A to 1D, includes configurations with sensor arrays at an edge (Fig. 1A), as well as configurations where “a multiplicity of light detector elements 134 are interspersed among light emitters 136 arranged in a plane 138” (Fig. 1C). *Id*. at 22, 92–93. Accordingly, there was a determination made that both detector assemblies, those with light detector elements interspersed among light emitters, as well as those with sensors at an edge, both comprised a species, which is the election made in the parent application to the ’931 patent.[8] *See* Tr. 27:19–29:25. Thus, the prosecution history informs that, in addition to the claim language and Specification, the claim interpretation should not be directed to only the edge sensor embodiment, as Patent Owner advocates. Instead, the intrinsic evidence supports that the position sensing array and pixel array may be integrated. Accordingly, we decline to adopt Patent Owner’s claim interpretation that the position sensing array and pixel array have to be physically separated structures and instead the position sensing array and pixel array may be in an integrated structure.

2. “through”

Patent Owner contends that in the term “through at least one layer of the display panel” “[t]he plain and ordinary meaning of the term ‘through’ means ‘into one side and out another side of at least one layer of the display panel.’” PO Resp. 8–9. Petitioner argues that no construction of the term is needed. Pet. Reply 9.

On the full record, we determine that it is not necessary to provide an express interpretation of this claim term because, as discussed below, we find that the prior art teaches the claim limitations with this term under Patent Owner’s proposed construction. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co*., 868 F.3d 1013, 1017 (Fed. Cir. 2017); *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc*., 200 F.3d 795, 803 (Fed. Cir.

[8] We do not find any other restriction requirements in the prosecution history of the ’931 patent.

1999) ("[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.").

D. Alleged Obviousness of Claims 1, 3, 6–13, 15, and 18–21 Over Gettemy Alone or In Combination with Philipp

Petitioner contends that claims 1, 3, 6–13, 15, and 18–21 would have been obvious over Gettemy alone or in combination with Philipp. Pet. 25–60; Pet. Reply 21–27.

Because the obviousness ground over the combination of Gettemy and Philipp is dispositive of claims 1, 3, 6–13, 15, and 18–21, we do not reach Petitioner's ground over Gettemy alone. *See Boston Sci. Scimed, Inc. v. Cook Grp. Inc.*, 809 F. App'x 984, 990 (Fed. Cir. Apr. 30, 2020) (non-precedential) (recognizing that the "Board need not address issues that are not necessary to the resolution of the proceeding" and, thus, agreeing that the Board has "discretion to decline to decide additional instituted grounds once the petitioner has prevailed on all its challenged claims").

To support its contentions, Petitioner provides explanations as to how Gettemy and Philipp teach each claim limitation and why there is a motivation to combine the references. *Id*. Petitioner also relies upon the Bederson Declarations (Ex. 1002; Ex. 1035) to support its positions.

Patent Owner asserts that Petitioner does not provide sufficient evidence that the prior art teaches certain limitations of the claims nor has provided sufficient rationale to combine the prior art references. PO Resp. 30–59; PO Sur-reply 21–30. Patent Owner relies on the Cairns Declaration to support its positions. Ex. 2056.

We begin our discussion with brief summaries of Gettemy and Philipp, and then address the evidence and arguments presented.

1. Gettemy (Ex. 1005)

Gettemy is directed to providing information relating to an object relative to a display. Ex. 1005 ¶ 10. The displays allow user interaction with displays that are used in various devices, such as computers, handheld devices, portable computing devices, handheld scanners, and mobile telephones. *Id.* ¶ 23. A schematic representation of a display is shown in Figure 1, reproduced below.

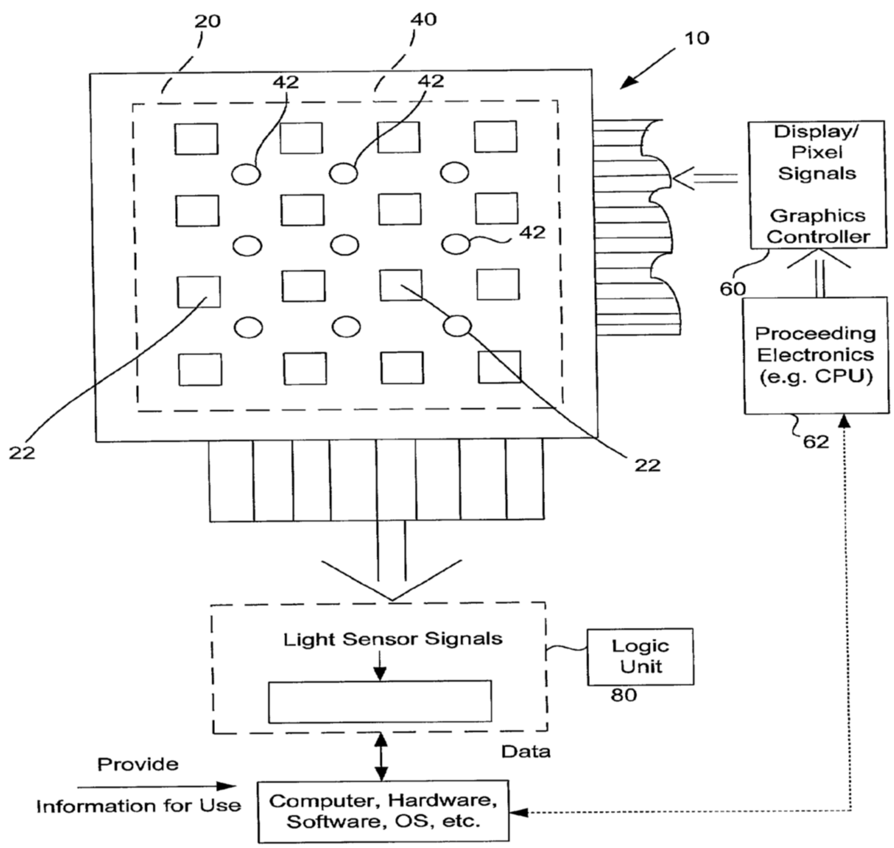
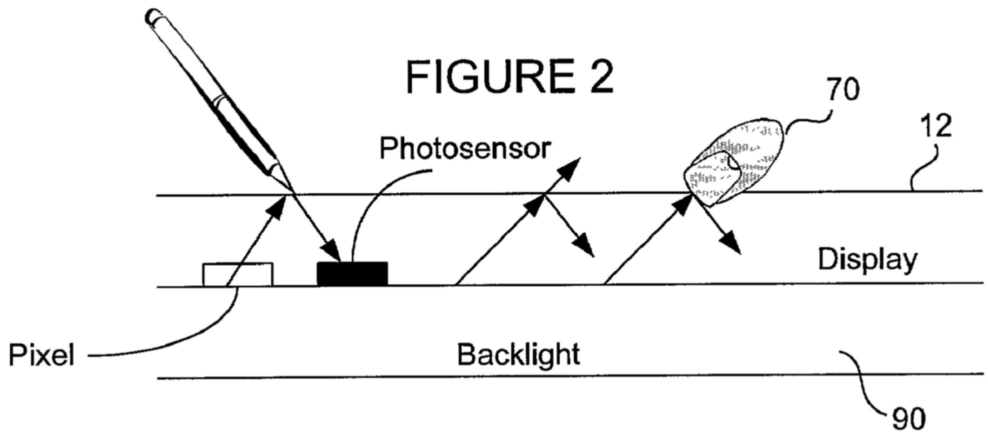


FIGURE 1

As shown in Figure 1, above, display 10 includes pixels 20, which include individual pixels 22, light sensors 40 in an array, which include individual light sensors 42, graphics controller 60, and logic unit 80. Ex. 1005 ¶¶ 24–28. Figure 2, reproduced below, is a cross-section of display 10.

