

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

MASIMO CORPORATION,
Patent Owner.

IPR2024-00294
Patent 10,736,507 B2

Before RICHARD H. MARSCHALL, DAVID COTTA, and
ALYSSA A. FINAMORE, *Administrative Patent Judges*.

COTTA, *Administrative Patent Judge*.

JUDGMENT

Final Written Decision

Determining All Challenged Claims Unpatentable
Denying Patent Owner's Contingent Motion to Amend

35 U.S.C. § 318(a)

Dismissing Petitioner's Motion to Strike

37 C.F.R. § 42.23

I. INTRODUCTION

On December 12, 2023, Apple Inc. (“Apple” or “Petitioner”)¹ filed a Petition to institute *inter partes* review of claims 1–20 of U.S. Patent No. 10,736,507 B2 (Ex. 1001, “the ’507 patent”). Paper 3 (“Pet.” or “Petition”). Masimo Corporation (“Masimo” or “Patent Owner”)² filed a Preliminary Response. Paper 7 (“Prelim. Resp.”). With our prior authorization, Petitioner filed a Preliminary Reply to Patent Owner’s Preliminary Response, and Patent Owner filed a Preliminary Sur-reply. Paper 9 (“Prelim. Reply”); Paper 10 (“Prelim. Sur-reply”).

We instituted trial on June 27, 2024. Paper 11. During trial, Patent Owner filed a Patent Owner Response. Paper 17 (“PO Resp.”). Petitioner filed a Reply (Paper 30, “Pet. Reply”), and Patent Owner filed a Sur-reply (Paper 47, “PO Sur-reply”). With our prior authorization Petitioner filed a Motion to Strike portions of Patent Owner’s Sur-reply (Paper 50, “Pet. MTS”), and Patent Owner filed an Opposition to Petitioner’s Motion to Strike (Paper 53, “PO MTS Opp.”).

Patent Owner also filed a Contingent Motion to Amend. Paper 18. With our prior authorization, Petitioner filed a Motion to Strike Patent Owner’s Contingent Motion to Amend (Paper 21), to which Patent Owner filed an Opposition (Paper 22), Petitioner filed a Reply (Paper 23), and Patent Owner filed a Sur-reply (Paper 24). We denied Petitioner’s Motion to Strike and extended the applicable deadlines to accommodate Patent

¹ Petitioner identifies itself as the real party-in-interest. Pet. 86.

² Patent Owner identifies itself as the real party-in-interest. Paper 5, 1.

Owner's Contingent Motion to Amend (Paper 25), after which, Petitioner filed an Opposition to Patent Owner's Contingent Motion to Amend (Paper 31).

At Patent Owner's request (Paper 18, 2), we issued Preliminary Guidance on Patent Owner's Contingent Motion (Paper 33). In the Preliminary Guidance, we provided our initial, preliminary, and non-binding views on whether Patent Owner had shown that it has satisfied the statutory and regulatory requirements for the proposed substitute claims. *See* Notice, 84 Fed. Reg. 9,497; *see also* 35 U.S.C. § 326(d); 37 C.F.R. § 2.221; *Lectrosonics, Inc. v Zaxcom, Inc.*, IPR2018-01129, Paper 15 (PTAB Feb. 25, 2019) (precedential).

Patent Owner then filed a Revised Contingent Motion to Amend. Paper 42 ("RMTA"). The Revised Motion seeks to amend claims 13, 14, 17, and 19 and replace them with substitute claims 21–24 in the event we find one of claims 13, 14, 17, or 19 unpatentable. *Id.* at 1. Petitioner filed an Opposition to Patent Owner's Revised Motion to Amend (Paper 52, "RMTA Opp.") to which Patent Owner filed a Reply in support of its Motion to Amend (Paper 53, "RMTA Reply"), and Petitioner filed a Sur-reply (Paper 58, "RMTA Sur-reply").

An oral hearing was held on May 22, 2025, a transcript of which has been entered into the record. Paper 65 ("Tr.").

We have jurisdiction under 35 U.S.C. § 6(b). After considering the full record developed through trial, we determine that Petitioner has proved by a preponderance of the evidence that the challenged claims are unpatentable, and we deny Patent Owner's Contingent Motion to Amend.

See 35 U.S.C. § 316(e). Our reasoning is explained below, and we issue this Final Written Decision under 35 U.S.C. § 318(a). We dismiss Petitioner’s Motion to Strike as moot.

A. Related Matters

The parties identify *Apple Inc. v. Masimo Corp. et al.*, No. 1-22-cv-01378 (D. Del.) (“the Delaware Litigation”), in which Patent Owner asserts a counterclaim of infringement of the ’507 patent, as a related matter. Pet. 86; Paper 5, 1.

The parties identify IPR2024-00293 as a parallel *inter partes* review proceeding in which Petitioner filed another petition challenging the ’507 patent. Paper 2, 1; Paper 8, 1. We denied institution in that case.

Patent Owner also identifies as related matters the following *inter partes* review proceedings involving patents asserted by Patent Owner in the Delaware Litigation:

Petitioner	Case No.	Patent No.
Apple Inc.	IPR2024-00290	8,190,223
Apple Inc.	IPR2024-00296	10,984,911
Apple Inc.	IPR2024-00243	10,722,159
Apple Inc.	IPR2024-00244	10,722,159
Apple Inc.	IPR2024-00293	10,736,507
Apple Inc.	IPR2024-00241	10,687,743
Apple Inc.	IPR2024-00242	10,687,743

Paper 5, 2.

B. The '507 Patent

The '507 patent relates to “patient monitors capable of connectivity to a mobile computing device.” Ex. 1001, 1:22–24. The '507 patent describes “a physiological monitoring system,” which includes “a sensor and cable assembly with a processing board or card,” and is “connectable to a mobile computing device, such as a smartphone, such that display of the monitored physiological data can occur on the computing device.” *Id.* at 2:24–29.

Figure 1A of the '507 patent, reproduced below, shows physiological monitoring system 100, including “sensor 110, first cable 120, processing module 130, second cable 140, connection port 150, and a mobile computing device, illustrated here as smartphone 160.” *Id.* at 3:58–62.

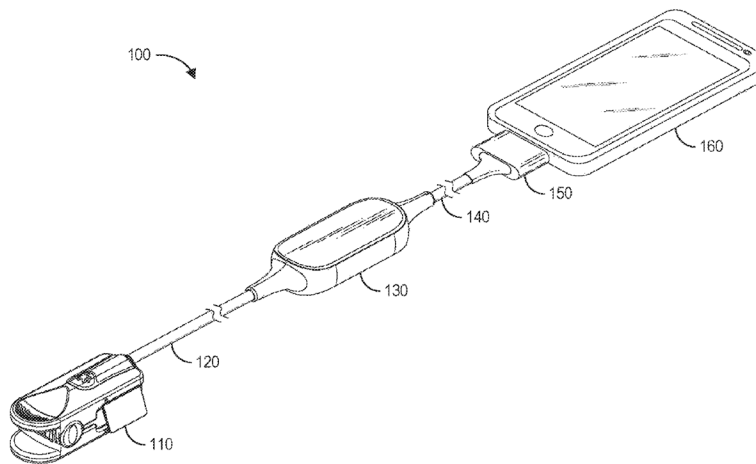


FIG. 1A

As shown in Figure 1A, “[s]martphone 160 can be coupled to the processing module 130 by a second cable 140 and connection port 150.” *Id.* at 5:9–11. Sensor 110 may be “a pulse oximeter capable of being secured to a digit such as a finger.” *Id.* at 4:9–13. According to the '507 patent, “the sensor

data is transmitted from sensor 110 along the first cable 120 to the processing module 130, which can apply noise filtering and signal processing techniques . . . to provide output data for display on the smartphone 160.” *Id.* at 4:67–5:4. The specification describes that “[t]he smartphone 160 can include software such as an application configured to manage output measurement data from the processing module 130.” *Id.* at 5:25–27.

Figure 4A of the ’507 patent, reproduced below, shows an embodiment of an application for display and management of physiological monitoring data. *Id.* at 13:10–12.

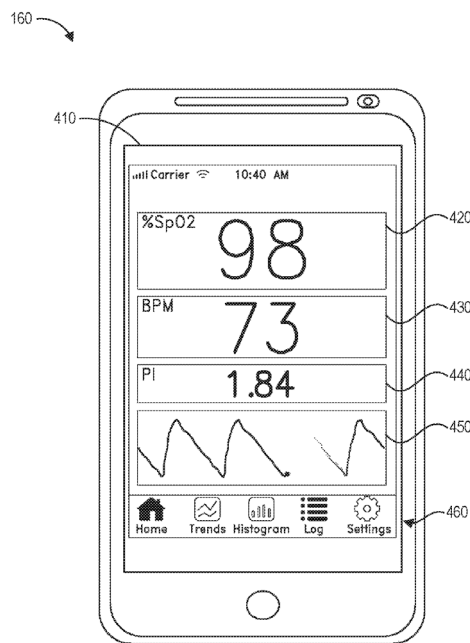


FIG. 4A

Figure 4A depicts smartphone 160 with display 410, “which can be used to

generate a user interface for the software application.” *Id.* at 13:25–27. According to the specification, the application may include “a plurality of display portions in which a plurality of physiological parameters can be displayed, such as SpO₂ display 420, heart rate display 430, perfusion index display 450, or plethysmographic waveform display 450.” *Id.* at 13:27–31.

C. Challenged Claims

The ’507 patent includes 20 claims, all of which are challenged in the Petition. Claims 1 and 13 are independent claims and read as follows:

1. A mobile pulse oximetry system for informing a user of mobile measurement of oxygen saturation (“SpO₂”), the mobile pulse oximetry system comprising:
 - an SpO₂ measurement system including:
 - an optical sensor configured to output one or more signals responsive to light from a light source attenuated by tissue of the user at a measurement site, said one or more signals responsive to an oxygen saturation of said tissue; and***
 - a processing board*** in data communication with the optical sensor and a mobile computing device including a display and cellular communication, wherein the processing board is ***configured to:***
 - receive said one or more signals from the optical sensor;***
 - process said one or more signals to generate SpO₂ measurement values; and
 - output the SpO₂ measurement values to the mobile computing device; and
 - one or more hardware processors of the mobile computing device configured to execute an application, the application configured to execute commands to:
 - generate a graphical user interface having a plurality of display portions;

display, in at least one portion of the plurality of display portions, a representation of a physiological parameter of a plurality of physiological parameters comprising at least the SpO₂ measurement values; and

display, in a different portion of the plurality of display portions, a plurality of user inputs configured to allow the user to interact with at least one of the plurality of display portions or the application;

wherein the processing of the one or more signals to generate SpO₂ measurement values is performed only on the processing board, thereby freeing up memory available to the mobile computing device; and

wherein the processing board is configured to draw power for operation from the mobile computing device.

13. A computer-implemented method of informing a user of mobile measurement of oxygen saturation (“SpO₂”), the computer-implemented method comprising:

outputting, from an optical sensor of an SpO₂ measurement system, one or more signals responsive to light from a light source attenuated by tissue of the user at a measurement site, said one or more signals responsive to an oxygen saturation of said tissue; and

via a processing board of the SpO₂ measurement system, the processing board in data communication with the optical sensor and a mobile computing device including a display:

receiving said one or more signals from the optical sensor;

processing said one or more signals to generate the SpO₂ measurement values; and

outputting the SpO₂ measurement values to the mobile computing device; and

via an application configured to execute commands on the mobile computing device:

generating a graphical user interface having a plurality of display portions;

displaying, in at least one portion of the plurality of display portions, a representation of a physiological parameter of a plurality of physiological parameters comprising at least the SpO2 measurement values; and displaying, in a different portion of the plurality of portions, a plurality of user inputs configured to allow the user to interact with at least one of the plurality of display portions or the application.

Ex. 1001, 20:26–63, 21:42–22:20 (emphasis added to reflect claim language relating to issues in dispute).

D. Asserted Ground of Unpatentability

Petitioner asserts the following grounds of unpatentability in this Petition (Pet. 1–2):

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
13, 15, 18, 19	102(b) ³	Mendelson ⁴
13, 15, 18, 19	103(a)	Mendelson
16, 18, 20	103(a)	Mendelson, Tran ⁵
14, 17	103(a)	Mendelson, Kianl ⁶

³ The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), amended 35 U.S.C. §§ 102 and 103, effective March 16, 2013. Based on the earliest possible effective filing date of the ’507 patent, i.e., September 20, 2012, we apply the pre-AIA versions of §§ 102 and 103. See Ex. 1001, code (60).

⁴ Mendelson, *A Wearable Reflectance Pulse Oximeter for Remote Physiological Monitoring*, Proceedings of the 28th IEEE EMBS Annual International Conference, pp. 912–915 (Aug. 30–Sept. 3, 2006) (New York City) (Ex. 1011, “Mendelson”).

⁵ Tran, U.S. Patent Application Publication No. 2008/0004904 A1, published Jan. 3, 2008 (Ex. 1005, “Tran”).

⁶ Kianl et al., U.S. Patent No. 6,658,276 B2, issued Dec. 2, 2003 (Ex. 1006, “Kianl”).

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1, 2, 5, 7, 9, 12–15, 17–19	103(a)	Mendelson, D’Angelo ⁷
3	103(a)	Mendelson, D’Angelo, Ording ⁸
4–6, 8, 16, 18, 20	103(a)	Mendelson, D’Angelo, Tran
2, 7, 14, 17	103(a)	Mendelson, D’Angelo, Kianl
3	103(a)	Mendelson, D’Angelo, Kianl, Ording
10, 11	103(a)	Mendelson, D’Angelo, Goldsmith ⁹
13, 15, 18, 19	103(a)	Mendelson, Moon ¹⁰
16, 18, 20	103(a)	Mendelson, Moon, Tran
14, 17	103(a)	Mendelson, Moon, Kianl
1, 2, 5, 7, 9, 12–15, 17–19	103(a)	Mendelson, Moon, D’Angelo
3	103(a)	Mendelson, Moon, D’Angelo, Ording
4–6, 8, 16, 18, 20	103(a)	Mendelson, Moon, D’Angelo, Tran
2, 7, 14, 17	103(a)	Mendelson, Moon, D’Angelo, Kianl
3	103(a)	Mendelson, Moon, D’Angelo, Kianl, Ording
10, 11	103(a)	Mendelson, Moon, D’Angelo, Goldsmith

⁷ D’Angelo et al., *A Sensor Network to iPhone Interface Separating Continuous and Sporadic Processes in Mobile Telemedicine*, Proceedings of the 33rd Annual International Conference of the IEEE EMBS, pp. 1528–1531 (Aug. 30–Sept. 3, 2011) (Boston, MA) (Ex. 1007, “D’Angelo”).

⁸ Ording et al., U.S. Patent No. 7,812,826 B2, issued Oct. 12, 2010 (Ex. 1008, “Ording”).

⁹ Goldsmith et al., U.S. Patent Application Publication No. 2007/0093786 A1, published Apr. 26, 2007 (Ex. 1009, “Goldsmith”).

¹⁰ Moon et al., U.S. Patent Application Publication No. 2010/0324387 A1, published Dec. 23, 2010 (Ex. 1010, “Moon”).

Petitioner relies on the three Declarations of Dr. Thomas W. Kenny (Ex. 1003; Ex. 1083; Ex. 1109), on the two Declarations of June Munford (Ex. 1012; Ex. 1108), and on the Declaration of Gordon MacPherson (Ex. 1082), among other evidence. Patent Owner relies on the three Declarations of Dr. R. James Duckworth (Ex. 2002; Ex. 2037; Ex. 2058) and on the Declaration of Bilal Muhsin (Ex. 2038).

II. PATENTABILITY ANALYSIS

A. Principles of Law

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”))).

“A claim is anticipated [under 35 U.S.C. § 102] only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. Inc. v. Union Oil Co.*, 814 F.2d 628, 631 (Fed. Cir. 1987). Moreover, “[b]ecause the hallmark of anticipation is prior invention, the prior art reference—in order to anticipate under 35 U.S.C. § 102—must not only disclose all elements of the claim within the four corners of the document, but must also disclose those elements ‘arranged as in the claim.’” *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008). Whether a reference anticipates is assessed from the perspective of an ordinarily skilled artisan. *See Dayco*

Prods., Inc. v. Total Containment, Inc., 329 F.3d 1358, 1368 (Fed. Cir. 2003).

A claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which that 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 indicia of nonobviousness when presented.¹¹ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. Person of Ordinary Skill in the Art

In determining the level of skill in the art, we consider the problems encountered in the art, the art's solutions to those problems, the rapidity with which innovations are made, the sophistication of the technology, and the educational level of active workers in the field. *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986).