FIGURE 2

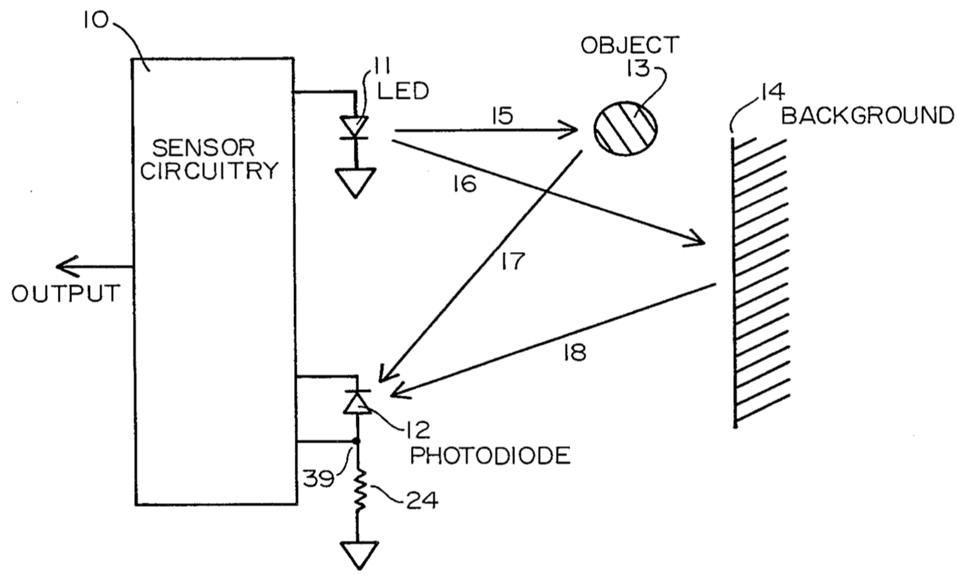


As shown in Figure 2, above, when light is emitted from pixels 20, from a backlight 90, or from other sources, a certain amount of light will pass through a display surface 12, and a certain amount of light will be reflected or refracted back from display surface 12. Ex. 1005 ¶ 24. When object 70 is near display 10, object 70 reflects or refracts a certain amount of light which has passed through display surface 12, back toward display 10. *Id.* By detecting the additional amount of light that is reflected or refracted from object 70, the position of object 70 relative to display 10 may be determined. *Id.*

2. Philipp (Ex. 1006)

Philipp is directed to a sensing apparatus for the emission and subsequent detection of energy fields and disturbances within such fields, and, more particularly, to an optical sensor for sensing object motion, presence, or other disturbance within a sensing region. Ex. 1006, 1:5–11. A block diagram of Philipp's optical sensor is shown in Figure 1, reproduced below.

FIG. 1



As shown in Figure 1, above, the optical sensor includes infrared light emitting diode (LED) 11 that emits rays of a beam of energy 15 represented by lines 15 and 16 into a sensing region of space. Ex. 1006, 5:12–17. The beam reflects off objects in the region, such as stationary background 14 which is used to discriminate against, and object 13 which is to be sensed. *Id*. at 5:17–20. Light energy reflected is received by photodiode 12 sensitive to the emitted light energy. *Id*. at 5:20–22. Photodiode 12 generates a signal current proportional to the intensity of the light received, which when passed through a passive element, such as resistor 24, creates a voltage proportional to the light energy received from the reflection. *Id*. at 5:22–28.

3. Analysis

A patent claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness.[9] *Graham v. John Deere Co*., 383 U.S. 1, 17–18 (1966).

a) Independent claim 1

The Petition asserts that Gettemy in combination with Philipp teaches all the limitations of claim 1, and one of ordinary skill in the art would have been motivated to combine the prior art references and would have had a reasonable expectation of success in doing so. *See* Pet. 25–42.

i. Rationale to combine Gettemy and Philipp

Petitioner argues that a person of ordinary skill in the art would have been motivated to combine Gettemy and Philipp. Pet. 25–27. Petitioner argues that Gettemy and Philipp "each relates to the same well-known issues in sensing objects near a touch display." *Id*. at 25 (citing Ex. 1002 ¶¶ 66–67). More specifically, Petitioner points to Gettemy's teachings that "provide for user interaction (such as by touching, pointing, placement of objects proximate to the display, etc.)" and use pixels and other light sources and sensors to detect the presence of an object. *Id.* (citing Ex. 1005 ¶¶ 23–24). Petitioner refers to Philipp's disclosures of the use of light emitters to illuminate a sensing area, where "the light energy from such emitters is detected and processed to determine the introduction of objects into the sense field, or the motion of objects already in the sense field." *Id*. (citing

[9] No objective evidence of nonobviousness is presented by Patent Owner. *See generally* PO Resp.

Ex. 1006, 1:15–20). Further, Petitioner asserts, Gettemy discloses comparing light sensor values to an expected value, and determining the object's position and tracking it, with Philipp disclosing "thresholding techniques for adding increased robustness in determining when an object comes into the sense field and how long it remains there." *Id*. at 25–26 (citing Ex. 1005 ¶¶ 39, 40, 42–43; Ex. 1006, 10:6–16, 10:33–41).

Patent Owner presents several arguments asserting that a person of ordinary skill in the art would not be motivated to combine Gettemy and Philipp. PO Resp. 30–35. As discussed below, Section II.D.3.A.vi–vii, Philipp is used in combination with Gettemy for the teaching of limitations 1[e] and 1[f] in this Decision. We discuss the rationale to combine the references for the teaching of those limitations below, and here we discuss whether the references are analogous art.

Patent Owner argues that a person of ordinary skill in the art would not have been motivated to combine Gettemy with Philipp because they are not analogous art. PO Resp. 30–35. Patent Owner asserts that "Gettemy discloses 'touch screens' in the context of mobile devices and explicitly teaches reducing the overall size and weight of mobile devices," and "its integrated sensor/display pixel [is manufactured] as a CMOS or CCD pixel array." *Id*. at 31–32. Patent Owner argues that "Philipp does not once mention any display, mobile device, or battery" and "[i]nstead, Philipp discloses an 'active energy field sensor' or a standalone motion sensor for automatic doors, faucets, and the like." *Id*. at 32. Patent Owner contends that "Philipp attempts to address specific sensitivity issues relating to 'drift in the output of [the] light emitter due to temperature effects, or from slowly changing backgrounds." *Id*. (citing Ex. 1006, 2:12–33). Patent Owner argues that "the issues and solutions disclosed by Philipp do not relate nor apply to the mobile touch screen or display disclosed in Gettemy." *Id*. at 33 (citing Ex. 1005 ¶ 9; Ex. 1006, 2:13–32; Ex. 2056 ¶ 90).

To the extent Patent Owner's argument is that Gettemy and Philipp are both not analogous art to the claimed invention, we disagree. The test for determining whether a prior art reference constitutes analogous art to the claimed invention is "(1) whether the [prior] art is from the same field of endeavor, regardless of the problem addressed and, (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved." *See In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004). "Prior art is analogous if it is from the same field of endeavor or if it is reasonably pertinent to the particular problem the inventor is trying to solve." *Circuit Check Inc. v. QXQ Inc*., 795 F.3d 1331, 1335 (Fed. Cir. 2015). A reference is analogous art if either of these two tests is met. *Scientific Plastic Prods., Inc. v. Biotage AB*, 766 F.3d 1355, 1359 (Fed. Cir. 2014). The Federal Circuit has indicated that the scope of analogous art is to be construed broadly. *Wyers v. Master Lock Co*., 616 F.3d 1231, 1238 (Fed. Cir. 2010) ("The Supreme Court's decision in *KSR International Co. v. Teleflex, Inc*., 550 U.S. 398 . . . (2007), directs us to construe the scope of analogous art broadly.").

We agree with Petitioner that Gettemy and Philipp both relate to proximity detection of objects. Pet. Reply 28–29. Petitioner refers to Gettemy's disclosures of a touch display with sensors configured to detect light of varying wavelengths reflected from an object. *Id*. at 28–29 (citing Ex. 1005 ¶¶ 23–24). We agree with Petitioner that Philipp also teaches the use of sensors for detecting objects. Ex. 1006, 1:6–11 ("This invention generally relates . . . to an optical sensor for sensing object motion [and] presence.").

Accordingly, both Gettemy and Philipp relate to the field of endeavor of proximity detection of objects and are analogous art to the '931 patent.

ii. Limitation 1[a] – "a display panel having a pixel array that defines a display area, the pixel array is configured to visually present digital content;"

Petitioner asserts that Gettemy discloses a display panel, which includes pixels. Pet. 30–32 (citing Ex. 1005 ¶¶ 24, 26, Fig. 1). Petitioner contends that in Gettemy the pixel array visually displays digital content such as "text, graphics, images, pictures, and other visual information." *Id.* at 32 (citing Ex. 1005 ¶ 25).

Patent Owner does not present any arguments specific to this limitation. *See generally* PO Resp. Instead, Patent Owner argues that Gettemy fails to teach a "position sensing array" because it has to be a separate structure from a "display panel having a pixel array" in limitation 1[c]. *Id.* at 50–51. We address that argument below.

We have reviewed the evidence and argument and determine that Petitioner has presented sufficient evidence that Gettemy teaches limitation 1[a].

iii. Limitation 1[b] – "an Infra-Red (IR) emitter positioned proximate to the display area, the IR emitter illuminating one or more objects in proximity to the device"

For limitation 1[b], Petitioner asserts that Gettemy discloses that light may be emitted from a pixel, a backlight, or other sources. Pet. 32 (citing

Ex. 1005 ¶ 24). In addition to placement of an IR light in the display screen, Dr. Bederson also testifies that, as another example, a person of ordinary skill in the art would have been able to implement Gettemy's backlight for illumination of the screen and nearby objects. Ex. 1002 ¶¶ 85–86. Dr. Bederson additionally refers to Gettemy's disclosure that its pixels may be made of subpixels, emitting light in different wavelengths, and that a person of ordinary skill in the art would have been successful in adding an IR-emitting subpixel in the pixel array. *Id*. ¶¶ 87–88.