¹¹ The current record in this proceeding does not include any argument or evidence directed to objective indicia of nonobviousness

Petitioner refers to Dr. Kenny's declaration testimony for the definition of a person of ordinary skill in the art ("POSITA" or "POSA"). *See* Pet. 14 n.2 (citing Ex. 1003 ¶¶ 32–33). Dr. Kenny testifies:

In my opinion, a person of ordinary skill in the art as of the Critical Date of the '507 Patent (hereinafter a "POSITA") would have been a person with a working knowledge of physiological monitoring technologies. The person would have had at least a bachelor's degree in electrical engineering, mechanical engineering, biomedical engineering, computer engineering, physics, or a related field, and would have had at least two years of relevant work experience with physiological monitoring technologies and devices, including user interfaces and capture and processing of physiological information, or equivalents thereof. Alternatively, the person could have also had a Master of Science degree in a relevant academic discipline to compensate for less related work experience in the same discipline or vice versa.

Ex. 1003 ¶ 32.

Patent Owner contends:

A POSITA at the time of the '507 Patent would be a person with a working knowledge of physiological monitoring technologies and/or optical sensors used in physiological monitoring technologies. EX2037, ¶36. The person would have had a Bachelor of Science degree in an academic discipline emphasizing the design of electrical, computer, software, or optical technologies, in combination with training or at least one to two years of related work experience with capture and processing of data or information, or designing and using optical sensors or systems, including but not limited to physiological monitoring technologies. *Id.* Alternatively, the person could have had a Master of Science degree in a relevant academic discipline with less than a year of related work experience in the same discipline. *Id.*

PO Resp. 11.

The main differences between the parties' definitions of the POSA appear to be that Patent Owner specifies that the POSA's knowledge and experience may include optical sensors and that the POSA may have a degree emphasizing software. We do not deem these differences material, particularly because the optical sensors and technologies at issue are those used in physiological monitoring technologies and both parties agree that the POSA would have a working knowledge of physiological monitoring technologies. Ex. 1003 ¶ 24; PO Resp. 11. We find the additional specificity of Patent Owner's definition to be helpful. In addition, Patent Owner's definition appears to be consistent with the level of skill in the art reflected in the prior art of record and the disclosure of the '507 patent. Accordingly, we adopt Patent Owner's proposed definition of the person of ordinary skill in the art. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (“[T]he prior art itself [may] reflect[] an appropriate level” as evidence of the ordinary level of skill in the art. (quoting *Litton Indus. Prods., Inc. v. Solid State Sys. Corp.*, 755 F.2d 158, 163 (Fed. Cir. 1985))). We note that we would reach the same outcome under either definition of the POSA. *Cf.*, PO Resp. 12 (asserting that Petitioner's proposed definition is “flawed” but also asserting that “patentability is confirmed” “[r]egardless of the level of skill”).

C. Claim Construction

We interpret a claim “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b).” 37 C.F.R. § 42.100(b) (2023). Under this standard, we construe

the claim “in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” *Id.*

Petitioner asserts that “no claim terms need to be construed to resolve issues of controversy in the present Petition.” Pet. 3 (citing *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011)).

Patent Owner asserts that “the claims have their plain meaning and thus require no construction,” noting that this is the same position it took in the Delaware Litigation. PO Resp. 14. However, Patent Owner specifically articulates what it understands the plain meaning to be, explaining that “the plain and ordinary meaning of ‘one or more signals responsive to light’ output by the optical sensors refers to ***data that is actually acquired*** with the optical sensor.” *Id.* at 18; *see also* PO Sur-reply 1 (“The parties agree the claimed phrase ‘one or more signals responsive to light’ should be given its plain and ordinary meaning, but only Masimo articulated the plain meaning of that phrase.”). And at oral argument, Patent Owner argued that we were required to construe the claims. Tr. 55 (citing *O2 Micro Int’l Ltd. v. Beyond Innovation Tech. Co., Ltd.*, 521 F.3d 1351 (Fed. Cir. 2008)).

We are not persuaded that the claims require construction because the prior art clearly meets the claim language at issue (*see infra* § II.E). As discussed *infra*, this is true even under Patent Owner’s proposed construction. Nonetheless, because Patent Owner contends it is required, we address Patent Owner’s proposed construction.

We begin with the language of the claims. Both claim 1 and claim 13 include language requiring that an optical sensor output a signal responsive to light. Ex. 1001, 20:30–34, 21:45–49. Claim 1 recites:

an optical sensor configured to output one or more signals responsive to light from a light source attenuated by tissue of the user at a measurement site, said one or more signals responsive to an oxygen saturation of said tissue.

Id. at 20:30–34. And, claim 13 recites:

outputting, from an optical sensor of an SpO₂ measurement system, one or more signals responsive to light from a light source attenuated by tissue of the user at a measurement site, said one or more signals responsive to an oxygen saturation of said tissue.

Id. at 21:45–49. As is apparent, the language of claims 1 and 13 places three requirements on the claimed signal: 1) it must be output by an optical sensor, 2) it must be responsive to light from a light source, and 3) it must be responsive to oxygen saturation. The language of claims 1 and 13 does not impose any limitation on what component “actually acquired” the signal, so long as the signal meets the above three requirements.

We next consider the intrinsic evidence. In support of its construction, Patent Owner directs us to Figure 1A, reproduced below (as annotated by Patent Owner). PO Resp. 19.

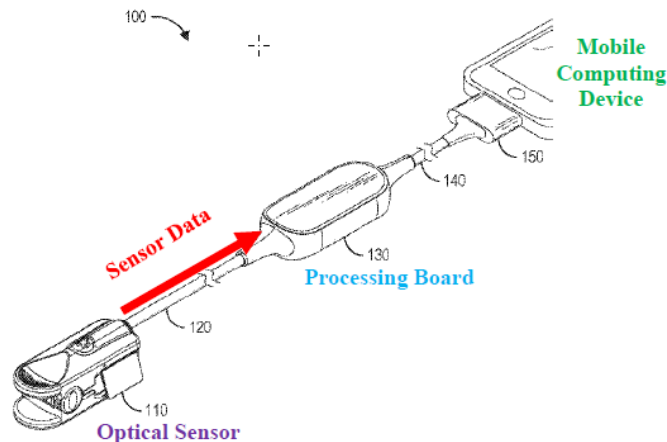


Figure 1A depicts “an embodiment of a physiological monitoring system.” Ex. 1001, 3:24–25. In Figure 1A, optical sensor 110 (labeled in purple by Patent Owner) is connected to processing board 130 (labeled in light blue by Patent Owner), which is connected to mobile computing device 160 (labeled in green by Patent Owner). Patent Owner added a red arrow, labeled “sensor data,” to Figure 1A to represent data passing from optical sensor 110 over cable 120 to processing board 130. *See id.* at 4:67–5:4 (“[S]ensor data is transmitted from sensor 110 along the first cable 120 to the processing module 130, which can apply noise filtering and signal processing techniques described below.”). Patent Owner explains that the “output signal data from the sensor is indicative of measured light because it is light intensity data acquired with the sensor’s detector.” PO Resp. 19 (citing Ex. 1001, 1:28–34, 4:46-51). According to Patent Owner, the detector “responds to the intensity” of light by outputting data (an electrical signal) corresponding to the intensity of the light that it measures. *Id.* Patent

Owner argues that based on this disclosure, and the absence of embodiments where “the optical sensor outputs data that is not measured by the sensor,” the POSA would have understood the plain meaning of “one or more signals” to be “data that is actually acquired with the optical sensor.” *Id.* at 18–20.

We acknowledge that the specification describes embodiments in which it is the optical sensor that acquires the signal that responds to the intensity of the light. We further acknowledge that the specification does not describe embodiments where a structure other than the optical sensor acquires a signal that responds to the intensity of the light. However, this does not justify restricting otherwise broad claim language to the embodiments disclosed in the specification. *Unwired Planet LLC v. Apple Inc.*, 829 F.3d 1353, 1359 (“[W]e have repeatedly held that it is ‘not enough that the only embodiments, or all of the embodiments, contain a particular limitation’ to limit claims beyond their plain meaning.” (citing *Thorner v. Sony Comput. Ent. Am. LLC*, 669 F.3d 1362, 1366 (Fed. Cir. 2012))).

Finally, we consider extrinsic evidence. Patent Owner’s Response cites the testimony of Dr. Duckworth in support of its proposed construction. PO Resp. 19–20 (citing Ex. 2037 ¶¶ 123–124). But this testimony simply provides Dr. Duckworth’s interpretation of the specification. Patent Owner’s Sur-reply additionally cites portions of Dr. Duckworth’s deposition testimony. PO Sur-reply 1 (citing Ex. 1087, 22:17–23:17, 71:21–72:8, 72:2–73:9, 94:3–14, 101:3–21). But this testimony does not provide persuasive reasons why we should adopt Patent Owner’s proposed construction. Ex. 1087, 22:17–23:17 (discussing the signal output by the

inventor's prototype), 71:21–72:8 (opining on the scope/application of Patent Owner's proposed construction), 72:2–73:9 (discussing application of Patent Owner's proposed construction), 94:3–14 (opining on the application of Patent Owner's proposed construction to Mendelson),¹² 101:3–21 (discussing application of Patent Owner's proposed construction to Mendelson).

In sum, we find that neither the intrinsic nor the extrinsic evidence identified by Patent Owner provides reason to limit “one or more signals” to one or more signals “actually acquired with the optical sensor.”

Patent Owner argues that we should adopt its proposed construction because Petitioner never articulates its own construction. PO Sur-reply 2. We disagree. The absence of a competing construction does not justify adopting a construction that we find is not supported by the evidence of record. Accordingly, we reject Patent Owner's proposal that we construe the phrase “one or more signals responsive to light” in claims 1 and 13 to mean “data that is actually acquired with the optical sensor.”

Patent Owner asserts that, in the Delaware Litigation, Petitioner argued that “one or more signals” means “raw detected signal(s)” but here, “contradicts its district court construction by arguing that Mendelson's Receiver Module—which does not receive ‘raw detected signals’—still satisfies the ‘one or more signals’ limitation.” PO Resp 15. According to

¹² The testimony at Exhibit 1087, lines 94:4–14 reflects Dr. Duckworth's attempt to get the questioner to clarify a question and cuts off mid-response. This citation, thus, appears to be a typographical error. We understand this citation to refer to the testimony at 94:4–95:14.

Patent Owner, Petitioner, thus, did not satisfy its burden to explain “how the construed claim is unpatentable.” *Id.* at 15–16 (quoting 37 C.F.R. § 104(b)(4)). In addition, Patent Owner argues that Petitioner failed to comply with its duty of candor and good faith by failing to inform the Board about its claim construction in the Delaware Litigation. *Id.* at 16 (citing 37 C.F.R. § 42.11(a)). Patent Owner contends that this is important because, under Petitioner’s claim construction in the Delaware Litigation, Petitioner “could not argue that the claims are unpatentable.” We address Patent Owner’s arguments regarding Petitioner’s alleged inconsistent positions in connection with our discussion of the application of the cited art to the claims. *See infra* § II.E.4.

Other than to the extent our rejection of Patent Owner’s claim plain meaning gloss constitutes a claim construction, we determine that no terms require express construction. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” (alteration in original) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

D. Overview of Asserted Prior Art Relevant to Disputed Issues

1. Mendelson

Mendelson is a paper entitled “A Wearable Reflectance Pulse Oximeter for Remote Physical Monitoring.” Ex. 1011, 912.¹³ It bears a

¹³ All citations in this Decision are to the native pagination rather than to the page numbering added by the parties.

header indicating that it was presented at an IEEE conference held in New York City on August 30–September 3, 2006. *Id.* Petitioner contends that Mendelson is prior art under pre-AIA 35 U.S.C. § 102(b). Pet. 2. Mendelson discloses a wearable pulse oximeter system consisting of three units: 1) a “Sensor Module,” 2) a “Receiver Module,” and 3) a “PDA [personal digital assistant].” Ex. 1011, 913.

Figure 2 of Mendelson is reproduced below. *Id.*

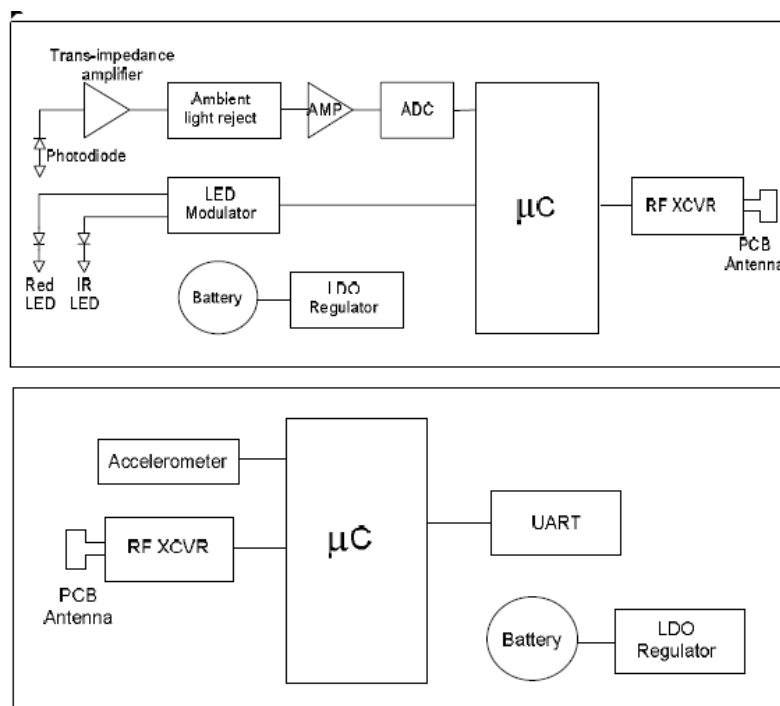


Figure 2 shows a “[s]ystem block diagram of [Mendelson’s] wearable, wireless, pulse oximeter” with the “Sensor Module” shown at top and the “Receiver Module” shown at bottom. The Sensor Module comprises, among other things, two LEDs and a photodiode as well as “analog signal processing circuitry, ADC, an embedded microcontroller [μC], and an RF transceiver [RF XCVR].” *Id.* “The Receiver Module contains an embedded microcontroller [μC], RF transceiver for communicating with the Sensor

Module [RF XCVR], and a Universal Asynchronous Receive Transmit (UART).” *Id.*

Mendelson discloses that “[t]he data processed by the Receiver Module can be transmitted wirelessly to a PDA,” which “can monitor multiple wearable pulse oximeters simultaneously and allows medics to collect vital physiological information to enhance their ability to extend more effective care to those with the most urgent needs.” *Id.* Figure 3 of Mendelson is reproduced below. *Id.* at 914.



Fig. 3. Sample PDA Graphical User Interface (GUI).

Figure 3 shows a “Sample PDA Graphical User Interface (GUI),” which displays, among other things, SpO₂. *Id.*

2. D’Angelo

D’Angelo is a paper presented at an Institute of Electrical and Electronics Engineers (“IEEE”) conference held in Boston, Massachusetts on August 30–September 3, 2011. Ex. 1007, 1528. Petitioner contends that

D’Angelo is prior art under pre-AIA 35 U.S.C. § 102(b). Pet. 3.¹⁴

D’Angelo describes a “new concept for interfacing sensor network nodes (motes) and smartphones,” and discloses a system that “allows receiving and storing data continuously using a mote and visualizing or sending it on the go using the smartphone as user interface only when desired.” Ex. 1007, 1528.

D’Angelo describes using “a dedicated device, called management device, which is part of the sensor network used to acquire health information and a smartphone.” *Id.* at 1529. Using the Apple iPhone as a smartphone, D’Angelo’s system transfers the data stored inside the management device to the iPhone by the iPhone application via the serial interface. *Id.* at 1530. D’Angelo discloses that the charging pin of its management device may be connected to “the smartphone’s power output pin . . . , allowing [the smartphone] to read out the management device with the smartphone even when its battery is empty.” *Id.*

3. Goldsmith

Goldsmith is a U.S. Patent Application, published on April 26, 2007. Ex. 1009. Petitioner asserts that Goldsmith is prior art under 35 U.S.C. § 102(b). Pet. 3. Goldsmith discloses “[a]n infusion system that includes a watch controller device and a communication system to transmit the communications from the watch controller device to an infusion device pump that controls delivery of fluids to the user’s body.” Ex. 1009, code

¹⁴ We discuss the parties’ dispute on whether D’Angelo constitutes prior art *infra* § II.F.1.

(57). Goldsmith’s controller device can used “with any number of therapy/diagnostic devices.” *Id.* ¶ 82. It can be used with “measurement devices” that “determine the concentration levels, or quantities of other characteristics . . . such as . . . oxygen.” *Id.* ¶ 38. And it includes a display that can be used to display data “received directly from a sensor transmitter on the patient’s skin.” *Id.* ¶ 87.

E. Anticipation by and/or Obviousness over Mendelson

Petitioner asserts that claims 13, 15, 18, and 19 are anticipated by, and/or would have been obvious over, Mendelson, and sets forth an element-by-element comparison of the challenged claims to the asserted art. Pet. 9–21. Other than as discussed below, Patent Owner does not challenge Petitioner’s showing for any of the limitations of claims 13, 15, 18, and 19. As to the unchallenged claim limitations, we have reviewed the evidence and arguments of record and find that Petitioner has shown, by a preponderance of the evidence, that they are disclosed by Mendelson for the reasons set forth in the Petition.

Turning to the disputed limitations, Patent Owner argues that Mendelson does not disclose or suggest “outputting, from an optical sensor[,] . . . one or more signals” and, “via a processing board[,] . . . receiving said one or more signals from the optical sensor,” as recited in claim 13. PO Resp. 17–26. We consider the evidence and arguments relating to these disputed limitations below. We begin by applying the claim language to Mendelson. We then consider Patent Owner’s argument that Mendelson’s signal does not meet the “one or more signals” language because it is an average of multiple signals. Next, we consider Patent

Owner's argument that Mendelson's signals do not meet the claim language because Mendelson converts its signals from an analog signal to a digital signal. We then consider Patent Owner's argument that Petitioner has taken inconsistent positions here and in the Delaware Litigation. Finally, we consider a number of other arguments Patent Owner raises. After considering the arguments and evidence of record, we conclude that Petitioner has established by a preponderance of the evidence that Mendelson discloses the disputed limitations. Our reasoning is set forth below.

1. Application of "one or more signals" to Mendelson

Petitioner identifies Mendelson's "Sensor Module" as corresponding to the "optical sensor" recited in claim 13. Pet. 10–11. As discussed *supra* § II.D.1, the Sensor Module comprises, among other things, two LEDs and a photodiode as well as "analog signal processing circuitry, ADC, an embedded microcontroller [μ C], and an RF transceiver [RF XCVR]." Ex. 1011, 913. In Mendelson's device, light emitted by the Sensor Module's LEDs is reflected off a user's forehead and detected by the photodiode. *Id.* at 912 (disclosing that "in reflection pulse oximetry, the LEDs and PD [photodiode] are both mounted side-by-side on the same planar substrate"), 913 (disclosing a "forehead-based reflectance pulse oximeter"); Ex. 1003 ¶¶ 53–56 (testimony of Dr. Kenny describing Mendelson's system). According to Mendelson, the Sensor Module transmits the information measured by the photodiode to a Receiver Module.

Petitioner identifies Mendelson's "Receiver Module" as corresponding to the "processing board" recited in claim 13. Pet. 10–11. As

discussed *supra* § II.D.1, Mendelson’s Receiver Module contains “an embedded microcontroller [μC], RF transceiver for communicating with the Sensor Module [RF XCVR], and a Universal Asynchronous Receive Transmit (UART).” Ex. 1011, 913. Mendelson’s Receiver Module converts the signal it receives from the Sensor Module to red and infrared signals. *Id.* at 914.

We agree with Petitioner that the signal output by Mendelson’s Sensor Module and received by its Receiver Module meets the requirements of the disputed claim limitations. As discussed *supra* § II.C, the language of claim 13 places three requirements on the “one or more signals” language: 1) it must be output by an optical sensor, 2) it must be responsive to light from a light source, and 3) it must be responsive to oxygen saturation. The signal output by Mendelson’s Sensor Module and received by its Receiver Module meets all three of these requirements. Ex. 1011, 913–914; Ex. 1003 ¶¶ 53–56.

Patent Owner does not challenge that the signal output by Mendelson’s Sensor Module and received by its Receiver Module meets any of these requirements. PO Resp. 18–26 (challenging Petitioner’s showing for “one or more signals” limitations, but not making these arguments). Instead, Patent Owner argues that the signal is not the “data that is actually acquired with the optical sensor.” *Id.* at 21. But Mendelson unequivocally states that the information transmitted by the Sensor Module—i.e., the structure Petitioner identifies as corresponding to the claimed “optical sensor”—is “acquired by the Sensor Module.” Ex. 1011, 913 (“*The information acquired by the Sensor Module* is transmitted wirelessly via an

RF link over a short range to a body-worn Receiver Module.” (emphasis added)). And Mendelson further states that Mendelson’s Receiver Module—i.e., the structure Petitioner identifies as corresponding to the claimed processing board—receives signals “acquired by the Sensor Module.” *Id.* (“***Signals acquired by the Sensor Module*** are received by the embedded microcontroller [of the Receiver Module] which synchronously converts the corresponding PD output to R and IR PPG signals.” (emphasis added)). Thus, even under Patent Owner’s proposed claim construction, the signal output by Mendelson’s Sensor Module and received by its Receiver Module is “data actually acquired with the optical sensor.”

2. Patent Owner’s averaging of signals argument

Patent Owner argues that Mendelson’s Sensor Module does not output data actually acquired with the Sensor Module because the data it outputs is an average of multiple samples. PO Resp. 21 (“Mendelson’s Sensor Module does not output data actually acquired with the Sensor Module. Instead, the Sensor Module computes and outputs average red and infrared PPG samples to the Receiver Module.” (internal citation omitted)).

This argument is not persuasive because even if the POSA would have understood the signal output by Mendelson’s Sensor Module to have been averaged it is still an electronic transmission that is 1) output by an optical sensor, 2) responsive to light from a light source, and 3) responsive to oxygen saturation. Put another way, it still meets all of the requirements of the claim.

In addition, Patent Owner’s signal averaging argument is not persuasive because the evidence does not support that the POSA would have

understood Mendelson to disclose averaging signals. We do not find in Mendelson any discussion of summing or averaging signals. *See generally* Ex. 1011, 912–915. Our inability to find a teaching of averaging in Mendelson is consistent with the testimony of Drs. Kenny and Duckworth. Dr. Kenny testifies that “there is simply no disclosure in Mendelson itself of any summing or averaging of collected signals.” Ex. 1083 ¶ 23. And in his deposition, Dr. Duckworth was unable to identify any express disclosure of averaging in Mendelson. *See* Ex. 1087, 103:9–114:11 (confirming that certain aspects of his declaration testimony relating to averaging of signals are not discussed in Mendelson). Accordingly, Mendelson, standing alone, does not support that the POSA would have understood Mendelson’s Sensor Module to have output averaged signals

Dr. Duckworth opines that the POSA would have understood Mendelson to average signals. Ex. 2037 ¶ 126. In doing so, Dr. Duckworth provides a detailed account of exactly how Mendelson’s system worked. *Id.* ¶¶ 125–129. As an “author of the Mendelson paper and someone who was integral to the development of the system it describes” (*id.* ¶ 125), Dr. Duckworth is in a position to know how Mendelson’s system worked. But as Petitioner points out, it is “not relying on the Mendelson system as prior art but rather the Mendelson paper as printed publication prior art.” Reply 13. This distinction is important because Dr. Duckworth does not provide persuasive testimony explaining *why* the POSA would have understand Mendelson to disclose averaging of samples. Ex. 2037 ¶¶ 125–129. Absent such rationale, we give Dr. Duckworth’s testimony on this issue little weight. *Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9 at 15

(PTAB Aug. 24, 2022) (Decision Denying Institution) (precedential) (finding that conclusory testimony that “does not cite to any additional supporting evidence or provide any technical reasoning to support [that testimony] . . . is entitled to little weight”); *see also* 37 C.F.R. § 42.65(a) (“Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.”).

In his deposition, Dr. Duckworth testified that a POSA would have known that Mendelson used signal averaging because it is “a commonly undisturbed technique for digital signal averaging to try to reduce the effects of noise.” Ex. 1087, 105:4–19. But even crediting that signal averaging is a common technique, Patent Owner does not identify any evidence from which we can determine how common a technique it is. PO Sur-reply 6 (citing Dr. Duckworth’s testimony that averaging was a commonly used technique, but not identifying evidence to support or quantify this assertion). Absent such information, Dr. Duckworth’s testimony that averaging is a “common[] . . . technique” provides scant support for Patent Owner’s assertion that a POSA would have understood Mendelson to disclose averaging signals.

Moreover, Dr. Kenny testifies that Dr. Duckworth’s testimony that the POSA would have known that “signal averaging” would have been a part of Mendelson’s processing (Ex. 1087, 105:1–3) relies on a “particular series of assumptions and decisions that are unrelated to the explicit disclosure of Mendelson” (Ex. 1083 ¶¶ 26–27). According to Dr. Kenny, “there is no reason a [POSA] would assume distal signal averaging to be required at all.” *Id.* ¶ 28. Dr. Kenny explains that Figure 4 of Mendelson “shows very clean

measurements of SpO₂ and HR” with a “very high S/N ratio.” *Id.* ¶ 29. Therefore, Dr. Kenny opines, the POSA “would not think that the successful result shown in the figure would be dependent on an undisclosed system . . . or that this would necessarily be achieved by implementation of a distal signal averaging with only 5 samples.” *Id.* We credit this testimony.

Patent Owner points to Dr. Kenny’s testimony that “PPG sample averaging ‘would not have been inherent’ in or ‘the only obvious implementation’ for Mendelson.” PO Sur-reply, 6. Patent Owner then asserts that even if these statements are true, “that fails to show that a [POSA] would not have understood Mendelson’s Sensor Module employed this undisputedly common noise reduction technique.” *Id.* But even if Dr. Kenny’s testimony does not prove that the POSA would have understood Mendelson not to disclose averaging, it does identify significant deficiencies in the only evidence Patent Owner identified supporting that Mendelson does disclose averaging—i.e., the testimony of Dr. Duckworth. Ex. 1083 ¶¶ 22–31. Moreover, even without Dr. Kenny’s testimony, the preponderance of the evidence does not support that the POSA would have understood Mendelson to average signals. Mendelson itself does not disclose this. And, for the reasons discussed above, we give the testimony of Dr. Duckworth on this issue little weight.

3. Patent Owner’s analog-to-digital conversion argument

In its Sur-reply, Patent Owner argues that “the analog signal actually acquired with Mendelson’s optical sensor is not what is transmitted by Mendelson’s Sensor Module or received by its Receiver Module.” PO Sur-reply 3. Patent Owner acknowledges that “Mendelson’s optical sensor, a

photodiode, outputs an analog signal proportional to light it detects,” but argues that “that analog signal is *never* transmitted by Mendelson’s Sensor Module.” *Id.* As support, Patent Owner points out that, after it is output by the photodiode, Mendelson’s analog signal is “converted into digital information by an analog-to-digital converter (‘ADC’), processed by a microcontroller (‘ μ C’), and then used by the RF transceiver (‘RF XCVR’) to generate packets of information that are then transmitted to the Receiver Module.” *Id.*

Petitioner contends that this is new argument, explaining that Patent Owner’s Response relies only on the argument that Mendelson outputs an average of red and infrared signals to show that Mendelson does not output or receive “one or more signals responsive to light.” Pet. MTS 2. Petitioner acknowledges that Patent Owner’s Response describes Mendelson’s pre-processing steps, including its use of analog-to-digital conversion, but argues that Patent Owner never identified analog-to-digital conversion as a reason why Mendelson did not meet the “one or more signals” limitations of claim 13. *Id.* We agree.

Patent Owner’s Response does not identify Mendelson’s analog-to-digital conversion step, or any pre-processing step, as a reason why Mendelson does not meet the “one or more signals” limitations. To be sure, Patent Owner describes the various pre-processing steps that occur in Mendelson, but Patent Owner does not identify these as a basis for distinguishing claim 13 over what is disclosed in Mendelson. For example, after describing Mendelson’s pre-processing steps without discussing their relation to claim 13, Patent Owner states:

As Dr. Duckworth explains, and a POSITA would have understood, Mendelson's Sensor Module does not output data actually acquired with the Sensor Module. EX2037 ¶126.

Instead, the Sensor Module computes and outputs ***average*** red and infrared PPG samples to the Receiver Module.

PO Resp. 20–21 (first emphasis added). The use of the word “instead” signals that the language that follows—describing average samples—is different from and distinguishable over the language that precedes—i.e. “data actually acquired with the Sensor Module.” Thus, with this statement, Patent Owner relies on averaging of samples as the reason why Mendelson does not meet the “one or more signals” claim language.

Similarly, after describing in detail the process by which it alleges Mendelson averages signals, Patent Owner clearly identifies signal averaging as the reason why Mendelson does not anticipate claim 13. It states:

[A]verage red and infrared PPG samples are the only information that Mendelson's Sensor Module outputs to its Receiver Module. EX2037 ¶129. And those output average PPG samples are ***not*** data actually acquired with the optical sensor. *Id.* Instead, they are values computed using acquired data. *Id.* Thus, a POSITA would have understood that Mendelson does not disclose an optical sensor outputting, or processing board receiving, “one or more signals responsive to light” under the plain meaning of that phrase. *Id.*

Id. at 23. Here again, Patent Owner unambiguously identifies “average red and infrared . . . samples” as the feature that distinguishes Mendelson from the claimed “one or more signals” (under its proposed claim construction, i.e., “data actually acquired with the optical sensor”).

Even when faulting Petitioner for not addressing Mendelson’s pre-processing steps, Patent Owner relies on average signals, not pre-processing steps, as the reason why Mendelson does not anticipate:

Apple and its expert never address, much less show, what happens to the Sensor Module’s photodiode signal before any “information” is sent to the Receiver Module. *See generally* Pet.; EX1003. Despite conceding that the Sensor Module has “signal processing circuitry” (Pet. 6), Apple ignores that circuitry and its microcontroller. Pet. 10-11, 44. ***That microcontroller results in the Sensor Module outputting average PPG samples*** to the Receiver Module, not any data actually acquired from using the sensor, as explained above. EX2037 ¶130. ***Thus, Apple fails to show that Mendelson discloses these limitations.***

Id. at 23 (emphasis added). Here too, Patent Owner relies not on the signal processing circuitry, which includes the analog-to-digital converter, but on the fact that the circuitry “results in the Sensor Module outputting average PPG samples.” *Id.*

Finally, Patent Owner’s Response points to the testimony of Petitioner’s expert in the Delaware Litigation that “the signal from a photodiode is no longer the claimed ‘one or more signals’ once it is ‘converted, amplified, filtered, or otherwise processed.’” *Id.* at 24. But in doing so, Patent Owner does not argue that the claims require an unprocessed signal. *Id.* Indeed, Patent Owner pointedly avoids adopting any portion of Petitioner’s expert’s testimony from the Delaware Litigation in this proceeding, instead arguing only that the inconsistencies between Petitioner’s position in this proceeding and the Delaware Litigation demonstrate that Mendelson does not anticipate. *Id.* at 24–25 (citing Ex.

2037 ¶ 131 (Dr. Duckworth testifying, in regard to this same alleged inconsistency, “[r]egardless, it is my opinion that Apple fails to show that Mendelson discloses an optical sensor that outputs, or a processing board that receives, ‘one or more signals responsive to light’”).

Our regulations require the a “sur-reply may only respond to arguments raised in the corresponding reply.” 37 C.F.R. § 42.23(b); Consolidated Trial Practice Guide November 2019, 74 (“‘Respond,’ in the context of 37 C.F.R. § 42.23(b), does not mean proceed in a new direction with a new approach as compared to the positions taken in a prior filing.”). We therefore decline to consider Patent Owner’s belatedly presented argument that Mendelson does not meet the “one or more signals” limitations because Mendelson’s Sensor Module converts the analog signal produced by its photodiode to a digital signal before sending it to Mendelson’s Receiver Module.

Even if we were to consider Patent Owner’s new argument, we would not find it persuasive. There does not appear to be any dispute that the signal output by Mendelson’s photodiode meets the claim requirement for “one or more signals.” PO Resp. 20 (explaining that Mendelson’s “Sensor Module has a ‘photodiode’ that outputs a signal responsive to the detected light”); PO MTS Opp. 2 (explaining that the Patent Owner Response “identifies the photodiode as the component that ‘outputs a signal responsive to the detected light’”). And, regardless of any pre-processing steps undertaken by Mendelson’s Sensor Module, including analog-to-digital conversion, there can be no dispute that the signal received by Mendelson’s Receiver Module includes the information output by the photodiode.

Indeed, without this information, Mendelson's PDA, which relies on information transmitted by Mendelson's Receiver Module, would be unable to display SpO₂ values. Ex. 1011, 913 (teaching that Mendelson's Receiver Module transmits wirelessly to a PDA), 914 (teaching that Mendelson's PDA displays SpO₂ values and explaining that "[t]he stream of data received from the wearable unit is distributed to various locations on the PDA's graphical display").