Referring to Gettemy's disclosure that "[l]ight sensor 42 may be tuned to be responsive to certain types of light (i.e. infrared, visible, ultra-violet, other types of electromagnetic radiation, etc.)," Petitioner asserts that a person of ordinary skill in the art would have found it obvious to use an IR emitter in view of this disclosure. Pet. 33 (citing Ex. 1005 ¶ 32). Dr. Bederson additionally refers to Gettemy's disclosures that the wavelength for reflection may be chosen and the panel may be designed to allow light, including non-visible light, through the panel for detection. Ex. 1002 ¶ 81 (citing Ex. 1005 ¶¶ 32, 47). Dr. Bederson testifies that a person of ordinary skill in the art "would understand that an obvious kind of non-visible light is IR light (especially since Gettemy discloses that it can sense IR light.)." *Id*.

Petitioner additionally asserts that, to the extent that an IR emitter is not taught by Gettemy alone, Philipp discloses the use of an infrared light emitting diode (LED). Pet. 35–36 (citing Ex. 1006, 5:13–22; Ex. 1002 ¶ 83). Petitioner contends that a person of ordinary skill would have been motivated to use the same wavelength of light for an emitter and detector to ensure that the signals are properly tuned to each other. *Id*. at 36–37 (citing Ex. 1005 ¶¶ 32, 48; Ex. 1002 ¶ 83).

We focus on Petitioner's arguments and evidence related to its assertion that Gettemy's backlight emissions illuminate objects and that a person of ordinary skill in the art would understand that the emissions are non-visible IR light.

Patent Owner argues that Gettemy does not disclose an IR emitter proximate to the display area and a person of ordinary skill in the art would not modify Gettemy's visible light sources to emit non-visible IR light. PO Resp. 40–49. Patent Owner argues that Petitioner concludes that a person of ordinary skill in the art would modify Gettemy's backlight to emit non-visible IR light "without explaining why or how such a modification would or could work or referencing evidence in the record." *Id*. at 45 (citing Ex. 1002 ¶¶ 80–81). Patent Owner asserts that "basic ten[e]ts and required backlight operations require emitting visible light, not non-visible IR light." *Id*. (citing Ex. 2061; Ex. 2063). Patent Owner asserts that "[t]here is simply no motivation to modify Gettemy's backlight to emit IR light because such modification would be against its intended purpose." *Id*. (citing Ex. 2056 ¶ 123). Patent Owner argues that modifying Gettemy's backlight to emit IR light requires the backlight to generate IR light as well as visible light, "resulting in diminished display brightness and resolution and increased power consumption." *Id*. at 46 (citing Ex. 2056 ¶¶ 124–125; Ex. 1005 ¶¶ 7–8; Ex. 2061; Ex. 2063). Patent Owner asserts that a person of ordinary skill in the art would not have been motivated to modify Gettemy to emit IR light from the backlight. *Id*. (citing Ex. 2056 ¶ 126).

In Response, Patent Owner additionally argues that Gettemy's statement that light sensors can be tuned to certain types of light including infrared light would be understood by a person of ordinary skill in the art to mean that the "infrared light refers to heat emitted by an object such as a finger or hand." PO Resp. 41 Patent Owner contends that "attempting to modify any of Gettemy's 3 visible light sources to emit non-visible light (e.g., IR light), as proposed by Dr. Bederson, would require significant experimentation and the resultant device would either be inoperable or have significantly diminished resolution, brightness, and battery life." *Id*. at 42 (citing Ex. 2063, 5; Ex. 2056 ¶ 114).

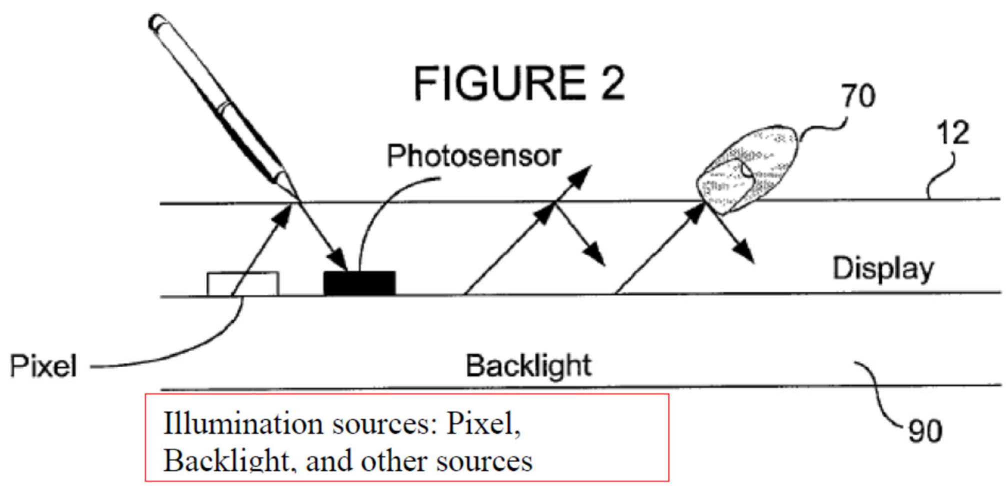
Patent Owner also asserts that Petitioner initially argued that "Gettemy does not expressly disclose that the emitter is an infrared (IR)," and "Gettemy is silent on the implementation details of an IR emitter." PO Sur-reply 21. Patent Owner argues that the Petition did not reference paragraph 47 of Gettemy that was included in the Decision on Institution, which Petitioner now adopts, and Petitioner's new arguments should be struck. *Id*. at 21–22.

Patent Owner also asserts that Petitioner's "new theory regarding Gettemy's alleged IR emitting backlight raises new issues regarding the presumption of distinct components," that is, claim 1 recites "an Infra-Red (IR) emitter" and dependent claims 11 and 12 recite a "backlight." PO Sur-reply 25. Patent Owner contends that Petitioner "incorrectly argues" that a person of ordinary skill in the art "would modify Gettemy's backlight to satisfy all of these distinctly claimed components." *Id*. Patent Owner asserts that Gettemy discusses: (1) increasing the amount of backlight to provide "additional light" to be reflected; and (2) the panel may be designed to allow light (including non-visible light) through the panel for detection. *Id*. (citing Ex. 1005 ¶ 47). Patent Owner argues that the Gettemy applicants knew how to identify visible and non-visible light, but referred to only "additional light," but not non-visible light when referring to modifying the backlight to provide additional light. *Id*. at 25–26.

The Petition indicates the reliance on the backlight layer of Gettemy for the teaching of the claimed "IR emitter" of limitation 1[b]. More specifically, the Petition (Pet. 32) refers to the disclosure that:

> For example, Gettemy discloses that light may be emitted from a pixel, a backlight, or "other sources." "As shown in FIG. 2, when light is emitted from a display (either emanating from pixels 20, from a *backlight 90*, or from other sources), a certain amount of light will pass through a display surface 12, and a certain amount of light will be reflected or refracted back from display surface 12.

Ex. 1005 ¶ 24. Petitioner refers to annotated Figure 2 of Gettemy, reproduced below, in further support of its assertions. *Id*. at 33.



Petitioner's annotated Figure 2 of Gettemy, above, presents a depiction of emitted light from a display either emanating from pixels 20 or from a backlight 90. Pet. 33. In support, Dr. Bederson testifies that light may be emitted from a backlight, as disclosed in Gettemy. Ex. 1005 ¶¶ 80, 86 ("Gettemy discloses using a 'backlight' to illuminate the screen and nearby objects"). Further, Dr. Bederson testifies that a person of ordinary skill in the art "would have also been able to implement Gettemy's backlight 90 'to provide a light source which will be reflected by object 70.'" *Id*. ¶ 86 (citing Ex. 1005 ¶ 27. This testimony is supported by Gettemy's disclosure that "[a]s shown in FIG. 2, when light is emitted from a display (either emanating from pixels 20, from a backlight 90, or from other sources), a certain amount of light will pass through a display surface 12," where an "object 70 reflects or refracts a certain amount of light which has passed through display surface 12." Ex. 1005 ¶ 24; *see also* Ex. 1002 ¶ 80.

We also credit Dr. Bederson's testimony that based on Gettemy's disclosure of using sensors "configured to detect light in the infrared wavelength," a person of ordinary skill in the art "would have found it obvious to use an IR emitter in . . . the backlight." Ex. 1002 ¶ 81 (citing Ex. 1005 ¶ 32). This testimony is supported by Gettemy's disclosure that the "panel may be designed to allow light (including non-visible light) through the panel for detection." *Id.* (citing Ex. 1005 ¶¶ 32, 47). We also credit Dr. Bederson's testimony that a person of ordinary skill in the art "would understand that an obvious kind of non-visible light is IR light (especially since Gettemy discloses that it can sense IR light.)." *Id*.; Ex. 1005 ¶ 32 ("light sensor 42 is configured to detect light in the infrared wavelength").