It may be that, as Patent Owner asserts, the information output by Mendelson's photodiode is converted from analog to digital (and amplified and filtered) before it is received by Mendelson's Receiver Module. The evidence, however, does not support that such pre-processing steps distinguish the claimed "one or more signals" over the signal transmitted in Mendelson. Indeed, Mendelson itself describes the information output by the Sensor Module to the Receiver Module, after it has undergone analog-to-digital conversion (and amplification and filtration), as the output of the photodiode. Ex. 1011, 913 (explaining that the "Receiver Module contains an embedded microcontroller" and that "[s]ignals acquired by the Sensor Module are received by the embedded microcontroller which synchronously converts the *corresponding PD [photodiode] output* to R and IR PPG signals" (emphasis added)). Thus, Mendelson considers the signal output by its Sensor Module and received by its Receiver Module to include the output of the photodiode. And, as discussed above, such output meets the three requirements that the language of claim 13 places on the "one or more signals" language: it is output by the optical sensor, responsive to light from a light source, and responsive to oxygen saturation. Accordingly, the

evidence supports that Mendelson discloses outputting and receiving “one or more signals,” as required by claim 13, even considering Patent Owner’s new argument.

4. Patent Owner’s inconsistent position argument

Patent Owner faults Petitioner for “the inconsistency between the opinions of its expert here and its expert in the Delaware Litigation.” PO Resp 24. In particular, Patent Owner contends that Petitioner’s “expert in Delaware opines that the signal from a photodiode is no longer the claimed ‘one or more signals’ once it is ‘converted, amplified, filtered, or otherwise processed” but Petitioner’s expert in this proceeding did not apply Petitioner’s Delaware construction. *Id.*

We recognize that, in the Delaware Litigation, Petitioner asserted that “one or more signals” means “raw detected signals.” Ex. 2029, 35–38. However, as discussed above, the record supports that Mendelson’s Sensor Module outputs and its Receiver Module receives “one or more signals” under the claim construction positions advanced by both parties in this proceeding—the plain and ordinary meaning position advanced by Petitioner and the “actually acquired by the optical sensor” position advanced Patent Owner.

As to Petitioner’s proposed claim construction in the Delaware Litigation, the district court has not yet construed the claims. And neither party asserts that the construction advanced by Petitioner in the Delaware Litigation is correct. Pet. 11 (asserting that Mendelson’s disclosure of outputting one or more signals “corresponds to [Patent Owner’s] apparent interpretation of this claim element”); PO Resp. 14–16 (discussing, but not

advocating for, Petitioner’s claim construction in the Delaware Litigation), 18–20 (arguing that the plain meaning of “one or more signals” is “data actually acquired with the optical sensor”), 24 (discussing, but not advocating for, Petitioner’s claim construction in the Delaware Litigation). Indeed, in the Delaware Litigation, Patent Owner asserted that Petitioner’s proposed “raw detected signal” construction was wrong and that it was “common for sensors to perform preprocessing on signals.” Ex. 2029, 38–39. Under these circumstances, we do not fault Petitioner for declining to advance a claim construction neither party here asserts is correct. *See W. Digit. Corp. v. SPEX Techs., Inc.*, IPR2018-00084, Paper 14 at 10–11 (“Petitioner’s statement that its Petition ‘is *based on* the claim constructions urged by Patent Owner’ in the related District Court litigation . . . suffices to identify claim constructions Petitioner is adopting . . . in compliance with [37 C.F.R.] § 104(b)(3).”); *Philip Morris Prods., S.A. v. RAI Strategic Holdings, Inc.*, IPR2020-00921, Paper 13 at 42–44 (“Numerous decisions have held that [37 C.F.R. § 42.104(b)(3)] does not . . . prohibit a petitioner from relying on claim constructions that it believes are incorrect.”).

5. Other arguments raised by Patent Owner

Patent Owner argues that Petitioner improperly relies on a comparison to the inventor’s testimony about how the claimed optical sensor works. PO Sur-reply 4. This argument is moot because our analysis does not rely on this testimony.

Patent Owner argues that the inventor testified that, unlike Mendelson’s Sensor Module, which “processes the acquired photodiode signal *before* outputting information to the alleged processing board

(Receiver Module),” Patent Owner’s “prototype sensor directly outputs the data acquired with its detector to a separate processing board via a cable, with all processing occurring after the data reaches the processing board.” *Id.* at 5 (emphasis omitted). We do not find this argument persuasive because the proper comparison is between Mendelson and claim 13, not Mendelson and Patent Owner’s prototype.

Patent Owner fault’s Petitioner’s statement in its Reply that “Mendelson’s Sensor Module outputs ‘information acquired by the Sensor Module’ representing the data output by the photodetector [i.e., optical sensor],” arguing that Petitioner “never explains its basis for reading the claim to cover data ‘representing’ what was acquired. *Id.* 5 (citing Pet. Reply 9) (alteration by Patent Owner)). We do not find this argument persuasive because, as pointed out by Petitioner, “Mendelson describes that “[*s*]ignals acquired by the Sensor Module are received by the embedded microcontroller [of the Receiver Module] which synchronously converts the corresponding PD output to R and IR PPG signals.” Pet. Reply 8 (citing Ex. 1011, 913) (alterations by Petitioner). Petitioner’s use of the word “representing” does not negate this disclosure, and we do not read it as advocating for a different interpretation of the “one or more signals” claim language.

6. Conclusion with respect to Anticipation

In summary, the preponderance of the evidence supports that Mendelson discloses an optical sensor that outputs “one or more signals” and a processing board that receives the “one or more signals.” Other than as discussed above, Patent Owner does not challenge Petitioner’s assertions

that claims 13, 15, 18, and 19 are anticipated by Mendelson. As discussed above, we have reviewed the evidence and arguments of record and find that Petitioner has shown, by a preponderance of the evidence, that the remaining, unchallenged limitations of claims 13, 15, 18, and 19 are disclosed by Mendelson. Accordingly, the preponderance of the evidence supports that Mendelson anticipates claims 13, 15, 18, and 19.

F. Obviousness over the Combination of Mendelson and D'Angelo

Petitioner asserts that claims 1, 2, 5, 7, 9, 12–15, and 17–19 would have been obvious over the combination of Mendelson and D'Angelo and sets forth an element-by-element comparison of the challenged claims to the asserted art. Pet. 37–55. Patent Owner argues that Mendelson does not meet the requirement of claim 1 for an “optical sensor” that is “configured to output one or more signals responsive to light” and a “processing board” that is “configured to: receive, from an optical sensor . . . said one or more signals responsive to light.” PO Resp. 17–26. This argument is the same as the argument discussed *supra* § III.E for the corresponding limitations of claim 13, and we do not find it persuasive for the reasons already discussed. Other than as discussed below, Patent Owner does not challenge Petitioner’s showing for any of the limitations of claims 1, 2, 5, 7, 9, 12–15, and 17–19. As to these unchallenged limitations, we have reviewed the evidence and arguments of record and find that Petitioner has shown, by a preponderance of the evidence, that they are disclosed by the combination of Mendelson and D'Angelo for the reasons set forth in the Petition.

Turning to the issues in dispute, Patent Owner presents two arguments specific to this ground. First, Patent Owner argues that Petitioner has not

carried its burden to establish that D’Angelo constitutes prior art to the ’507 patent. Second, Patent Owner argues that Petitioner has not carried its burden to establish that a POSA would have been motivated to modify Mendelson’s Receiver Module to draw power from a smartphone based on the teachings of D’Angelo, as proposed in the Petition. *See id.* 26–44. After considering the arguments and evidence in this proceeding, we conclude that Petitioner has established by a preponderance of the evidence that D’Angelo is prior art to the ’507 patent and that a POSA would have been motivated to modify Mendelson to draw power a smartphone in the manner set forth in the Petition. Our reasoning on these disputed issues is set forth below.

1. Whether D’Angelo is prior art to the ’507 patent

The Petition asserts that D’Angelo is prior art under pre-AIA 35 U.S.C. § 102(b) because it was publicly available on or shortly after August 30, 2011—September 3, 2011, the dates of a conference held by the Institute of Electrical and Electronics Engineers (“IEEE”). Pet. 2. In its Reply, Petitioner asserts, more specifically, that D’Angelo was “made available no later than the last day of the conference”—i.e., September 3, 2011. Pet. Reply 1–2 (emphasis omitted). Patent Owner disputes this, asserting that D’Angelo was not publicly accessible until it was added to IEEE’s digital library, IEEE Xplore, on December 1, 2011. PO Resp. 31. Based on this December 1, 2011 date of public availability, Patent Owner asserts that D’Angelo is no longer § 102(b) prior art, and attempts to swear behind D’Angelo, asserting that “the inventions recited in Claims 1 and 13 were reduced to practice by August 31, 2011,” months “before the reference date of D’Angelo.” *Id.* at 32–33. We discuss the parties’ argument and evidence

below. We conclude that D’Angelo is prior art under 35 U.S.C. § 102(b) and that, even if it were not § 102(b) prior art, Patent Owner has not sufficiently corroborated its reduction to practice to antedate D’Angelo based on a December 1, 2011 publication date.

a) Whether D’Angelo is § 102(b) prior art

“Because there are many ways in which a reference may be disseminated to the interested public, ‘public accessibility’ has been called the touch-stone in determining whether a reference constitutes a ‘printed publication.’” *Jazz Pharm., Inc. v. Amneal Pharm., LLC*, 895 F.3d 1347, 1356 (Fed. Cir. 2018) (quoting *In re Hall*, 781 F.2d 897, 898–99 (Fed. Cir. 1986)). A reference is considered publicly accessible if it was “disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art, exercising reasonable diligence, can locate it.” *Id.* at 1355–56 (citing *In re Wyer*, 655 F.2d 221, 226 (CCPA 1981)). Under at least some circumstances, a reference may be a printed publication under § 102(b) if it was “displayed to the public,” even if it “was not later indexed in any database, catalog, or library.” *In re Klopfenstein*, 380 F.3d 1345, 1350 (Fed. Cir. 2004). There are several factors relating to whether such a display is sufficient to constitute a printed publication, including “the length of time the display was exhibited, the expertise of the target audience, the existence (or lack thereof) of reasonable expectations that the material displayed would not be copied, and the simplicity or ease with which the material displayed could have been copied.” *Id.* In addition, distribution of a reference at a professional conference may, under at least some circumstances, constitute sufficient

dissemination to show public accessibility. *Nobel Biocare Servs. AG v. Intradent USA, Inc.*, 903 F.3d 1365, 1375–80 (Fed. Cir. 2018); *Medtronic, Inc. v. Barry*, 891 F.3d 1368, 1380–83 (Fed. Cir. 2018).

The D’Angelo reference includes the following header:

33rd Annual International Conference of the IEEE EMBS¹⁵
Boston, Massachusetts USA, August 30 – September 3, 2011

Ex. 1007, 1528. The dispute between the parties focuses on whether D’Angelo was made available to attendees of the IEEE EMBS conference identified in this header and, if so, what effect that has.¹⁶ Accordingly, we begin our analysis by considering the conference.

The conference at issue was held by the IEEE. *Id.* The IEEE is the “largest technological professional association on earth. It’s a professional association for electrical engineers, computer scientists and technologists who revolve around those core areas.” Ex. 2057, 34:8–12. The IEEE has “[w]ell over 400,000 members.” *Id.* at 34:12–13.

Dr. Kenny testifies that, in his experience as an IEEE member and “regular attendee of various IEEE conferences,” “practitioners in the area of engineering in medicine and biology (which includes the subfield of physiological monitoring) would have been aware of and attended

¹⁵ EMBS refers to the Engineering in Medicine and Biology Society. Ex. 1012, App’x. MENDELSON02.

¹⁶ Petitioner also presents evidence that D’Angelo was made available through publication of the *Proceedings of the IEEE EMBS Annual Conference*. See Ex. 1012 ¶¶ 12–22 (testimony of Ms. Munford). Because it is dispositive, we focus on the evidence that D’Angelo was made available to conference attendees.

conferences such as the annual IEEE EMBS International Conference” identified in the header of D’Angelo. Ex. 1003 ¶ 114 (cited at Pet. 2).¹⁷ This testimony is consistent with that of June Ann Munford, a librarian, who testifies, based on advertisements she obtained using the Internet Archive, that “the IEEE EMBS was advertising this conference months before it took place.” Ex. 1012 ¶¶ 14–17, Apps. MENDELSON02, DANDELO02. Patent Owner points out that Dr. Kenny and Ms. Munford “never attended the 2011 IEEE EMBS conference and thus lack personal knowledge of what occurred there.” PO Resp. 32 (citing Ex. 2044, 38:19–45:18). But this does not detract from their testimony as neither Dr. Kenny nor Ms. Munford relies on personal attendance as a basis for their testimony. Accordingly, we credit the testimony of Dr. Kenny and Ms. Munford on this issue and find that practitioners in the area of engineering in medicine and biology, including persons working in the field of physiological monitoring, would have been aware of and attended the August 30–September 3, 2011 IEEE EMBS conference. We further find that such persons would include persons meeting the definition of the POSA.

We next consider whether the D’Angelo reference would have been available to attendees during the time period when the conference was held. Petitioner provides the testimony of Gordon MacPherson, the Director, Board Governance & Policy Development at IEEE, who testifies that

¹⁷ The Petition cites paragraph 112 of Dr Kenny’s Declaration, which bears no relation to the public availability of D’Angelo. The correct citation appears to be to paragraph 114. We understand this to have been a harmless typographical error.

D’Angelo “was published in the 33rd Annual International Conference of the IEEE EMBS Boston, Massachusetts, USA, held on August 30-September 3, 2011” and that “[c]opies of the conference proceedings were made available no later than the last day of conference.” Ex. 1082 ¶ 11. When asked at his deposition, what the publication date meant for an IEEE paper, Mr. MacPherson explained that it referred to the date of the conference and that the IEEE’s general practice was to distribute publications on the first day of the conference. Specifically, Mr. MacPherson testified:

The date of publication for an IEEE conference paper would recognize as the first day that the -- that the content was made available to an interested audience.

So our business rule is that we recognize the first day of the conference as the publication date, and we recognize the last day of the conference as the last reasonable date at which those proceedings would have been typically made available to the attendees.

Generally they were given to attendees the first day of the conference. We consider that a best practice. There are some rare cases where they would be held until the last day of the conference.

Ex. 2057, 20:8–21:2. With respect to the D’Angelo reference, Mr. MacPherson testified it was “more likely than not” that it was made available on the last day of the conference and that he did not have a “reasonable doubt” that it was provided to attendees by the last day of the conference. *Id.* at 32:7–34:2.

Contrary to Mr. MacPherson’s testimony that conference papers are usually given to attendees on the first day of the conference, Patent Owner asserts that “the parties’ experts agree that IEEE conference proceedings are

usually made available sometime ‘*after*’ the conference.” PO Sur-reply 12. As support, Patent Owner cites the deposition testimony of Drs. Kenny and Duckworth. *Id.* (citing Ex. 2044, 45:19–47:10 (deposition testimony of Dr. Kenny); Ex. 1087, 78:22–79:6 (deposition testimony of Dr. Duckworth)). Patent Owner’s citation of Dr. Kenny’s testimony is inapposite because it is directed not to whether D’Angelo was made available to attendees at the 2011 IEEE EMBS conference, but to when references like D’Angelo were made available to persons who did not attend a conference. Ex. 2044, 46:2–6 (“A. . . . So this is a question about when the conference proceedings would be made available to people who did not attend the conference. So that’s the question you’re asking? Q. Yes.”).

Patent Owner’s citation of Dr. Duckworth’s testimony speaks more directly to the issue at hand. Dr. Duckworth testified, somewhat equivocally, that he did not think attendees of a 2006 IEEE EMBS conference received a collection of the conference proceedings at the conference. Ex. 1087, 78:22 (“Q. Did the attendees of the conference receive a collection of the conference proceedings while at the conference? A. I don’t recall. But, I don’t believe so. I believe the proceedings would have been made available some time after the conference.”). Patent Owner also cites the testimony of Dr. Duckworth that in his experience at IEEE conferences, papers are not available before conferences. PO Sur-reply 13. In this regard, Dr. Duckworth testified:

Q. In your experience at IEEE conferences, are the papers being presented at the conference made available to attendees before the conference?

A. No.

Q. Do you know why papers presented at IEEE conferences are not made available to attendees before the conference?

A. Well, in most cases authors are still revising them and right up to the conference and even after the conference, making changes and edits to their papers.

Ex. 1087, 142:3–14. Although this testimony provides support for Patent Owner’s position that conference papers, like D’Angelo, are not made available until after a conference, it appears to conflict with the testimony of Mr. MacPherson discussed above.¹⁸ To the extent the testimonies of Dr. Duckworth and Mr. MacPherson are at odds, we credit the testimony of Mr. MacPherson, someone with knowledge of how the IEEE operates and whose testimony is based on the customary practices of the IEEE, over that of an individual scientist, like Dr. Duckworth, testifying based on his recollection of an individual IEEE conference in 2006 and his perception of when authors finalize their papers. *See also* Ex. 2057, 25:11–26:9 (testimony of Mr. MacPherson explaining that his testimony that copies of the proceedings were made available by the last day of the proceedings is based on his “experience with IEEE and not any personal knowledge of [the 2011 IEEE EMBS] conference”); 21:9–13 (testimony of Mr. MacPherson agreeing that his testimony that copies of the proceedings were made available by the last day of the proceedings is based on an “IEEE business rule”).