We do not find that Patent Owner's arguments undercut Petitioner's arguments and evidence presented in support of Gettemy's teaching of this claim limitation. Although Patent Owner argues that Gettemy does not disclose an IR emitter proximate to the display area, in view of Figure 2, reproduced above, the backlight area is shown below the display area and proximate to it. Patent Owner also faults Petitioner's conclusion concerning Gettemy's backlight emitting non-visible light, arguing that backlight operations require emitting visible light, modifications would be required to Gettemy's backlight, the backlight's use for IR emission is against its intended purpose, and the backlight's use for illuminating objects would result in diminished display brightness and resolution. *See* PO Resp. 45–46. These arguments, however, disregard Gettemy's express disclosures that the "panel may be designed to allow light (including non-visible light) through the panel for detection," with detection by sensors responsive to IR light. Ex. 1005 ¶¶ 32, 47. Petitioner additionally provides supporting testimony and other evidence that IR emitting backlights were known to a person of ordinary skill in the art. Pet. Reply 19 (citing Ex. 1035 ¶ 40; Ex. 1039; Ex. 1005 ¶ 47).

We also do not find persuasive Patent Owner's argument that Gettemy's statement that light sensors can be tuned to certain types of light including infrared light would be understood to mean that the "infrared light refers to heat emitted by an object such as a finger or hand" because Gettemy does not teach or suggest this. *See* PO Resp. 41. Instead, Petitioner asserts, and we agree, that Gettemy does not mention heat emissions, and instead consistently refers to the detection of light reflected by objects. Pet. Reply 16 (citing Ex. 1005 ¶¶ 32, 33, 39).

We also do not find persuasive Patent Owner's argument regarding the presumption of distinct components in view of claim 1's recital of "an Infra-Red (IR) emitter" and dependent claims 11 and 12's recital of a "backlight." *See* PO Sur-reply 25. The '931 patent Specification provides support that the IR emitter and backlight may be the same structure. Ex. 1001, 40:14–16 ("In another preferred embodiment of the present disclosure, backlight LEDs are selected to provide both IR and visible light wavelength emanations.").

Additionally, we do not find that Petitioner's arguments related to paragraph 47 of Gettemy should be struck. Patent Owner did not seek to file a motion to strike these arguments, Dr. Bederson provided testimony on this portion of Gettemy in the Declaration filed with the Petition (Ex. 1002 ¶ 81), and Patent Owner had notice of and opportunities to respond to the arguments.

Accordingly, we have reviewed the evidence and argument and determine that Petitioner has presented sufficient evidence that Gettemy teaches limitation 1[b].

iv. Limitation 1[c]- a position sensing array positioned proximate to at least one edge of the display area, the position sensing array is configured to receive, through at least one layer of the display panel, at least a portion of light reflected by an object in proximity to the device and generate an output signal that represents an amount of the portion of light; and

Petitioner asserts that Gettemy's position-sensing features may be positioned on the display 10 in positions proximate to the edge of the display. Pet. 39–41 (citing Ex. 1005 ¶¶ 25, 28, Fig. 1; Ex. 1002 ¶ 91). Petitioner further contends that Gettemy discloses that its "panel may be designed to allow light (including non-visible light) through the panel for detection" and that "a certain amount of light will pass through a display surface 12, and . . . [w]hen an object 70 is near display 10, object 70 reflects or refracts a certain amount of light which has passed through display surface 12, back toward display 10." *Id*. at 41 (citing Ex. 1005 ¶¶ 24, 47). Petitioner contends that Gettemy teaches generating an output signal indicative of the reflected light received. *Id*. at 42 (citing Ex. 1005 ¶ 32).

a. Position Sensing Array

Patent Owner asserts that "Gettemy expressly teaches a display panel that integrates photosensor pixels and display pixels inside the display panel itself." PO Resp. 50 (citing Ex. 1005 ¶ 37, Figs. 1–6). Patent Owner argues that because the light sensors "are incorporated in and are not separate from the sensor/display panel," "Gettemy's integrated display panel does not and cannot have a separate 'position sensing array' positioned proximate to an edge of the display area." *Id*. As discussed *supra* Section II.C.1, under the claim construction adopted here, there is no requirement that the position sensing array and pixel array have to be physically separated structures; instead, the position sensing array and pixel array can be integrated. This does not mean that the individual components are the same structure, as Patent Owner asserts, however, because the components still retain their own structures even if integrated. The integration issue aside, we are also not persuaded by Patent Owner's argument on this issue because the claim language requires that the position sensing array be "positioned proximate to at least one edge of the display area," so, accordingly, the requirement is only a positional one where the position sensing array is required to be near a *portion* of the display area, i.e., the edge, which Petitioner asserts, and we agree, is taught by Gettemy. *See* Pet. 39–41.

Patent Owner also argues that Petitioner provides no explanation of "how Gettemy's 'individual light sensors' relate to the claimed 'position sensing array'" or how Petitioner's box around light sensors constitutes an array. PO Resp. 51. Patent Owner argues that the '931 patent Specification does not describe any "individual detector" as an "array." *Id.* The Petition identifies the "position sensing array" in Gettemy as depicted in annotated Figure 1, reproduced below. Pet. 40.

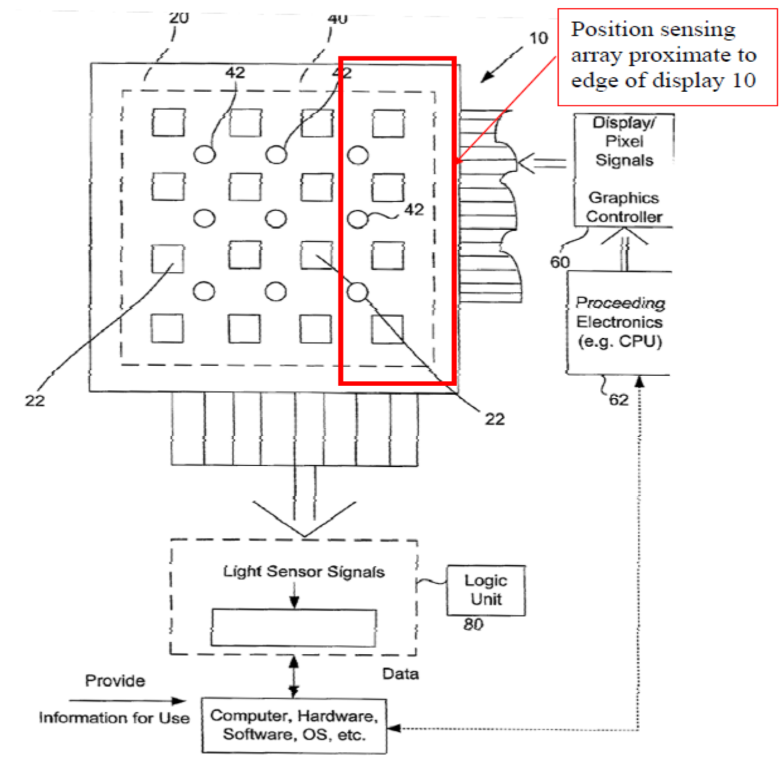


FIGURE 1

As shown in annotated Figure 1 of Gettemy, Petitioner asserts that "the array of sensors 42 among the pixels 20 along the rightmost edge of display 10, is a position sensing array positioned proximate to at least one edge of the display area." Pet. 40–41 (citing Ex. 1002 ¶ 91). Accordingly, Petitioner identifies the "array of sensors 42," within the box at the right side in annotated Figure 1 of Gettemy, as being proximate to an edge. Further, as Petitioner argues, and we agree, Gettemy discloses a touch screen that uses "an array of one or more light sensors," enabling the position sensing of those objects. Pet. Reply 20–21 (citing Ex. 1005 ¶ 23).

Patent Owner also argues that none of the individual sensors 42 in Figure 1 are positioned proximate to the edge of the display. PO Resp. 51. Rather, Patent Owner argues that "the individual sensors 42 are disposed in an interior of the display surrounded by display pixels 22." *Id*. (citing Ex. 2056 ¶ 144). Patent Owner contends that Petitioner's assertions are conclusory and there is an arbitrary box drawn and this fails to carry Petitioner's burden to demonstrate the teaching. *Id*. at 51–52 (citing Ex. 2056 ¶ 145). In Sur-reply, Patent Owner also argues that Petitioner is attempting to interpret certain dimensions and positions and this is improper and speculative. PO Sur-reply 29–30 (citing *Nystrom v. TREX Co*., 424 F.3d 1136, 1149 (Fed. Cir. 2005)). Patent Owner asserts that Gettemy's individual sensors 42 contained in the annotated Figure 1's red box drawn are surrounded by pixels 22, but are not proximate to any edge of the display area. *Id*. at 30.

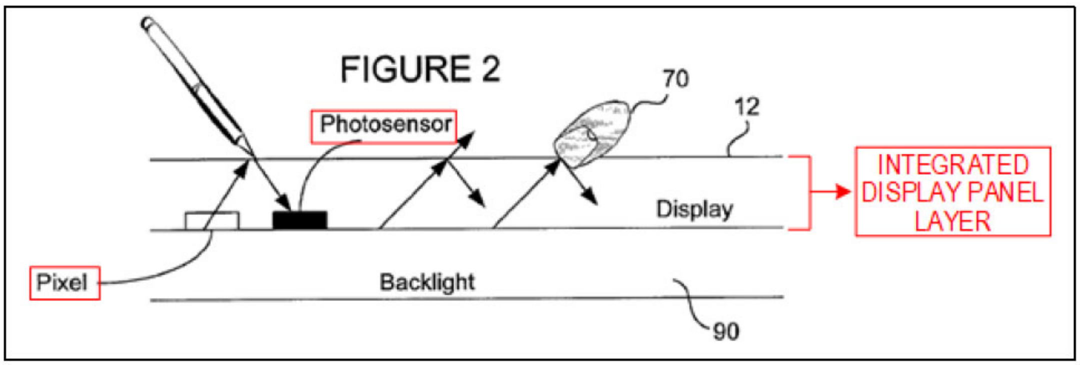
On this issue, Dr. Bederson testifies that "the array of sensors 42 among the pixels 20 along the rightmost edge of display 10, is a position sensing array positioned proximate to at least one edge of the display area." Ex. 1002 ¶ 91. Dr. Cairns testifies "that none of the 'individual sensors 42' . . . are positioned proximate to the edge of the display," as the "individual sensors 42 appear to be disposed in an interior of the display surrounded by display pixels." Ex. 2056 ¶ 144.

Patent Owner's arguments on this issue focus on the issues that certain individual sensors 42 are located in the interior area and that there are display pixels between the sensors and the edge of the display panel. Petitioner asserts, however, that it is the *position sensing array* near the edge that is proximate, so although there may be other sensors in other areas and pixels that are closer to the edge than the sensors, that is not relevant to whether the identified sensor array is proximate to the edge of the display screen. Further, although we agree that drawings cannot be used to determine dimensions, drawings may be used to determine the configuration of the elements and drawings may teach relative relationships between or among the depicted elements. *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d at 1566. Patent Owner indicated that it was not offering a construction of the term "proximate" (Tr. 43:11), and therefore the basis for Dr. Cairns' understanding of the term is unclear. Alternately, Petitioner's understanding of the term "proximate" to mean within a certain distance (Tr. 24:7), while not precise, indicates an understanding of the term. Accordingly, we credit Dr. Bederson's testimony, in view of his understanding of the term, which states that Gettemy teaches a touch screen using "an array of one or more light sensors," which may be configured in "different positions and orientations" relative to the position of pixels of the display panel, and the "array of one or more light sensors," as shown in the identified area of annotated Figure 1, is positioned proximate to an edge of the display panel. Ex. 1034 ¶ 43 (citing Ex. 1005 ¶¶ 23, 30, Fig. 1).

b. Through at least one layer of the display panel

Patent Owner argues that under its proposed claim construction for the term "through," Gettemy does not teach the claim limitation. PO Resp. 52–

55. Patent Owner argues that "the light received by Gettemy's photosensors does not pass all-the-way 'through at least one layer' of the display because the photosensors are part of the top display layer." *Id*. at 54 (citing Ex. 1005, Fig. 2). Patent Owner refers to annotated Figure 2 of Gettemy (*id*. at 53) reproduced below.



Gettemy, Fig. 2 (annotated)

Patent Owner's annotated Figure 2 depicts a cross-section view of a display. Patent Owner further asserts that "[l]ight simply exits and enters the same surface (e.g., surface 12) of Gettemy's display layer without passing all-the-way through that layer." Ex. 2056 ¶ 151.

In its Sur-reply, Patent Owner argues that emitted light from the display pixels or backlight is not the "reflected" light required by the claims and that reflected light is not coming through a "layer" as claimed. PO Sur-reply 16. Patent Owner further explained its position at oral argument, stating:

> What the claim requires is the reflected light. And the reflected light itself does not travel through the display because the photosensor is part of the display.
>
> That's not uncommon. That's all that Gettemy is teaching is an integrated display with the photosensors and pixels as part of the display layer.

> So there's only one layer here. The photosensor is part of it. The reflected light travels from the surface or outside the surface of the display. It's actually reflected back into the display, within the display where it hits the photosensor.
>
> And that is within the display, not through the display. In order to travel through the display, you will see by the photosensor it would have to be in the back of the display.

Tr. 51:12–24.

Petitioner argues that, even under Patent Owner's proposed claim construction, this limitation would be taught by Gettemy, which discloses that

> When an object 70 is near display 10, object 70 reflects or refracts a certain amount of light which has passed ***through*** display surface 12, back toward display 10. By detecting the additional amount of light that is reflected or refracted from object 70, the position of object 70 relative to display 10 may be determined, as will be discussed in greater detail below.

Ex. 1005 ¶ 24 (*quoted in* Pet. Reply 24).

We agree with Petitioner's assertion that Gettemy teaches "the position sensing array is configured to receive, through at least one layer of the display panel, at least a portion of light reflected by an object in proximity to the device" under Patent Owner's proposed claim construction of "through" as "into one side and out another side of at least one layer of the display panel." Gettemy teaches that light will be emitted and some of it will pass through a display, and "[w]hen an object 70 is near display 10, object 70 reflects or refracts a certain amount of light which has passed through display surface 12, back toward display 10." Ex. 1005 ¶ 24. We agree with Patent Owner that under the claim language, the position sensing array receives *the light reflected by the object* through at least one layer of the display panel. However, we do not agree with Patent Owner's contention that the photosensor is part of the display layer, and, thus, there can be no travel of the reflected light through the layer of the display. We agree with Petitioner that, as shown in the cross-section of Figure 2, that although the photosensor may be integrated with the display panel, the photosensor is its own "separately identifiable component." *See* Tr. 46:1–11. As shown in Figure 2 of Gettemy, in the areas where photosensors are located (*see* Figure 1, light sensor 42), the display layer is above the photosensor. In other words, Figure 2 shows that the bottom of the display layer meets the top of the photosensor(s) for that portion of the display layer where the photosensor(s) is located. We agree with Petitioner that Gettemy's disclosures indicate the light is reflected off an object, which is shown, for instance, as a finger in Figure 2, with the reflected light then entering the display surface, travelling through the display layer above the photosensor, and then into the photosensor. Ex. 1005 ¶ 24; Fig. 2; Tr. 45:22–24. Accordingly, the reflected light enters one side of the display panel and out the other side of a layer of the display panel into the photosensor. Moreover, the light transmission is "through at least one layer of the display panel," which is through the display panel layer, that is, with reflected light entering its top surface and exiting the display panel's bottom surface adjoining the top of the photosensor. Thus, Gettemy teaches the portion of the claim limitation under Patent Owner's construction of the term "through."

c. Conclusion

Accordingly, we have reviewed the evidence and argument and determine that Petitioner has presented sufficient evidence that Gettemy teaches limitation 1[c].

v. Limitation 1[d] - a processing unit configured to: receive the output signal from the position sensing array

For the teaching of this limitation, Petitioner contends that Gettemy discloses a processing unit and "signals from light sensors 40 are passed to logic unit 80, so that logic unit 80 can determine the position of object 70 relative to display 10. Once the position of object 70 is determined, the position may then be passed to CPU 62." Pet. 42–43 (citing Ex. 1005 ¶ 38).

Patent Owner does not contest Petitioner's assertions as to the prior art teachings of limitation 1[d]. *See generally* PO Resp.

We have reviewed the evidence and argument and determine that Petitioner has presented sufficient evidence that Gettemy teaches limitation 1[d].

vi. Limitations 1[e]and 1[f] - determine the output signal exceeds a predetermined threshold; calculate, based on the output signal, a position of the object relative to the device when the output signal exceeds the predetermined threshold; and

For the teaching of limitation 1[e], Petitioner asserts that Philipp discloses that "if software so chooses, it may elect to set the output driver 31 to a triggered state in response to this net signal, provided it is large enough (i.e. exceeds a threshold level)." Pet. 47 (citing Ex. 1006, 6:54–68). Additionally, Petitioner asserts, Philipp's threshold is predetermined because it relies upon a specific level set. *Id*. at 47–48 (citing Ex. 1006, 11:20–21); *see also* Ex. 1002 ¶ 102. Dr. Bederson testifies that Philipp describes multiple examples of using thresholds, and that if the "new object 13 remains in the sense field, the threshold will remain exceeded and a trigger output will occur," where the "threshold is predetermined because it relies upon a specific level set in advance." Ex. 1002 ¶ 102 (citing Ex. 1006, 10:35–38, 11:20–21). Dr. Bederson testifies that a person of ordinary skill in the art "would have been motivated to implement a predetermined threshold based on the expected readout value and determine when the signal exceeds this value. This would allow for a consistent, known benchmark against which to measure the signal, and ensure a consistent and reliable response." *Id.* ¶ 103. Petitioner also refers to Philipp's teaching that "thresholding of the detected signal could benefit from a greater degree of flexibility." Pet. 48 (citing Ex. 1006, 2:34–35). Dr. Bederson refers to Philipp's teachings of algorithms with such flexibility and testifies that a person of ordinary skill in the art would have been motivated to include Philipp's teachings in Gettemy to improve system reliability and flexibility. Ex. 1002 ¶ 103 (citing Ex. 1006, 10:1–11:37). Dr. Bederson also testifies that a person of ordinary skill in the art would have had a reasonable expectation of success in implementing use of Philipp's thresholding in Gettemy "because the threshold settings and algorithms are simple software or firmware routines that were well-understood to implement by a POSITA[10] with predictable results." Ex. 1002 ¶ 103.