¹⁸ Arguably, the testimony of Dr. Duckworth and Mr. MacPherson could be harmonized if Dr. Duckworth’s testimony were read narrowly as limited to the 2006 IEEE EMBS conference and to the issue of whether conference papers were available *before* IEEE conferences.

In addition to identifying the potentially conflicting testimony of Dr. Duckworth, Patent Owner provides several arguments as to why Mr. MacPherson's testimony should be given little weight. Patent Owner argues that "like Apple's other declarants, [Mr.] MacPherson did not attend the 2011 conference yet speculates about what occurred there." PO Sur-reply 13. Patent Owner further argues that Mr. MacPherson did "not recall handling the EMBS annual meeting" and had "virtually no personal knowledge of the conference." *Id.* at 13–14. These arguments are not persuasive because Mr. MacPherson does not rely on attendance at, or personal knowledge of, the 2011 IEEE EMBS conference as a basis for his testimony.

Patent Owner also seeks to undermine Mr. MacPherson's testimony by arguing that "[Mr.] MacPherson agreed IEEE's 'standard practice' is for a 'publication chair' to decide what gets distributed at the conference, but did not know who the 2011 conference's publication chair was or if they decided to distribute anything there." *Id.* at 14 (citing Ex. 1057, 24:17–28:3). This argument is not persuasive because the testimony that a publication chair decides what to distribute at an IEEE conference is consistent with Mr. MacPherson's testimony: that it is IEEE's "best practice" to distribute conference proceedings on the first day of a conference, that IEEE's "business rule" is to distribute conference proceedings by the last day of the conference, that it is more likely than not that the D'Angelo reference was made available on the last day of the conference, and that Mr. MacPherson does not have a reasonable doubt that the D'Angelo paper was provided by the last day of the 2011 IEEE EMBS

conference. Ex. 2057, 20:8–21:13, 25:11–26:5, 32:13–19, 33:11–34:3.

Simply put, the identity of the person making decisions on what to distribute, although introducing some potential for individual variation, does not change the general practices of the organization.

Patent Owner argues that Mr. MacPherson “did not know Hurricane Irene prevented several individuals from presenting, and had no knowledge of how the hurricane otherwise disrupted the conference.” PO Sur-reply 14 (citing Ex. 2057, 28:15–29:11). This argument is not supported by persuasive evidence. In the cited deposition testimony, Patent Owner’s counsel asked Mr. MacPherson: “Are you aware that Hurricane Irene made it impossible for several 2011 IEEE EMBS conference attendees to arrive in Boston in time for their presentation?” Mr. MacPherson responded, after objections including for lack of foundation, “I was not aware.” Ex. 2057, 28:15–29:11. But Patent Owner does not identify any evidentiary foundation for its counsel’s question. And even if we assume that the question is based in fact, it does not speak to the effect of the absence of a particular attendee on the availability of that attendees’ paper, particularly for papers, like D’Angelo, that have multiple authors. Ex. 1007 (identifying four authors).

In sum, we find that the preponderance of the evidence supports that D’Angelo was made available to attendees of the 2011 IEEE EMBS conference by the last day of the conference (i.e., September 3, 2011).

Attendees who received a copy of the D’Angelo reference would not have considered it confidential. D’Angelo is “the type of document intended for public dissemination and it bears no designations, such as ‘draft’ or

‘confidential,’ that might suggest it was not intended for public distribution.” *Nobel Biocare*, 903 F.3d at 1378; Ex. 1007. Further, Mr. MacPherson’s testimony that it was “published” and “made available” supports that it was not confidential. Ex. 1082 ¶ 11; *see also* Ex. 2044, 46:16–18 (testimony of Dr. Kenny that “[t]here’s no expectation that these conferences are confidential presentation of materials not to be forwarded beyond the attendees”).

To summarize, a preponderance of the evidence supports that practitioners, including persons meeting the definition of a POSA, would have been aware of and attended the IEEE EMBS conference. The evidence further supports that the D’Angelo reference would have been made available to attendees by September 3, 2011, the last day of the conference. And the evidence supports that attendees who received the D’Angelo reference would have been under no obligation of confidentiality with respect to the content of the D’Angelo reference. Accordingly, considering all of the evidence and argument of record, we find that D’Angelo was “disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art, exercising reasonable diligence, can locate it.” *Jazz Pharm.*, 895 F.3d at 1355–56. As such, D’Angelo qualifies as prior art under 35 U.S.C. § 102(b). *See Nobel Biocare*, 903 F.3d at 1365 (affirming the Board’s finding that a catalog distributed at a convention without confidentiality restrictions was a printed publication under pre-AIA § 102(b)); *Medtronic*, 891 F.3d at 1380–83 (summarizing cases and identifying factors to be considered in determining whether distribution of a video and slides at three meetings made them

printed publications within the meaning of 35 U.S.C. § 102(b)).

b) *Alternatively, whether Patent Owner has sufficiently corroborated that it reduced its invention to practice by August 31, 2011*

Patent Owner contends that “D’Angelo was not publicly accessible until **December 1, 2011**” and, thus, that D’Angelo does not qualify as prior art under 35 U.S.C. § 102(b). PO Resp. 28 (“D’Angelo was not published until it was ‘added to IEEE Xplore’ on December 1, 2011.”). On the premise that D’Angelo is no longer § 102(b) prior art, Patent Owner attempts to swear behind its priority date. Specifically, Patent Owner contends that the inventions of claims 1 and 13 were reduced to practice by August 31, 2011. *Id.* at 32–33. As support, Patent Owner cites the testimony of Dr. Duckworth, who cites the testimony of Bilal Muhsin, one of the inventors of the ’507 patent. *Id.* (citing Ex. 2037 ¶¶ 41–88 (which cites Ex. 2038 (the declaration of Mr. Muhsin))). Mr. Muhsin, in turn, cites as corroboration a Prototype Video (Ex. 2039) and a User Interface Summary (Ex. 2040).

Petitioner argues that the single sentence in Patent Owner’s Response asserting prior reduction to practice violates our rules against incorporating arguments by reference. Pet. Reply 3–4. We agree.

The argument in Patent Owner’s Response that Patent Owner reduced to practice the invention of claims 1 and 13 before D’Angelo became publicly available, in its entirety, reads as follows:

D’Angelo became publicly available on December 1, 2011, **less than one year** before the ’507 Patent’s effective filing date. *Supra* §VIII.A. Thus, D’Angelo is not § 102(b) prior art. At

most, D’Angelo might qualify as § 102(a) art. But, here, the claimed inventions were reduced to practice before the reference date of D’Angelo. And indeed, the inventions recited in the independent Claims 1 and 13 were reduced to practice by August 31, 2011. EX2037 ¶¶41-88. Thus, D’Angelo, which published months later in December 2011, is also not § 102(a) prior art.

PO Resp. 32–33. Patent Owner includes no analysis to support its assertion that the “inventions recited in the independent Claims 1 and 13 were reduced to practice by August 31, 2011.” *Id.* Indeed, Patent Owner’s Response does not even mention the Declaration of Mr. Muhsin, the Prototype Video, or the User Interface Summary. Instead, this evidence is incorporated by reference through a block citation to forty-eight paragraphs of Dr. Duckworth’s testimony (Ex. 2037 ¶¶ 41–88), who, in turn, cites the testimony of inventor Mr. Muhsin (Ex. 2038 ¶¶ 1–23).

According to our rules, “[a]rguments must not be incorporated by reference from one document into another document.” 37 C.F.R. § 42.6(a)(3). We determine that Patent Owner has not presented its arguments regarding prior conception and reduction to practice in its Response as required by our rules. Rather, Patent Owner improperly incorporates its arguments by reference into its Response in violation of Rule 42.6(a)(3).

“[W]hen a patent owner attempts to antedate an asserted prior art reference, the patent owner assumes a temporary burden of production.” *Parus Holdings, Inc. v. Google LLC*, 70 F.4th 1365, 1371 (Fed. Cir. 2023) (citing *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015)). Patent Owner’s Response does not provide a

meaningful explanation to support its conclusory assertion that the “inventions recited in the independent Claims 1 and 13 were reduced to practice by August 31, 2011.” PO Resp. 32–33. Nor does Patent Owner’s Response cite corroborating evidence with specificity. For this reason alone, Patent Owner has not met its temporary burden of production on this issue. *Parus Holdings*, 70 F.4th at 1372 (“The burden of production cannot be met without some combination of citing the relevant record evidence with specificity and explaining the significance of the produced material in briefs.”).

Even if we were to consider Patent Owner’s incorporated arguments, we would find them unpersuasive because Patent Owner offers no corroborating evidence beyond the testimony of inventor Mr. Muhsin to support that its prototype meets the requirement of claim 1 that a processing board is configured to “generate SpO2 measurement values” and “output the SpO2 measurement values to the mobile computing device.” Ex. 1001, 20:35–44.¹⁹

Patent Owner relies on the testimony of Mr. Muhsin (incorporated through the testimony of Dr. Duckworth) to antedate D’Angelo. Mr. Muhsin, testifies, unequivocally, that the prototype includes a processing board configured to “generate SpO2 measurement values” and “output the SpO2 measurement values to the mobile computing device.”

I confirm from my personal knowledge working on the prototype system that its processing board receives the one or more signals output by the detector of the finger sensor. The

¹⁹ Claim 13 includes substantively identical requirements. Ex. 1001, 22:3–6.

processing board receives said signals and calculates the measurements (including SpO₂, pulse rate, perfusion index, and the PPG waveform) that are ultimately displayed via the user interface of the application run on the iPhone. The Prototype Video shows the data cable used for [the] processing board to receive the one or more signals from the optical sensor.

Ex. 2038 ¶ 15; *see also id.* ¶ 13 (Mr. Muhsin’s testimony that “the prototype system’s processing board used [the] signals from the detector to calculate the user’s oxygen saturation (i.e., ‘SpO₂’) and other parameters”). But Mr. Muhsin offers little to corroborate this testimony.

Mr. Muhsin’s Declaration cites a video as corroboration. *Id.* ¶¶ 7–23. The video shows the exterior of a system comprised of a finger clip, a processing board, and an iPhone all connected by cables. Ex. 2039. In the video, when the clip is placed on a finger, the connected iPhone displays SpO₂ and pulse rate, among other information. *Id.* The video, however, provides no information about the inner workings of the clip, the processing board, or the iPhone. Mr. Muhsin’s Declaration also references a User Interface Summary (Ex. 2040), but this document similarly lacks information about the inner workings of the prototype, showing mostly images of the “user interface screens of the application that ran on the iPhone.” Ex. 2038 ¶ 8; Ex. 2040. Absent such information, there is nothing to corroborate Mr. Muhsin’s testimony that the processing board, rather than, for example, the finger clip or the iPhone, generates SpO₂ measurement values.

In its Sur-reply, Patent Owner asserts that its corroborating evidence relies on “more than the Prototype Video and User Interface Summary,” and that Mr. Muhsin “relied extensively on the physical prototype in the

Prototype Video.” PO Sur-reply 19. But the physical prototype has not been introduced into evidence, and Mr. Muhsin’s testimony makes no mention of having the prototype that was shown in the video. *See generally* Ex. 2038; *see also, specifically id.* ¶¶ 6–8 (testimony of Mr. Muhsin: “I have two exhibits that illustrate our work. . . . First, I took a video that includes a demonstration of the prototype system (the ‘Prototype Video’). . . . Second, I found a document on the Masimo network that shows the user interface screens of the application that ran on the iPhone (the ‘User Interface Summary’).”).

Patent Owner argues that the absence of evidence corroborating generation and output of SpO2 values is not a problem because “sufficiency of corroboration ‘is evaluated under a “rule of reason,” considering all pertinent evidence”” and, “the rule of reason does not require ‘every individual aspect of reduction to practice be corroborated.’” PO Sur-reply 18 (citing *Medtronic, Inc. v. Teleflex Innovations S.A.R.L.*, 68 F.4th 1298, 1306 (Fed. Cir. 2023)). We agree with Patent Owner’s characterization of the law. However, in this case, where much of the invention lies in which specific component handles the signal processing, we are not persuaded that a video showing the exterior of a signal processing device is sufficient to corroborate testimony that such device works in the manner claimed. Ex. 2039 (video showing only exterior of the device); PO Resp. 6–7 (explaining, with citation to the ’507 patent, that using a dedicated processing board to handle advanced signal processing “improves power savings and decreases measurement latency when compared to using a processor on a mobile device” which “allows for more comprehensive patient care”); Ex. 2038 ¶ 16

(testimony of inventor Mr. Muhsin that “[p]erforming all of the signal processing with the processing board was a main purpose of the inventions in the ’507 Patent, to reduce the computation load and battery drain on whatever device was used as the mobile computing device”). Accordingly, even if we were to consider Patent Owner’s improperly incorporated evidence, we would not find it persuasive to antedate D’Angelo based on a December 1, 2011 publication date.

2. Whether a POSA would have been motivated to modify Mendelson to draw power from a smartphone

Claim 1 requires that the processing board of the claimed mobile pulse oximetry system be “configured to draw power for operation from [a] mobile computing device.” Ex. 1001, 20:62–63. Petitioner contends that it would have been obvious to modify Mendelson’s Receiver Module to meet this limitation. According to Petitioner, the POSA would have been motivated to “apply D’Angelo to Mendelson . . . to configure Mendelson’s Receiver Module to draw power from the PDA/smartphone.” Pet. 40. In response, Patent Owner provides seven reasons why the POSA would not have been so motivated. PO Resp. 33–44; *see also* PO Sur-reply 19–25. After considering the arguments and evidence of record, we conclude that Petitioner has established by a preponderance of the evidence that the POSA would have been motivated to modify Mendelson’s Receiver Module to draw power from a PDA/smartphone in the manner set forth in the Petition. Our reasoning on this disputed issue is set forth below.

D’Angelo and Mendelson disclose similar systems. As Dr. Kenny explains, “D’Angelo’s ‘management device’ is equivalent to Mendelson’s

Receiver Module in that they are both computing devices that are in communication with both physiological sensors and the smart display devices . . . and they both perform signal processing to determine physiological parameters based on physiological parameter signals received from the sensors.” Ex. 1003 ¶ 153.

Petitioner contends that it would have been obvious to modify Mendelson’s device so that it draws power from a smartphone in the same manner taught in D’Angelo. Pet. 40–43, 49–50. The evidence supports, and Patent Owner does not dispute, that the technique of drawing power from a smartphone in such a system was a known technique. Ex. 1007, 1529–30 (D’Angelo disclosing this technique). The evidence also supports, and Patent Owner also does not dispute, that the results of employing this technique would have been predictable. Ex 1003 ¶ 128 (testimony of Dr. Kenny that modifying Mendelson’s Receiver Module to draw power from a smartphone “would be merely the application of a known technique to a known system . . . ready for improvement to yield predictable results”). This supports that modifying Mendelson to draw power from a smartphone would have been obvious. *KSR*, 550 U.S. at 417 (suggesting that “the mere application of a known technique to a piece of prior art ready for the improvement” generally would have been obvious).

In addition, Petitioner provides reason why the POSA would have been motivated to modify Mendelson to draw power form a smartphone. Dr. Kenny testifies that applying D’Angelo’s teaching of drawing power from a smartphone to Mendelson’s physiological monitoring system would have provided Mendelson’s system “additional and beneficial functionality,”

including “crucial backup functionality,” which “could facilitate potentially lifesaving interventions.” Ex. 1003 ¶ 124. We find this testimony credible because it is consistent with and supported by the disclosure of D’Angelo. Ex. 1007, 1530 (stating that the addition of a connection that allows D’Angelo’s management device to draw power from a smartphone allows one “to read out the management device with the smartphone even when its battery is empty”).

Patent Owner provides seven reasons why the POSA would not have been motivated to modify Mendelson’s Receiver Module to draw power from a PDA/smartphone. PO Resp. 33–44; *see also* PO Sur-reply 19–25.²⁰ We address each of these seven reasons in turn.

First, Patent Owner contends that “Mendelson’s system was expressly intended ‘for use in combat casualty care, such as for ***remote triage***, and by first responders, such as firefighters.” PO Resp. 34. More specifically, Patent Owner asserts that “Mendelson’s system was . . . intended ‘to determine a casualty’s condition ***remotely without exposing the first responders to increased risks***.’” *Id.* “To accomplish its intended remote monitoring purpose,” Patent Owner argues, Mendelson “transmits physiological measurements ‘***wirelessly*** to a PDA’ that is ‘carried by medics or first responders.’” *Id.* at 35. Patent Owner argues that Petitioner’s

²⁰ Although Patent Owner presents affirmative reasons why the POSA would not have been motivated to modify Mendelson’s Receiver Module, we recognize that Patent Owner does not bear the burden to prove absence of motivation. Rather, it is Petitioner’s burden to prove that the POSA would have reason to modify Mendelson in the manner set forth in the Petition. *See Harmonic*, 815 F.3d at 1363.

proposed modification “would require the medic carrying the PDA to enter the dangerous scenario and be co-located with the casualty.” *Id.* According to Patent Owner, this would “defeat Mendelson’s intended purpose of providing ‘remote monitoring’ without “exposing the first responders to increased risks.”” *Id.* at 35–36. Patent Owner also argues that Petitioner’s proposed modification incorrectly assumes the medic would use the PDA to power a Receiver Module attached to an injured person for remote monitoring rather than simply monitoring the injured person directly now that there is no longer a need for remote monitoring (because the medic is present). *Id.* at 37.

We do not find this argument persuasive. As Petitioner explains, “the proposed modification does not remove any of the remote monitoring capabilities from Mendelson’s system but rather provides additional ‘backup functionality.’” Pet. Reply 17. Furthermore, Mendelson expressly contemplates that its system would be used in situations where medical personnel would be in close proximity to the person being monitored, such as in “continuously tracking the injured condition until [the injured person] arrive[s] safely at a medical facility” and notes that battery-operated pulse oximeters have been “attached to patients during emergency transport as they are being moved from a remote location to a hospital, or between hospital wards.” Ex. 1011, 912–13. We agree with Dr. Kenny that the POSA would have recognized the benefit of modifying Mendelson’s system as proposed by Petitioner in such situations. Ex. 1083 ¶ 40.

As to Patent Owner’s argument that a medic would employ direct monitoring rather than recharging the remote monitoring system, we

recognize that there are advantages and disadvantages to each approach. *See id.* ¶ 41 (testimony of Dr. Kenny discussing drawbacks of direct monitoring); *see also* Ex. 2037 ¶ 146 (testimony of Dr. Duckworth asserting that the POSA “would have understood as a matter of common sense that the medic would directly monitor the person right before them using ordinary medical equipment”). Ultimately, however, we see the possibility of direct monitoring as an alternative solution to the same problem that does not diminish the motivation of the POSA to modify Mendelson as set forth in the Petition. *PAR Pharm., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1197–98 (Fed. Cir. 2014) (“Our precedent . . . does not require that the motivation be the best option, only that it be a suitable option from which the prior art did not teach away.”); *In re Mouttet*, 686 F.3d 1322, 1334 (Fed. Cir. 2012) (“[J]ust because better alternatives exist in the prior art does not mean that an inferior combination is inapt for obviousness purposes.”); *In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004) (“The prior art’s mere disclosure of more than one alternative does not constitute a teaching away from . . . alternatives because such disclosure does not criticize, discredit, or otherwise discourage the solution claimed.”); *Medichem S.A. v. Rolabo S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006) (“The fact that the motivating benefit comes at the expense of another benefit, however, should not nullify its use as a basis to modify the disclosure of one reference with the teachings of another. Instead, the benefits, both lost and gained, should be weighed against one another.”).

Second, Patent Owner argues that “modifying Mendelson’s Receiver Module to draw power from the PDA as proposed would not have allowed

the PDA to read out ‘data that’s been stored’ (i.e., previously measured physiological data) even after the Receiver Module’s battery had died” because Mendelson’s Receiver Module lacks “a microSD card or other non-volatile storage from which measured data could be ‘read out’ after its battery has died.” PO Resp. 37; *see also* Ex. 2037 ¶ 147 (testimony of Dr. Duckworth confirming that Mendelson’s system could not store data that could be read out after its battery died). Accordingly, Patent Owner argues the POSA “would not have been motivated to modify Mendelson’s Receiver Module to draw power from the PDA as proposed because doing so would not allow the PDA to ‘read out’ the previously ‘measured physiological data’ after the Receiver Module’s battery died.” PO Resp. 39.

This argument is not persuasive because even accepting Patent Owner’s premise—i.e., that Mendelson’s Receiver Module cannot read out previously measured data—we agree with Petitioner that it would have been obvious to provide power so that Mendelson’s system could read out current real-time measurements. Pet. Reply 20; Ex. 2044, 54:18–56:9 (Dr. Kenny’s credible testimony that D’Angelo’s description of “read[ing] out the management device with the smartphone even when its battery is empty” could include “realtime data that’s flowing from the sensor to the management device and available for transfer” and that the proposed modification would include allowing “current flow of data”). Put another way, Petitioner’s modification provides power in the event Mendelson’s Receiver Module’s battery dies and, once provided with backup power, Mendelson’s Receiver Module would receive real-time information from the sensor module, process that information, and provide it to the

PDA/smartphone as it would in ordinary operation. The modification simply provides backup power.

Third, Patent Owner contends that Mendelson teaches that “its system’s wireless design ensures ‘[t]he PDA can monitor multiple wearable pulse oximeters simultaneously and allows medics to [remotely] collect vital physiological information’ from each injured person in the field.” PO Resp. 40 (alteration by Patent Owner) (citing Ex. 1011, 3; Ex. 2037 ¶ 151). Patent Owner then argues that Petitioner’s proposed modification “requires using the PDA to read out data from the single Receiver Module to which it was connected.” *Id.* According to Patent Owner, and Dr. Duckworth, the POSA “would have understood that the medic was not using the PDA as intended (i.e., monitoring “*multiple*” injured people at the same time) whenever the medic had to use the PDA to read out *one* injured person’s Receiver Module” and, thus, the POSA “would not have been motivated to modify Mendelson as proposed because doing so would eliminate functionality that Mendelson’s system was intended to provide.” *Id.*; Ex. 2037 ¶ 151 (Dr. Duckworth’s testimony to the same effect).

This argument is not persuasive because the evidence supports that Mendelson describes embodiments in which Mendelson’s PDA only monitors one person at a time. Ex. 1011, Fig. 3 (Mendelson’s PDA displaying parameters for only a single person); Ex. 1087, 80:7–81:10, 84:13–22 (testimony of Dr. Duckworth agreeing that Mendelson included an embodiment that displayed information for only one individual); Ex. 1083 ¶¶ 46–47 (testimony of Dr. Kenny that “even in the unmodified version of Mendelson’s system, the PDA only presents vital sign information for a

single person at any given time”). As such, the proposed modification does not eliminate functionality Mendelson’s system was intended to have.

Fourth, Patent Owner argues that “Mendelson’s Sensor and Receiver Modules already include batteries that provide ample power for their intended use.” PO Resp. 41. As support, Patent Owner points to Mendelson’s teaching that its sensor module is powered by a battery that provides “at least 5 days of operation” and Dr. Duckworth’s testimony that Mendelson’s Receiver Module uses two AA batteries which provide a similar length of operation. *Id.* (citing Ex. 1011, 914; Ex. 2037 ¶ 152). Thus, Patent Owner argues, “given that Mendelson’s system was already amply powered for its intended use in limited duration emergency events, a POSITA would not have been motivated to modify Mendelson’s Receiver Module so that the PDA could be used to provide backup power.” *Id.* (citing Ex. 2037 ¶ 152). Furthermore, Patent Owner asserts that a POSA “would have recognized that simply replacing the dead AA batteries with new ones was a much easier, cheaper, and faster solution.” *Id.* (citing Ex. 2037 ¶ 153).

We do not find this argument persuasive. We recognize that if the batteries are fully charged, and if the length of use is short, there may be no need for backup. However, we agree with Dr. Kenny that Patent Owner’s argument does not account for “scenarios where unexpected events and circumstances extend the situation beyond the life of fully-charged batteries.” Ex. 1083 ¶ 51. We also agree with Dr. Kenny that the POSA, “as well as anyone using battery-powered hand-held devices at the time of the ’507 [patent]” would appreciate, “it is not unusual for everyday situations to lead to a need for back-up power” and “[i]n the cases of

systems intended for use in the battlefield or other hazardous scenarios, there should be an even greater appreciation that things will not go as planned, and back-ups are wise and useful.” *Id.* Thus, as Dr. Kenny credibly explains, “even if the need for supplying backup power to the Receiver Modules from the PDA/smartphone were rare, it would still be extremely helpful in applicable scenarios, especially in situations in which the wearer of the device may be facing life-threatening injuries or a similarly serious medical emergency.” *Id.* ¶ 50.

Fifth, Patent Owner argues that the POSA “would not have used the PDA to power a Receiver Module because doing so would drain the PDA’s battery more quickly.” PO Resp. 42. Patent Owner asserts that Mendelson’s system would be unusable if the PDA’s battery died and, therefore, a POSA “would not have risked depleting the PDA’s battery to power only one receiver Module, in a system that could include many such Receiver Modules.” *Id.* Instead, Patent Owner argues, the POSA would have simply replaced the Receiver Module’s AA batteries. *Id.*

This argument is not persuasive because, as Petitioner explains, its proposed modification “would not have ***forced*** the medic to provide backup power to a Receiver Module with a depleted battery in very scenario” rather it “would have provided the user of the PDA with the ***option*** to provide backup power to a Receiver Module with a depleted battery[,] an option which the user could opt not to take depending on the current charge level of the PDA and the given scenario.” Pet. Reply 23 (citing Ex. 1083 ¶ 53 (Dr. Kenny’s testimony to the same effect)). In addition, Dr. Kenny testifies credibly, that the amount of power drawn from the PDA “would have been

negligible when compared to the overall battery capacity of the PDA/smartphone.” Ex. 1083 ¶ 52. Finally, we agree with Petitioner that even crediting Patent Owner’s concerns, backup functionality represents, “at most, a tradeoff,” which in this case weighs in favor of providing backup functionality. *See Medichem*, 437 F.3d at 1165.

Sixth, Patent Owner argues that implementing Petitioner’s proposed modification “would have required adding components to Mendelson’s Receiver Module, such as a voltage converter and external power connector, to allow it to be powered by the PDA.” PO Resp. 42–43 (citing Ex. 2037 ¶ 155 (testimony of Dr. Duckworth to the same effect)). According to Patent Owner, Mendelson’s Receiver Module was “designed to be a ‘compact, low-power, small-size, light-weight, [] unobtrusive’ and ‘cost-effective’ system,” and modifying it as proposed by Petitioner would “run contrary to Mendelson’s design by adding components that make its Receiver Module larger, heavier, and more expensive to produce.” *Id.* at 43 (alteration in original) (citing Ex. 1011, 1–2; Ex. 2037 ¶ 155). Patent Owner argues that these considerations “would have dissuaded a POSITA from modifying Mendelson’s Receiver Module as proposed.” *Id.* (citing Ex. 2037 ¶ 155).

This argument does not diminish the motivation of the POSA to modify Mendelson because as Petitioner and Dr. Kenny persuasively explain, Mendelson’s Receiver Module “already includes a serial port for connecting the PDA.” Pet. Reply 24; Ex. 1083 ¶¶ 43, 54; Ex. 1011, Fig. 1. Dr. Kenny testifies that Petitioner’s “proposed modification would not have led to the burdensome weight or expense that Dr. Duckworth contemplates

but merely would have required routine adjustments that would have been known to a POSITA to swap the already existing data connector included in Mendelson's Receiver Module for a data connector having a charging pin, as described in D'Angelo." Ex. 1083 ¶ 54. To the extent this testimony conflicts with that of Dr. Duckworth, we credit Dr. Kenny's testimony over Dr. Duckworth's testimony. *Compare id.*, with Ex. 2037 ¶ 155 (testimony of Dr. Duckworth that Petitioner's proposed modification "would require adding components that make the Receiver Module larger, heavier, and more expensive to manufacture"). In this regard, we note that, consistent with Dr. Kenny's testimony, D'Angelo discloses an embodiment where its management device, which draws power from a PDA, has a compact and lightweight form factor. *See* Ex. 1007, Fig. 4. Moreover, even if Petitioner's proposed modification did require an increase in size and weight, such a modification at most represents a tradeoff, which in this case weighs in favor of providing backup functionality. *See Medichem*, 437 F.3d at 1165.

Seventh, Patent Owner argues that Dr. Kenny used equivocal language in his deposition when discussing his opinion that modifying Mendelson's Receiver Module to draw backup power from the PDA would have been obvious. PO Resp. 43. More specifically, Patent Owner faults Dr. Kenny for testifying "based on what a [POSA] 'might' or 'would consider' doing, or what 'could be useful.'" *Id.* (citing Ex. 2044, 49:4–14, 49:15–50:4, 50:5–51:1, 55:12–20, 55:5–11, 61:5–17. We have reviewed the testimony at issue and do not find it to detract from the testimony in Dr. Kenny's Declaration or from any of the testimony discussed above. Nor do

we find that the cited testimony otherwise suggests that the proposed modification would have been nonobvious.

For the reasons discussed above, the preponderance of the evidence supports that the POSA would have found it obvious to modify Mendelson to draw power from a PDA/smartphone.

3. Conclusion with respect to Obviousness over the Combination of Mendelson and D'Angelo

In summary, the preponderance of the evidence supports that D'Angelo is prior art to the '507 patent and that the POSA would have found it obvious to modify Mendelson in view of D'Angelo to draw power from a PDA/smartphone. Patent Owner does not otherwise challenge Petitioner's assertions that claims 1, 2, 5, 7, 9, 12–15, and 17–19 would have been obvious over the combination of Mendelson and D'Angelo. As discussed above, we have reviewed the evidence and arguments of record and find that Petitioner has shown, by a preponderance of the evidence, that the unchallenged limitations of claims 1, 2, 5, 7, 9, 12–15, and 17–19 would have been obvious over the combination of Mendelson and D'Angelo. Accordingly, the preponderance of the evidence supports that claims 1, 2, 5, 7, 9, 12–15, and 17–19 would have been obvious over the combination of Mendelson and D'Angelo.

G. Obviousness over the Combination of Mendelson, D'Angelo, and Goldsmith

Claims 10 and 11 depend from claim 1 and further require that the mobile computing device comprise “a wearable computing device” (claim 10) and a “wristwatch” (claim 11). Petitioner asserts that claims 10 and 11

would have been obvious over the combination of Mendelson, D’Angelo, and Goldsmith and sets forth an element-by-element comparison of the challenged claims to the asserted art. Pet. 61–64. Patent Owner repeats its argument as to why Petitioner’s arguments for claim 1 are deficient. PO Resp. 45 (arguing that Petitioner “fails to show obviousness of Claim 10–11 for at least the reasons set forth above for Claim 1”). This is not persuasive for the reasons already discussed. *See supra* § II.F (discussing obviousness of claim 1); *see also supra* § II.E (discussing anticipation of claim 13). In addition, Patent Owner argues that the POSA “would not have been motivated to make Mendelson’s PDA into a wearable ‘wristwatch.’” PO Resp. 45. We address this argument below.

Petitioner contends that “Goldsmith discloses a medical watch controller device” that “can be ‘used with any number of . . . diagnostic devices’ and sensors to obtain various physiological measurements, such as user oxygen level.” Pet. 61 (alteration in original). According to Petitioner, “controller device 900 includes a wrist band 940 that enables it to be worn ‘like a watch.’” *Id.* In addition, Petitioner asserts, Goldsmith’s device can “conveniently monitor and display ‘concentration, levels, or quantities of . . . oxygen.’” *Id.* at 62 (alteration in original). Petitioner argues that, based on these disclosures, a POSA would have “implement[ed] the cellular capable display device of the Mendelson-D’Angelo combination . . . as a watch” in order to “increase[] the portability of the display device,” “free[] up the users hands for other tasks,” and “increase ease of use as the user would not need to retrieve the display device from a pocket, backpack, or bag to view the display physiological parameters.” *Id.* at 62–63. In addition, Petitioner

argues that “smart watches were becoming in wide-spread use by 2012 and therefore such functionality would have provided additional functionality to devices already owned by users.” *Id.* at 63.

With respect to the requirement of claim 1 that the “processing board [be] configured to draw power for operation from the mobile computing device,” Petitioner argues that the POSA “would have recognized that implementing the wristwatch display device described by Goldsmith to provide a power output pin for the Receiver Module /management device would have achieved the same benefits of allowing read out even when the Receiver Module device battery is empty.” *Id.* at 63–64. Petitioner argues that modifying the device suggested by the combination of Mendelson and D’Angelo would have been “merely the application of a known technique to a known system ready for improvement to yield predictable results.” *Id.* at 64.

Patent Owner argues that Petitioner proposes turning “Mendelson’s PDA into a wristwatch and using that PDA turned-wristwatch to provide backup power to the Receiver Module.” PO Resp. 46. According to Patent Owner, modifying Mendelson’s Receiver to draw power from a wristwatch would “require the medic with the . . . wristwatch to enter the dangerous scenario and co-locate with the injured person.” *Id.* Thus, Patent Owner argues, Petitioner’s “proposed modification for Claims 10-11 suffers the same fatal deficiencies as [its] proposed modification for Claim 1,” namely, it would “defeat Mendelson’s intended purpose of ‘determin[ing] a casualty’s condition remotely without exposing the first responders to increased risks.” *Id.* at 46–47 (alteration in original). We discussed much

the same argument in connection with Petitioner's argument that claim 1 would have been obvious over the combination of Mendelson and D'Angelo alone. Patent Owner also repeats other arguments it made against modifying Mendelson to draw power from the PDA in connection claim 1. *Id.* These arguments not persuasive for the reasons already discussed. *See supra* § II.F.3.