For limitation 1[f], Petitioner refers to Gettemy's disclosure of calculating the position of the object relative to the device by its disclosure of Figure 3, reproduced below, which shows a simplified grid of light sensors. Pet. 48–50 (citing Ex. 1005 ¶ 39, Fig. 3).

[10] Person of ordinary skill in the art.

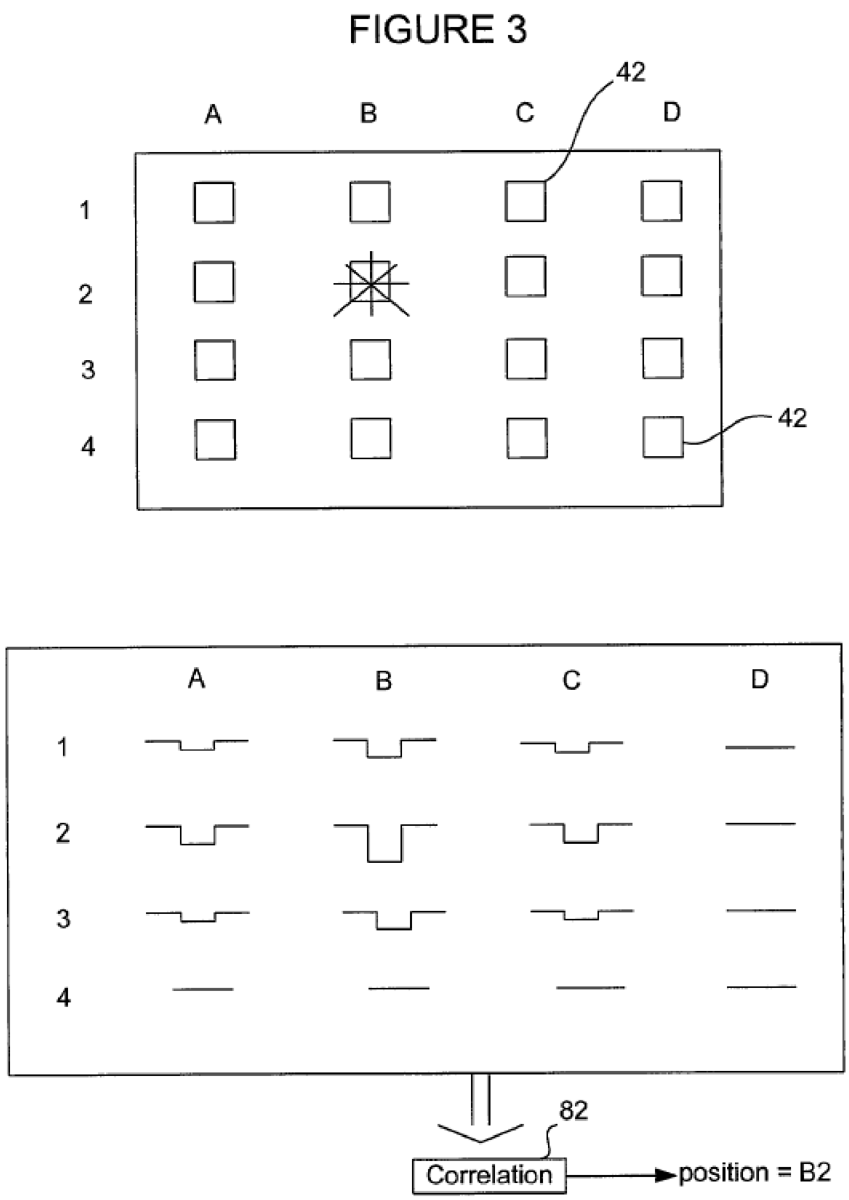


Figure 3 of Gettemy, above, depicts a simplified grid of light sensors, where each light sensor 42 detects an amount of light reflected off an object, where the state of each light sensor is then passed to a correlation step 82 which uses maximum or minimum values in order to determine a position of an object. Ex. 1005 ¶ 39. Petitioner relies on Philipp's use of a predetermined threshold in combination with Gettemy's teaching of calculations of a position of an object because, as Dr. Bederson testifies, a person of ordinary skill in the art "would have understood that the positioning calculation is done when the detected signal exceeds the pre-determined threshold, as exceeding a threshold is known by a POSITA to be a triggering event." Ex. 1002 ¶ 105.

Patent Owner argues that Philipp describes setting a triggered state of an output driver or thresholding a filtered signal to determine if a trigger state exists. PO Resp. 58 (citing Ex. 1006, 6:54–59, 11:18–22). Patent Owner asserts that Petitioner "avoids explaining what Philipp's triggered state means or how it would work in the context of Gettemy, or how it relates to the claimed 'predetermined threshold.'" *Id*. Patent Owner contends that Petitioner is generalizing Philipp's threshold concept and concluding that a person of ordinary art would have been motivated to combine it with Gettemy "based on unsupported attorney argument and generic statements." *Id*. (citing Ex. 1002 ¶ 103; Ex. 2056 ¶¶ 165–166). Patent Owner cites to *In re Hedges*, suggesting that Petitioner has picked and chosen from the reference to the exclusion of other parts. *Id*. at 58–59 (citing *In re Hedges*, 783 F.2d 1038, 1041 (Fed. Cir. 1986)); *see also id.* at 33. Patent Owner asserts that Philipp's teachings do not relate to a display, touch screen, or touch event or suggest that the predetermined threshold operation calculates "a position of the object relative to the device when the output signal exceeds the predetermined threshold." *Id*. at 59; *see also id*. at 31–33 (asserting that Gettemy discloses the use of touch screens but Philipp is directed to the use of an "active energy field sensor" or a standalone motion sensor for automatic doors, faucets, and the like).

Patent Owner further argues that Petitioner's "reference to Philipp's generic statement regarding a 'greater degree of flexibility' does not provide a sufficient motivation to combine." PO Resp. 59. Patent Owner also contends that Petitioner does not explain how Philipp works in the context of Gettemy because the references are not analogous. *Id*. at 59–60 (citing Ex. 2056 ¶¶ 87, 132, 169). Patent Owner asserts that Philipp's threshold teaching would not work in Gettemy's sensor grid/pixel correlations because Philipp teaches setting "output driver 31 to a triggered state," and there is no output driver in Gettemy. *Id*. at 60.

Philipp discloses the use of a thresholding based on a specific set level to "determine whether a valid trigger condition exists," where the condition is triggered when, for instance, the "new object 13 remains in the sense field." Ex. 1006, 10:35–38, 11:17–22. Thresholding is used for "determining whether a *valid* trigger state exists." *Id*. at 11:17–18 (emphasis added). Philipp describes various algorithms that can be used for object detection and movement using thresholding. *Id*. at 10:3–11:25. Accordingly, the record supports Dr. Bederson's testimony that a person of ordinary skill in the art would be motivated to employ Philipp's thresholding features in Gettemy's thresholding object detection in order to allow greater flexibility in operation by the use of algorithms that use thresholding and to allow for a consistent, known benchmark against which to measure the signal, in order ensure a consistent and reliable response. Ex. 1002 ¶¶ 102–103.

Additionally, as we discuss *supra* Section II.D.3.a.i, Philipp and Gettemy are analogous art. Further, we also do not agree with Patent Owner's arguments to the extent they are based on bodily incorporation of Philipp into Gettemy; "[t]he test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference . . . Rather, the test is what the combined teachings of those references would have suggested to those of ordinary skill in the art." *In re Keller*, 642 F.2d 413, 425 (CCPA 1981). Additionally, although Patent Owner argues that Gettemy is directed to the use of touch screens and Philipp is directed to motion sensors for automatic doors, for instance, we find sufficient rationale to combine the teachings of the references, given the similar objectives of the prior art. *See KSR*, 550 U.S. at 417 ("When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability."). Also, we do not find the evidence to support that the references were picked and chosen and reflect hindsight—both references are directed to proximity detection of objects, and Petitioner relies on specific teachings of Philipp that offer improvements to Gettemy.

Accordingly, we have reviewed the evidence and argument and determine that Petitioner has presented sufficient evidence that the combination of Gettemy and Philipp teaches limitations 1[e] and 1[f] and a rationale to combine the references has been provided.

v. Limitation 1[g] - execute input functionality corresponding to the position of the object.

For the teaching of the limitation of executing input functionality corresponding to the position of the object, Petitioner asserts that Gettemy discloses executing a number of input functionalities corresponding to the position of the object. Pet. 50. In support, Petitioner refers to an example where "the information relating to the object is provided to data processing electronics (such as a CPU 62) to determine or interpret the motion of object 70 into an alpha-numeric text characters (e.g. Graffiti™, etc.) for use with text processing programs, user programs, operating systems, etc." *Id*. (citing Ex. 1005 ¶ 42).