In addition to its repeated arguments against claim 1, Patent Owner also argues that the POSA "would have understood that the PDA-turned-wristwatch was a small device with a very small battery capacity that was not suitable for powering the Receiver Module." PO Resp. 48. Patent Owner then argues that because Mendelson's system would be "unusable if the battery of the PDA (or PDA-turned-wristwatch) died," the POSA would not have been motivated to "use the PDA-turned-wristwatch to power a Receiver Module" for fear of "draining the PDA-turned-wristwatch's small battery, rendering the entire system unusable." *Id.*

We do not find this argument persuasive. Patent Owner supports its argument with the testimony of Dr. Duckworth that the POSA "would have understood that the PDA-turned-wristwatch was a small device with a very limited battery capacity, which a [POSA] would have understood was not suitable for powering the Receiver Module or other devices." Ex. 2037 ¶ 165. But Dr. Duckworth does not provide a persuasive explanation of why the POSA would have thought a watch battery too small to provide backup power for the Receiver Module. Nor does Dr. Duckworth cite evidence to support this assertion. *Id.*

Petitioner supports its position with the testimony of Dr. Kenny that a

POSA “would have found that smartwatches that were commercially available by 2012 would have had sufficient battery capacity to provide the negligible amount of power required to provide the backup power functionality described in D’Angelo for the short amount of time required to read vital sign information from the Receiver Module.” Ex. 1083 ¶ 60. Dr. Kenny supports his position with citation to evidence and a detailed explanation. For example, Dr. Kenny explains that “Goldsmith . . . expressly contemplates powering the various devices in its system (e.g., the ‘controller device’ having a wristwatch formfactor, the sensors, and other components) using a single battery.” *Id.* ¶ 59. This testimony is supported by Goldsmith, which Dr. Kenny cites. Ex. 1009 ¶ 41 (“The power of the controller device and of the other various devices discussed herein may be provided from a battery.”); *see also id.* ¶ 52 (disclosing that the electronics architecture shown in Goldsmith’s Figure 8, which includes a “main battery,” “can support many of the devices discussed herein, for example the controller device, the infusion device, the characteristic determining device, a BG meter, or any combination of the above”).

Dr. Kenny also points to Brady as support. Ex. 1083 ¶ 60. Brady discloses a “monitoring device 20 [that] is preferably worn on a user’s wrist.” Ex. 1091 ¶ 46. It may include “an optical sensor 30, . . . a display member,” a “pulse oximetry board,” and a separate “microprocessor board that receives data from the pulse oximetry board.” *Id.* ¶¶ 46, 58. Dr. Kenny testifies that “Brady demonstrates that as early as 2006, smartwatches had sufficient battery power to continuously power a blood oxygen detection system and as such, certainly had sufficient battery power to provide

temporary backup power to a Receiver Module with a depleted battery.”

Ex. 1083 ¶ 60. This testimony is consistent with Brady’s disclosure.

On the issue of whether the POSA would have considered a watch battery sufficient to power the Receiver Module, we credit the well-supported and explained testimony of Dr. Kenny (Ex. 1083 ¶¶ 59–60) over the comparatively less-well-explained and unsupported assertion of Dr. Duckworth to the contrary (Ex. 2037 ¶ 165). Considering all of the evidence and argument of record, we find that Petitioner has established, by a preponderance of the evidence, that the POSA would have found the mobile pulse oximetry system of claims 10 and 11 obvious over the cited art.

H. Remaining Obviousness Grounds

The Petition can be grouped into two sets of nine grounds. In the first set of grounds, Petitioner relies on Mendelson alone or together with D’Angelo as disclosing the elements of independent claims 1 and 13. In the second set of grounds, Petitioner relies on Mendelson and D’Angelo in the same manner as in the first set of grounds, but adds Moon in the event the language “mobile measurement of oxygen saturation (‘SpO₂’)” in the preamble of claim 1 is construed to require “active reduction and/or correction of motion artifacts caused by user motion.” Pet. 64–65.

Neither party in this proceeding asserts that the preamble is limiting or, more specifically, that the term “mobile measurement of oxygen saturation (‘SpO₂’)” should be construed to require “active reduction and/or correction of motion artifacts caused by user motion.” Accordingly, we do not find it necessary to address the grounds relying upon Moon. We now turn to the Petitioner’s remaining obviousness grounds.

Petitioner contends that: claims 16, 18, and 20 would have been obvious over the combination of Mendelson and Tran; claims 14 and 17 would have been obvious over the combination of Mendelson and Kianl; claim 3 would have been obvious over the combination of Mendelson, D'Angelo, and Ording; claims 4–6, 8, 16, 18, and 20 would have been obvious over the combination of Mendelson, D'Angelo, and Tran; claims 2, 7, 14, and 17 would have been obvious over the combination of Mendelson, D'Angelo, and Kianl; and claim 3 would have been obvious over the combination of Mendelson, D'Angelo, Kianl, and Ording. For each of these grounds, Petitioner sets forth an element-by-element comparison of the challenged claims to the asserted art. Patent Owner does not challenge Petitioner's showing for any of the additional limitations recited in claims 2–8, 14, 16–18, and 20. For each of these grounds and for each of the claims challenged in these grounds, we have reviewed the evidence and arguments of record and find that Petitioner has shown, by a preponderance of the evidence, that they are disclosed or rendered obvious by the cited art for the reasons set forth in the Petition.

III. REVISED CONTINGENT MOTION TO AMEND

As discussed above, Patent Owner filed a Revised Contingent Motion to Amend, presenting substitute claims 21–24. RMTA 1–2. Because we conclude that Petitioner shows, by a preponderance of the evidence, that claims 1–20 of the '507 patent are unpatentable, we consider Patent Owner's Revised Contingent Motion to Amend with respect to the substitute claims.

Patent Owner bears the burden of persuasion to show, by a

preponderance of the evidence, that the Motion to Amend complies with certain statutory and regulatory requirements. 37 C.F.R. § 42.121(d)(1). Specifically, a patent owner must provide a claim listing reproducing each proposed substitute claim, and must make an initial showing to demonstrate the following: (1) the amendment proposes a reasonable number of substitute claims; (2) the amendment responds to a ground of unpatentability involved in the trial; and (3) support for each proposed substitute claim. *See* 35 U.S.C. § 316(d); 37 C.F.R. § 42.121.

As also provided under our Rules, a petitioner bears the burden of persuasion to show, by a preponderance of the evidence, that any proposed substitute claim is unpatentable. 37 C.F.R. § 42.121(d)(2).

A. Proposed Substitute Claims

Patent Owner proposes to amend the '507 patent by adding new claims 21–24 as respective substitutes for original claims 13, 14, 17, and 19. *See* RMTA 1–2; *see also* RMTA App'x. Claim 21 is proposed as a substitute for original claim 13 and is reproduced below:²¹

21. **[pre]** A computer-implemented method of informing a user of mobile measurement of oxygen saturation (“SpO2”), the computer-implemented method comprising:

[a] outputting, from an optical sensor of an SpO2 measurement system, one or more analog signals responsive to light from a light source attenuated by tissue of the user at a measurement site, said one or more analog signals responsive to an oxygen saturation of said tissue; and

[b] via a processing board of the SpO2 measurement

²¹ Underlined language reflects subject matter added to the original claims and strike-through indicates deletion.

system, the processing board in data communication with the optical sensor and a smartphone mobile computing device including a touch-sensitive smartphone display:

[c] receiving through a wired connection said one or more analog signals from the optical sensor;

[d] processing said one or more analog signals to generate the SpO2 measurement values and heart rate; and

[e] wirelessly outputting the SPO2 measurement values and heart rate to the smartphone mobile computing device; and

[f] via an application configured to execute commands on the smartphone mobile computing device:

[g] generating a graphical user interface having a plurality of display portions on the touch-sensitive smartphone display;

[h] displaying, in at least one portion of the plurality of display portions at one or more times, a representation of a physiological parameter of a plurality of physiological parameters comprising the SpO2 measurement values;

[i] displaying, in at least one portion of the plurality of display portions at one or more times, a graph of a history of the SpO2 measurement values;

[j] displaying, in at least one portion of the plurality of display portions at one or more times, a graph of a history of the heart rate;

[k] displaying, in at least one portion of the plurality of display portions at one or more times, a graphical representation of a heart; and

[l] displaying, in a different portion of the plurality of portions, a plurality of user inputs configured to allow the user to use the touch-sensitive smartphone display to interact with at least one of the plurality of display portions or the application;

[m] wherein the computer-implemented method is configurable to authenticate user data access by using at least

one of fingerprint, facial, and voice recognition technologies;

[n] the processing board surrounded within a protective assembly comprising upper and lower shells and a rounded rectangular enclosure forming a cavity with upper and lower openings, the openings having an inner ledge and a perimeter lip sized and configured to receive the upper and lower shells to fill the openings such that the perimeter lip surrounds at least a portion of perimeter sides of the upper and lower shells;

[o] the light from the light source comprises at least red and infrared light; and

[p] the SpO2 measurement system is configured to be portable by including the sensor and processing board together, wirelessly connectable to the smartphone mobile computing device for display of physiological data.

RMTA App'x., 16–18 (bracketed letters corresponding to those used by Petitioner added here for reference).

Claim 22 is proposed as a substitute for original claim 14 and is reproduced below:

22. **[pre]** The mobile pulse oximetry system of claim ~~13~~21, further comprising, via the application:

[a] perform a trend analysis on received SpO2 measurement values; and

[b] display results of the trend analysis in at least one portion of the plurality of display portions;

[c] wherein the processing said one or more analog signals comprises applying an advanced signal processing algorithm with data filtering.

Id. at 18–19 (bracketed letters corresponding to those used by Petitioner added here for reference).

Claim 23 is proposed as a substitute for original claim 17 and is reproduced below:

23. [a] The computer-implemented method of claim 1321, further comprising, via the application, updating the representation of the physiological parameter to comprise one or more of a plurality of graphical representations of the SpO₂ measurement values, the plurality of graphical representations comprising at least one of bar graphs or charts;

[b] the rounded rectangular enclosure comprising, on a first side, a first transition from the enclosure to a tapered flexible support member, and on a second side opposite the first side, a second transition from the enclosure to a tapered flexible support member;

[c] wherein the sensor and processing board are provided together with a wrist-mounted device.

Id. at 19 (bracketed letters corresponding to those used by Petitioner added here for reference).

Claim 24 is proposed as a substitute for original claim 19 and is reproduced below:

24. The computer-implemented method of claim 1321, wherein the protective assembly is configured to protect sensitive circuitry of the processing board from water damage ~~further comprising wirelessly transmitting the SpO₂ measurement values from the SpO₂ measurement system to the mobile computing device.~~

Id. at 19–20.

B. Analysis

Petitioner challenges Patent Owner's Revised Motion to Amend on several grounds, including that the substitute claims lack written description support, are indefinite, and would have been obvious. Because it is dispositive, we focus on Petitioner's argument that the substitute claims would have been obvious.

1. Incorporation by Reference from the Petition

Before addressing Petitioner’s obviousness arguments, we address Patent Owner’s procedural argument that Petitioner’s obviousness showings are deficient because they improperly incorporate by reference arguments made in the Petition. RMTA Reply 13–15. For example, Petitioner’s Opposition cites the Petition when mentioning discussion how the POSA would have applied the teachings of Kianl to modify Poeze. RMTA Opp. 11. We find no impropriety in Petitioner’s reliance on material from its Petition. The body of evidence the Board may consider for a motion to amend includes the entire evidence of record in a proceeding. *Nike, Inc. v. Adidas AG*, 955 F.3d 45, 54 (Fed. Cir. 2020) (“[T]he Board may rely on prior art of record in considering the patentability of amended claims.”). Moreover, where appropriate, Petitioner cites supporting evidence from outside the Petition, such as when arguing why the POSA would have modified Poeze in view of Kianl (RMTA Opp. 11–12), and we agree with Petitioner that it relies on references to the Petition to address the previously identified prior art’s teachings of subject matter from the original claims (RMTA Sur-reply 5).

2. Overview of the Assert Art Relevant to Disputed Issues

(a) Poeze

Poeze is a U.S. Patent Application published on April 7, 2011. Ex. 1110. Poeze discloses a “personal health organizer” which may be a “portable device that is adapted to retrieve reading data from a health data collection device, which is a noninvasive device in an embodiment.” *Id.* ¶ 9.

“The health data collection device 112 can be . . . a pulse oximeter . . . that measure[s] . . . SpO2.” *Id.* ¶ 29. Figure 2B, reproduced below, illustrates an embodiment of Poeze’s personal health organizer. *Id.* ¶ 18.

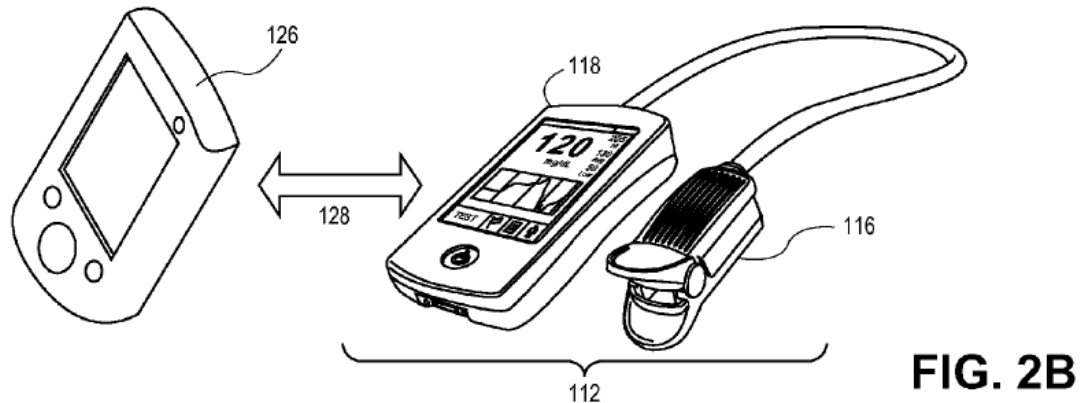


FIG. 2B

As shown in Figure 2B, “the health data collection device 112 includes a finger clip sensor 116 connected to a monitor 118 via a cable.” *Id.* ¶ 31. In Figure 2B, the “health data collection device 112” is coupled to “general computing device 126.” *Id.* ¶ 35. Communication between monitor 118 and general computing device 126 may be via a wireless link, such as an RF or infrared link or a Bluetooth® link. *Id.* ¶ 35.

Poeze’s sensor 116 may include emitter 504 and detectors 506. Poeze’s “monitor 118 can advantageously include[] electronic processing, signal processing, and data storage devices capable of receiving signal data from the sensor 116 [and] processing the signal data to determine one or more output measurement values indicative of one or more physiological parameters of a monitored patient.” *Id.* ¶ 31. Poeze’s system may include “front-end interface 508 . . . that adapts the output of the detectors 508, which is responsive to desired physiological parameters.” *Id.* ¶ 118. “The

front-end-interface 508 can have its components assembled in the sensor 116, in the monitor 118, in connecting cabling (if used), combinations of the same, or the like.” *Id.* ¶ 120. Poeze’s system may also include “analog to digital converters (ADCs) (which can be in the monitor 118).” *Id.* ¶ 122.

(b) Pakula

Pakula is a U.S. Patent Application published on August 4, 2011. Ex. 1113. Pakula discloses “[i]mproved housings for electronic devices” having protective sides “to dissipate impact forces and thus reduce damage to the electronic device housing.” *Id.* at code (57). Pakula discloses that “[e]lectronic device components” can be “electrically coupled to each other” within the housing “to enable data and power transfers, as required for the proper operation of [the] electronic device[, for] example, using . . . a PCB [printed circuit board].” *Id.* ¶ 66; *see also id.* ¶ 69 (“[T]he internal platform can be formed by a printed circuit board.”).