Patent Owner does not contest Petitioner's assertions for the prior art teachings of limitation 1[g]. *See generally* PO Resp.

We have reviewed the evidence and argument and determine that Petitioner has presented sufficient evidence that Gettemy teaches limitation 1[g].

vii. Summary

On the full record, Petitioner has established by a preponderance of the evidence that claim 1 would have been obvious over the combination of Gettemy and Philipp.

b) Independent claims 13 and 21

Independent claim 1 is a device claim, claim 13 is a method claim, and claim 21 is a system claim, and all these claims recite substantially similar limitations. *See* Ex. 1001, 45:44–67, 46:50– 67, 48:5–29. Petitioner relies on the same evidence and argument as that provided for claim 1 for claims 13 and 21. Pet. 27–51.

Patent Owner presents the same arguments for claim 13 and 21 as those presented for claim 1. PO Resp. 30–60.

We have reviewed the evidence and arguments and, on the full record, Petitioner has established by a preponderance of the evidence that claims 13 and 21 would have been obvious over the combination of Gettemy and Philipp.

c) Dependent claims 3, 6–12, 15, and 18–20

Claim 3 depends from claim 1, and further recites "wherein the processing unit is further configured to: determine a change in the output signal; and calculate movement of the object relative to the display panel based on the output signal." Claim 15 depends from claim 13 and recites a similar limitation. Petitioner asserts that "Gettemy calculates at the correlation step, based on the output signal, a position of the object relative to the device." Pet. 52. Petitioner further contends that Gettemy discloses translation of signals "into more useable information such as position, *motion*, acceleration, shape etc." *Id*. (citing Ex. 1005 ¶ 52).

Claim 6 depends from claim 1, and further recites "wherein the processing unit is further configured to: determine, based on the output signal, a two-dimensional position of the object relative to the display area." Claim 18 depends from claim 13 and recites a similar limitation. Petitioner asserts that, as shown in its Figure 3, Gettemy discloses determining a two-dimensional position of an object by the use of its grid with rows and columns. Pet. 53–54 (citing Ex. 1005 ¶ 39, Fig. 3).

Claim 7 depends from claim 1, and further recites "wherein the display panel comprises at least one of an infra-red (IR) transmissive display layer, a liquid crystal display (LCD) layer, or an organic light emitting diode (OLED) layer." Claim 19 depends from claim 13 and recites a similar limitation. Petitioner asserts that Gettemy discloses a display that includes an IR transmissive layer, as well as an LCD layer on the display. Pet. 55–56 (citing Ex. 1005 ¶¶ 45, 47).

Claim 8 depends from claim 1, and further recites "wherein the display panel comprises at least one of a diffusing layer, a reflector layer, or a collimating layer." Petitioner argues that Gettemy discloses a reflective layer. Pet. 56–57 (citing Ex. 1005 ¶¶ 24, 34, 45, 47).

Claim 9 depends from claim 1, and further recites “wherein the object comprises at least one of a stylus, a portion of a hand, or a finger.” Claim 20 depends from claim 13 and recites a similar limitation. Petitioner contends that Gettemy teaches this limitation by its disclosure that a stylus or a finger is used as the touch object. Pet. 57–58 (citing Ex. 1005 ¶¶ 24, 45, Fig. 2).

Claim 10 depends from claim 1, and further recites “wherein the IR emitter comprises an IR light-emitting diode (LED).” Petitioner asserts that this limitation is taught for the reasons discussed for claim 1. Pet. 58.

Claim 11 depends from claim 1, and further recites “wherein the display panel includes a backlight layer for illuminating at least a portion of the display area.” Claim 12 depends from claim 1, and further recites “a backlight for illuminating at least a portion of the display area.” Petitioner asserts that Gettemy discloses a backlight layer that provides illumination of the display. Pet. 59–60 (citing Ex. 1005 ¶¶ 4, 27, Fig. 2).

Patent Owner does not present any arguments specific to dependent claims 3, 6–12, 15, and 18–20. *See generally* PO Resp.

We have reviewed the evidence and arguments and, on the full record, Petitioner has established by a preponderance of the evidence that claims 3, 6–12, 15, and 18–20 would have been obvious over the combination of Gettemy and Philipp.

E. Alleged Obviousness of Claims 2 and 14 over Gettemy Alone, Or In Combination with Philipp and Carstedt

Claim 2 depends from claim 1, and further recites “wherein the processing unit is further configured to: determine a baseline level of ambient light proximate to the device; and set the predetermined threshold above the baseline level of ambient light." Claim 14 depends from claim 13 and recites a similar limitation.

Petitioner contends that claims 2 and 14 would have been obvious over Gettemy alone, or in combination with Philipp, and Carstedt. Pet. 61–67.

Because the obviousness ground over the combination of Gettemy in combination with Philipp and Carstedt is dispositive of claims 2 and 14, we do not reach Petitioner's ground over Gettemy and Carstedt. *See Boston Sci. Scimed*, 809 F. App'x at 990.

To support its contentions, Petitioner provides explanations as to how the combination of the references teaches each claim limitation and that there is a rationale to combine the references. *Id*. Petitioner also relies upon the Bederson Declarations (Ex. 1002; Ex. 1035) to support its positions. Patent Owner argues that one of ordinary skill in the art would not have been motivated to combine Carstedt with Gettemy and Philipp, and also that Carstedt teaches away from the use of predetermined thresholds. PO Resp. 60–62. Patent Owner relies on the Cairns Declaration. Ex. 2056.

We begin our discussion with a summary of Carstedt, and then address the evidence and arguments presented.

1. Carstedt (Ex. 1007)

Carstedt is directed to a touch input device, and, more particularly, to "an opto-matrix frame having automatic corner glare compensation." Ex. 1007, 1:7–9. Carstedt states that it is desirable "to have a device which dynamically compensates for ambient light and for variations in emitter output and detector sensitivity." *Id*. at 2:17–19. In order to compensate, Carstedt uses ambient light sampling and updates detection thresholds based on the ambient light, with "a continuous and dynamic sampling of ambient light [] utilized and taken into account." *Id*. at 15:15–16, Fig. 7, step 330.

2. Analysis

Petitioner asserts that Gettemy in combination with Philipp teaches determining a predetermined threshold. Pet. 62. Petitioner refers to Gettemy's disclosures that "unwanted registrations" may be caused by dust or smudges, and the adjustments to a "sensitivity level" can be used to correct for such effects, and "light sensors 40 may be configured to detect an amount of ambient light present (or absent) due to object 70 from the surrounding environment." *Id*. at 63 (citing Ex. 1005 ¶¶ 35, 49). Petitioner points to Carstedt's disclosure of the determination of a baseline level of ambient light incident on the device, which is then subtracted from the level read from the detector. *Id*. (citing Ex. 1007, 14:20–26, Fig. 7, steps 210, 220). Petitioner also refers to Carstedt's disclosures that if the detector is saturated with ambient light, the sensed signal value "is compared against a predetermined fixed minimum threshold value," and if this ambient saturated value is greater than the first predetermined threshold, then a new threshold above the baseline ambient level is calculated. *Id*. at 63–64 (citing Ex. 1007, 15:1–15, Fig. 7 (steps 230, 330)).

Petitioner asserts that a person of ordinary skill in the art would have been motivated to include Carstedt's type of ambient baseline processing in the combination of Gettemy and Philipp. Pet. 65 (citing Ex. 1002 ¶¶ 134–135). Dr. Bederson testifies that "Gettemy itself explains that a 'level of sensitivity' may be updated to ensure correct registration of nearby objects." Ex. 1002 ¶ 134 (citing Ex. 1005 ¶ 49). Dr. Bederson testifies that a person of ordinary skill in the art would have understood that "since the level of ambient light changes, the sensitivity level or threshold should change as well, otherwise the system will not be properly sensitive to nearby objects that are too strongly or weakly lit." *Id*. Dr. Bederson testifies that a person of skill "would have been motivated to determine and update thresholds to accommodate for ambient light to the ensure an appropriate 'level of sensitivity' for the then present lighting conditions." *Id*. Dr. Bederson further testifies that Carstedt would motivate a person of ordinary skill in the art to include setting thresholds over an ambient baseline because "Carstedt teaches that using a threshold that does not change 'dynamically' in response to ambient lighting conditions is problematic." *Id*. (citing Ex. 1007, 2:4–7). Dr. Bederson testifies that Gettemy already includes logic or programming to detect ambient lighting conditions, and a person of ordinary skill in the art would have been motivated to include Carstedt's algorithms in Gettemy to improve system responsiveness to changing ambient lighting conditions and such a change would have had a reasonable likelihood of success. *Id*. ¶ 135 (citing Ex. 1005 ¶¶ 35, 40).

Patent Owner asserts that, for the reasons discussed for limitation 1[e], Gettemy and Philipp fails to teach the claimed threshold operations. PO Resp. 30. Patent Owner also argues that Carstedt expressly disparages "predetermined thresholds" in association with "ambient light sensing" and teaches the dynamic determination of thresholds, and therefore Carstedt teaches away from "predetermined thresholds." *Id*. at 61 (citing Ex. 1007, 1:27–2:7, 2:17–19; Ex. 2056 ¶ 174).

Patent Owner additionally argues that a person of ordinary skill in the art would not combine Carstedt with Gettemy and Philipp because Carstedt requires projecting beams of light parallel to and over a display while

Gettemy requires an orthogonal direction of light emission. PO Resp. 61 (citing Ex. 1005, Fig. 2; Ex. 1007, Fig. 5). Patent Owner contends that the references "require different hardware, and rely on fundamentally different principles of operation." *Id*. Patent Owner asserts that Petitioner has cherry-picked Carstedt's dynamic thresholds and therefore is relying on hindsight reconstruction. *Id*. Patent Owner argues that Petitioner fails to demonstrate that there is a reasonable expectation of success of the combination, with Dr. Cairns testifying that his opinion is based on "Dr. Bederson's failure to explain his conclusions or provide evidence in the record." *Id*. at 62; Ex. 2056 ¶ 177.

We do not find that Patent Owner's arguments undermine Petitioner's showing that the combination of Carstedt, Gettemy, and Philipp teaches the limitations of claims 2 and 14 and that there is a rationale to combine the references. As discussed *supra* Section II.D.3.a.vi, we determined that the weight of evidence supports that the combination of Gettemy and Philipp teaches the "predetermined threshold" of limitation 1[e]. Petitioner also provides evidence of motivation to apply Carstedt's teachings to compensate for ambient light to Gettemy and to teach setting the predetermined threshold above a baseline level of ambient light. We do not find persuasive Patent Owner's argument that Carstedt teaches away from the teaching of a predetermined threshold because it teaches the dynamic determination of thresholds. We agree with Petitioner that setting the threshold above the baseline level of ambient light would ensure that the device detects objects irrespective of changes in ambient lighting. Pet. 65–66; Pet. Reply 26–28; Ex. 1002 ¶ 131; Ex. 1035 ¶ 53. Petitioner relies on Carstedt's teachings concerning ambient light detection and response, which is dynamic, that is, it is based on the ambient light conditions at any certain time, in combination with Gettemy and Philipp. *See* Ex. 1002 ¶ 134; Ex. 1005 ¶ 49; Ex. 1035 ¶ 51. Based on the disclosures in the references, we agree that there is support for Dr. Bederson's testimony that a person of skill would apply Carstedt's teachings regarding the ambient light detection and response to the system of Gettemy and to the predetermined thresholds of Philipp. Ex. 1035 ¶ 53. Carstedt discloses that a new threshold above the baseline ambient level is calculated, which, in combination with Gettemy and Philipp's predetermined thresholds, would allow setting the predetermined threshold above the baseline level of ambient light to account for changing or dynamic ambient light conditions. *See* Ex. 1005 ¶¶ 35, 40; Ex. 1007, 15:8–13, Fig. 7 (step 330); Ex. 1006, 10:1–11:37. Accordingly, in view of Gettemy's disclosures that already include programming to detect and make adjustment based on ambient lighting conditions, we credit Dr. Bederson's testimony that a person of ordinary skill in the art "would improve system responsiveness in the presence of changing ambient lighting conditions" and "would have had a reasonable expectation of success in implementing such a determination in Gettemy because the ambient lighting and threshold settings and algorithms are simple software routines that were well-understood and predictable to implement." Ex. 1002 ¶ 135; Ex. 1005 ¶¶ 35, 40.

Additionally, we do not find Patent Owner's argument that a person of ordinary skill in the art would not combine Carstedt with Gettemy and Philipp because of differences in light transmission undermines Petitioner's showing. These arguments are based on bodily incorporation of Carstedt into Gettemy. We also do not find that the evidence supports that the references have been "cherry-picked" and reflect hindsight—Petitioner relies on specific teachings of Carstedt that offer improvements to the combination of Gettemy and Philipp.

We have reviewed the evidence and arguments and, on the full record, Petitioner has established by a preponderance of the evidence that claims 2 and 14 would have been obvious over the combination of Gettemy, Philipp, and Carstedt.

III. MOTION TO EXCLUDE

Patent Owner argues that paragraphs 31–33, 37, 39–41, 43–46, 49, 52–53, 55, and 56 of Exhibit 1035 (Bederson Reply Declaration) should be excluded under the Federal Rules of Evidence 401 and 403. PO Mot. Exclude 1. Patent Owner argues that paragraphs 31–33, 37, 39–41, 43–46, 49, 52, and 53 are irrelevant and have little or no probative value and are "not adequately supported by the record," so they have no tendency to make any fact any more probable than it would be without the evidence and, as such, they do not constitute proper opinion testimony. *Id*. at 1–2. Patent Owner also asserts that paragraphs 55 and 56 of the Declaration are introduced to support attorney argument in opposition to evidence as to why the asserted prior art cannot be properly combined, and the testimony is not adequately supported by the record and is not proper opinion testimony. *Id*. at 2.

In response, Petitioner asserts that the evidence is proper expert testimony under the Federal Rules of Evidence and the Board's Trial Practice Guide. Pet. Opp. Mot. Exclude 1. Petitioner asserts that the opinions offered by Dr. Bederson directly respond to Patent Owner's Response and the "testimony is replete with citations to the record." *Id*. at 1.

Petitioner provides a chart comparing portions of the Patent Owner Response to portions of the Bederson Reply Declaration. *Id*. at 2–5. Petitioner argues that although Patent Owner argues that paragraphs 55 and 56 are presented for the "sole purpose of supporting attorney argument in opposition to Patent Owner's evidence that the prior art cannot be properly combined," this is the kind of opinion evidence authorized by the Board's rules and procedures. *Id.* at 5 (citing TPG 35). Petitioner also argues that Patent Owner cannot show that the probative value of the evidence is outweighed by any unfair prejudice or confusion because Dr. Bederson was not deposed so there can be no confusion regarding the testimony or potential prejudice, which could have occurred if, for instance, there was an evasive answer to a question during a deposition. *Id*. at 6. Petitioner also argues that the Motion is an unauthorized attempt to strike Dr. Bederson's reply opinions, and striking testimony is an exceptional remedy granted rarely. *Id*. at 7–8 (citing TPG 80–81).

We find persuasive Petitioner's arguments on the relevancy and the probative value of the expert testimony at issue. Patent Owner does not provide any specific explanations as to why the testimony at issue is irrelevant or has little or no probative value. Federal Rule of Evidence 401 provides that evidence is relevant if it "has any tendency to make a fact more or less probable than it would be without the evidence" and "the fact is of consequence in determining the action." Fed. R. Evid. 401; Fed. R. Evid. 402. Courts have characterized the relevance threshold as being "very low." *United States v. White*, 692 F.3d 235, 246 (2nd Cir. 2012). Under this standard, we find that Dr. Bederson's testimony is relevant. Additionally, under the circumstances here, a bench trial, Rule 403 has limited applicability. *See, e.g.*, *Schultz v. Butcher III*, 24 F.3d 626, 632 (4th Cir. 1994). Patent Owner does not provide explanation as to why there would be prejudice to it and we can weigh the evidence without improper inference. Accordingly, we do not find a basis for exclusion under Federal Rule of Evidence 403.

Moreover, we agree with Petitioner that paragraphs 55 and 56 of the Bederson Reply Declaration are provided in support of attorney argument, which accords with the Board's rules and procedures. Accordingly, we *deny* the Motion to Exclude. Additionally, to the extent that the Motion to Exclude is intended to serve as a motion to strike, the Motion is also denied on that basis because Patent Owner was not granted leave to file a motion to strike.

IV. CONCLUSION

For the foregoing reasons, we conclude that Petitioner has shown by a preponderance of the evidence that claims 1–3, 6–15, and 18–21 of the '931 patent are unpatentable.

Claim(s)	35 U.S.C. §	References/ Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1, 3, 6–13, 15, 18–21	103(a)[11]	Gettemy		
1, 3, 6–13, 15, 18–21	103(a)	Gettemy, Philipp	1, 3, 6–13, 15, 18–21	
2, 14	103(a)[12]	Gettemy, Carstedt		
2, 14	103(a)	Gettemy, Philipp, Carstedt	2, 14	
Overall Outcome			1–3, 6–15, 18–21	

IV. ORDER

Accordingly, it is

ORDERED that claims 1–3, 6–15, and 18–21 of U.S. Patent 10,156,931 B2 have been shown to be unpatentable;

FURTHER ORDERED that Patent Owner's Motion To Exclude is *denied*; and

FURTHER ORDERED that, because this is a Final Written Decision, the parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.[13]

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[11] We decline to reach the ground based on Gettemy alone as each challenged claim is determined to be unpatentable over Gettemy in combination with Philipp.

[12] We decline to reach the ground based on Gettemy in combination with Carstedt as each challenged claim is determined to be unpatentable over the combination of Gettemy, Philipp, and Carstedt.

[13] Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice*

Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding. *See* 84 Fed. Reg. 16654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. §§ 42.8(a)(3), (b)(2).

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