(c) Baba

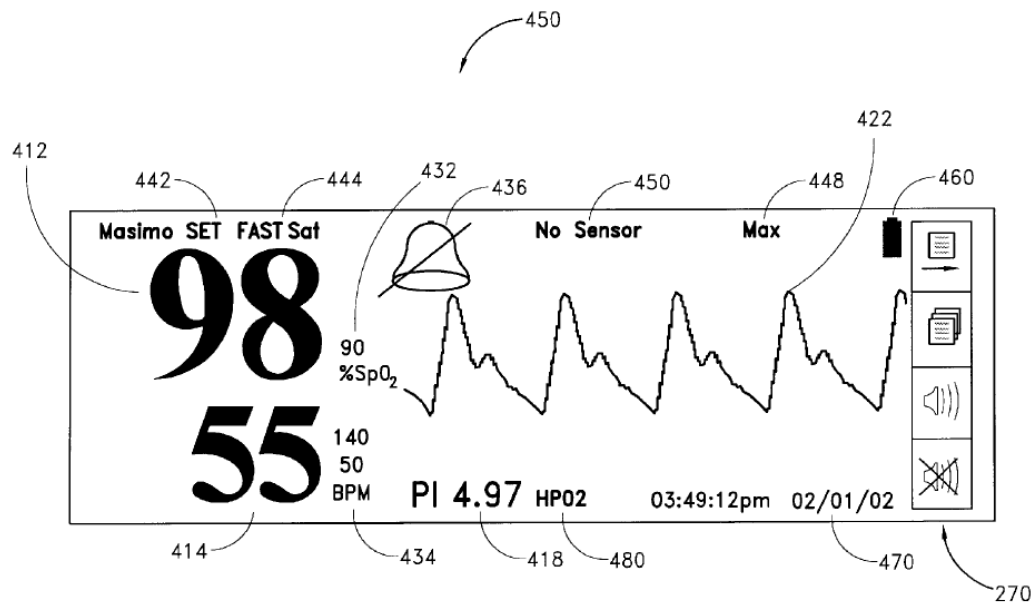
Baba is a U.S. Patent Application published on September 18, 2003. Ex. 1114. Baba discloses “a wristwatch type physical activity measurement apparatus.” *Id.* ¶ 52. Baba’s displayed interface includes a “heart icon 400 [that] changes according to the heart rate” so that “the user can determine the load on the heart by simply glancing at the heart icon 400.” *Id.* ¶¶ 96–97.

(d) Kianl

Kianl is U.S. Patent issued on December 2, 2003. Ex. 1006. Kianl discloses a “pulse oximetry user interface ha[ving] a display and a plurality of views each configured to occupy the display.” *Id.* at code (57). Kianl’s user interface employs a method that “deriv[es] a pulse waveform

responsive to a physiological signal, calculat[es] a data trend responsive to the physiological signal and provid[es] the pulse waveform in a first display view. *Id.* at 2:32–37.

Figure 4 of Kianl, reproduced below, “illustrates a pleth only view 400” of one of Kianl’s displays. *Id.* at 3:7–8.



The display shown in Figure 4 displays “an oxygen saturation 412, a pulse rate 414, a perfusion index 418 and a pulse waveform.” *Id.* at 5:66–6:1.

“The oxygen saturation 412 displays a functional arterial hemoglobin oxygen saturation measurement in units of percentage SpO₂.” *Id.* at 6:1–3.

Figure 10, reproduced below, provides another example of one of Kianl’s displays. *Id.* at 3:18.

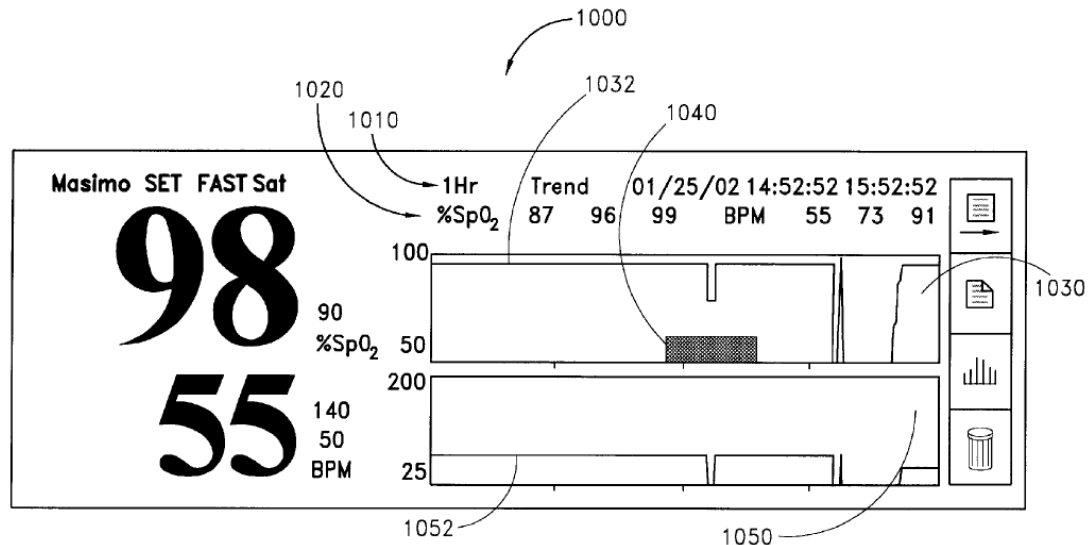


Figure 10 shows a “trend view” display comprising “a first line of information 1010, a second line of information 1020, an oxygen Saturation trend graph 1030, a low signal quality indicator 1040, and a pulse rate trend graph 1050.” *Id.* at 11:6–10. The first line of information 1010 shows the “time scale of the trend graph.” *Id.* at 11:10–13. The second line of information 1020 “shows the minimum, average, and maximum SpO₂ and pulse rate measurements.” *Id.* at 11:13–15. “The oxygen saturation trend graph 1030 shows the SpO₂ measurements displayed versus time. The pulse rate trend graph 1050 shows the pulse rate measurements displayed versus time.” *Id.* at 11:17–20.

3. Obviousness over the Combination of Poeze, Kianl, Baba, and Pakula

Petitioner asserts that claims 21, 23, and 24 would have been obvious over the combination of Poeze, Kianl, Baba, and Pakula and sets forth an element-by-element comparison of the challenged claims to the asserted art. RMTA Opp. 10–32. We address each of the substitute claims in turn, beginning with claim 21.

(a) Substitute Claim 21

Patent Owner does not challenge Petitioner’s showing for many of the limitations of claim 21. As to these unchallenged limitations, we have reviewed the evidence and arguments of record and find that Petitioner has shown, by a preponderance of the evidence, that they are disclosed or suggested by the combination of by Poeze, Kianl, Baba, and Pakula for the reasons set forth in the Petitioner’s Opposition to Patent Owner’s Revised Motion to Amend.²²

Turning to the disputed limitations, Patent Owner argues that the cited art does not disclose or suggest “outputting, from an optical sensor[,] . . . one or more analog signals” and “via a processing board[,] . . . receiving . . . said one or more signals from the optical sensor,” as recited in limitations 21[a] and 21[c]. RMTA Reply 18–19. Patent Owner also argues that cited art does not disclose a “processing board,” as also recited in limitation 21[b]. *Id.* at 24–26. And Patent Owner argues that the POSA would not have modified Poeze in view of Kianl (to provide multiple display portions with info) and Baba (to provide a heart icon for heart rate), as required by limitations 21[f]–21[l]. We address each of Patent Owner’s arguments in

²² Petitioner contends that limitation 21[p] is indefinite because “the specification and claims provide no indication to a [POSA] as to the scope of what it means to provide the sensor and processing board ‘together’” and because “the additional limitation is irreconcilably vague as to which components are ‘wirelessly connectable’ to the smartphone.” RMTA Opp. 7–8. We need not address this argument because regardless of the full scope of limitation 21[p], it is clear that it encompasses at least Poeze’s system. Indeed, Patent Owner does not contest that Poeze discloses limitation 21[p].

turn. We conclude that Petitioner has demonstrated, by a preponderance of the evidence, that claim 21 would have been obvious over the cited art.

(i) “*One or more analog signals*”

Limitation 21[a] recites “outputting, from an optical sensor of an SpO₂ measurement system, one or more analog signals responsive to light from a light source attenuated by tissue of the user at a measurement site, said one or more analog signals responsive to an oxygen saturation of said tissue.” RMTA Opp. x (underlining omitted). Limitation 21[c] recites, via a processing board, “receiving through a wired connection said one or more analog signals from the optical sensor.” *Id.* (underlining omitted).

Petitioner contends that Poeze discloses these limitations. *Id.* at 14–15, 17.

More specifically, Petitioner contends that Poeze discloses finger clip sensor 116 that includes emitter 504 that transmits light and detectors 506 that capture light emitted from emitter 504 after it has been attenuated or reflected from the tissue in a measurement site. *Id.* 14–15 (citing Ex. 1110 ¶¶ 31, 93, 106, 118). According to Petitioner, the output of Poeze’s detectors 506 is responsive to physiological parameters including oxygen saturation. *Id.* at 15 (citing Ex. 1110 ¶¶ 114, 120, Fig. 8). Petitioner asserts that Poeze discloses front-end interface 508 that adapts a signal 524 received from detectors 506 into a form that can be processed by the monitor. *Id.* Then, an analog-to-digital converter (“ADC”) receives the output from front-end-interface 508, and provides it to signal processor 510 of monitor 118 for processing. *Id.* Petitioner contends that the signals output by sensor 116 and received by monitor 118 correspond to the claimed “one or more analog signals.” *Id.*; *see also* Ex. 1109 ¶¶ 53–56 (testimony of Dr. Kenny to

the same effect).

Patent Owner argues that the language in limitations 21[a] and 21[c], reciting “outputting” and “receiving” “one or more analog signals responsive to light” should be interpreted to mean outputting and receiving “data that is actually acquired with the optical sensor.” RMTA Reply 18 (emphasis omitted). Here, Patent Owner’s arguments mirror those for the “one or more signals” limitations of claims 1 and 13. PO Resp. 18–20; PO Sur-reply 1–2. Although the language of the substitute claim differs from the original claim language—with the substitute claim adding the term “analog” to limitations 21[a] and 21[c] and adding language specifying that the signal is received “through a wired connection” in limitation 21[c]—these differences do not affect our claim construction analysis. Accordingly, for the reasons discussed *supra* § II.C, we decline to construe the substitute claims to require “outputting” and “receiving” “data that is actually acquired with the optical sensor.”

Patent Owner argues that Petitioner “ignores that Poeze’s detector signals 524 are manipulated by the front-end interface 508 before reaching the signal processor 510 in Poeze’s monitor 118.” RMTA Reply 19. According to Patent Owner, Petitioner “has not met its burden to show that these same detector signals 524 are output by Poeze’s sensor 116 and received by Poeze’s monitor 118” and, thus, “fails to show that Poeze satisfies the plain meaning of the ‘one or more analog signals responsive to light’ required by” limitations 21[a] and 21[c]. *Id.* We disagree.

Poeze’s detectors 506 “capture and measure light from the measurement site” and output a signal that is “responsive to desired

physiological parameters” including “oxygen saturation (SpO₂).” Ex. 1110 ¶¶ 106, 114, 118, 120; *see also* RMTA Opp. 15–16 (discussing application of limitation 21[a] to Poeze). The signal output by detector 506 is an analog signal and is “data that is actually acquired with the optical sensor.” Ex. 1110 ¶ 120. Accordingly, Poeze meets the requirements of limitation 21[a], which recites “outputting, from an optical sensor . . . one or more analog signals responsive to light . . . [and] responsive to an oxygen saturation,” when limitation 21[a] is given its plain meaning (*see supra* § II.C) and when it is construed as proposed by Patent Owner.

Poeze also meets the requirements of limitation 21[c] which recites, via a processing board “receiving . . . said one or more analog signals from the optical sensor.” Petitioner contends that the components of Poeze’s monitor, or Poeze’s monitor modified as taught by Pakula, meet the requirement for a “processing board.” RMTA Opp. 15–17 (“To the extent that the internal components of the monitor 118 (including the ADC and signal processor 510) are not expressly described as being a ‘processing board’ it would have been obvious to mount these processing components on a board (e.g., PCB) as was well-known in the art,” including, “[f]or example, Pakula”).²³ Poeze teaches that the “monitor 118 . . . advantageously includes electronic processing, signal processing, and data storage devices capable of receiving signal data from the sensor 116 [and] processing the signal data to determine one or more output measurement values indicative

²³ We address Patent Owner’s argument that the cited art does not render the “processing board” of limitation 21[b] obvious *infra* § III.B.3.(a).ii.

of one or more physiological parameters of a monitored patient.” Ex. 1110 ¶ 31. The monitor, thus, receives analog signals, meeting limitation 21[c] when that limitation is given its plain meaning (*see supra* § II.C) and when it is construed as proposed by Patent Owner.

Patent Owner argues that the POSA would have understood that “in the Poeze embodiments relied on by [Petitioner], the detected analog signal is converted to a digital signal **before** it reaches monitor 118.” RMTA Reply 21. According to Patent Owner, “Poeze’s front-end interface 508 . . . includes at least one analog-to-digital converter (‘ADC’) to output ‘digital information for processing by the signal processor 510 of the monitor 118.’” *Id.* Patent Owner argues that because front-end-interface 508 in the embodiments that Petitioner relies upon is part of sensor 116, and because the front-end-interface includes an ADC, the POSA “would have understood that . . . the detected analog signal is converted to a digital signal **before** it reaches monitor 118.” *Id.* Therefore, Patent Owner argues, the signals that sensor 116 outputs, and the signals that monitor 118 receives, do not meet the requirement of limitations 21[a] and 21[c] for analog signals. *Id.* at 21–23.

Patent Owner’s argument is not persuasive because it overlooks that Petitioner relies on assembling Poeze’s ADCs in its monitor/processing board and because Petitioner points to embodiments in which Poeze’s front-end interface is incorporated in its monitor. Poeze discloses that its ADCs can be in the monitor. Ex. 1110 ¶ 122 (“The front-end interface 508 can be implemented using one or more amplifiers . . . that are coupled to one or more analog to digital converters (ADCs) (which can be in the monitor

118)"). Petitioner's Opposition clearly contemplates that in the system rendered obvious by the cited art, Poeze's monitor would include an ADC.

For example, Petitioner's Opposition states:

To the extent that *the internal components of the monitor 118 (including the ADC and signal processor 510)* are not expressly described as being a "processing board" it would have been obvious to mount these processing components on a board (e.g., PCB) as was well-known in the art. For example, Pakula describes that various internal computing components of the resulting device "can be electrically coupled using one or more of a PCB." . . . *Implementing at least the ADC and signal processor 510 of Poeze as components of a circuit board* (along with front-end interface 508 in some embodiments) based on Pakula's suggestions would have beneficially allowed the components to be in electrical communication in a reliable, well-known manner while securing the components within the assembly to provide the benefits discussed in §III.A.4.

RMTA Opp. 16 (Petitioner's emphasis omitted, our emphasis added). In the above passage, Petitioner identifies the ADC as part of Poeze's monitor and proposes to include the ADC as part of a proposed modification to include a processing board (to the extent Poeze's monitor does not include a processing board). *Id.*; *see also id.* at 15 ("An 'analog to digital converter[]' (ADC) receives the output of the front-end interface 508 and 'provide[s] one or more outputs . . . for processing by the signal processor 510 of the monitor 118' and therefore the signals output by the sensor 116 and front-end interface 508 are analog." (alterations in original)). This supports that Petitioner does not rely on an embodiment in which "the detected analog signal is converted to a digital signal *before* it reaches monitor 118." RMTA Reply 21. Patent Owner's argument fails for this reason alone.

In addition, we are not persuaded that Petitioner relies only on embodiments in which the front-end interface is part of the sensor. Poeze discloses that the “front-end interface 508 can have its components assembled . . . in the monitor.” Ex. 1110 ¶ 120. And Petitioner’s Opposition proposes modifying Poeze’s monitor components to include a processing board, which would involve “[i]mplementing at least the ADC and signal processor 510 of Poeze as components of a circuit board (*along with front-end interface 508* in some embodiments).” RMTA Opp. 16 (emphasis added). Thus, Petitioner contemplated that the processing board rendered obvious by the cited art would include front-end interface 508. In embodiments where the monitor/processing board includes front-end interface 508, Patent Owner’s argument is untenable.

In sum, after considering all of the arguments and evidence of record, we find that Petitioner has established, by a preponderance of the evidence, that the cited art teaches or discloses “outputting” and “receiving” “one or more analog signals” as recited in limitations 21[a] and 21[c].

(ii) a “processing board in data communication with the optical sensor”

Limitation 21[b] requires a “processing board in data communication with the optical sensor and a smartphone mobile computing device.” RMTA Opp. x. (underlining omitted). Petitioner contends that Poeze’s “[m]onitor 118 includes signal processor 510 having ‘processing logic that determines measurements for desired analytes’” and that Poeze’s Figure 2B shows “monitor 118 is in data communication with sensor 116 and computing device 126,” which can be a smartphone having a touchscreen. *Id.* at 15–16

(citing Ex. 1110 ¶¶ 34, 40–43, 126; Ex. 1109 ¶¶ 57–60). Petitioner further contends that, to the extent the internal components of Poeze’s monitor (including the analog-to-digital converter and signal processor 510) are not considered a processing board, “it would have been obvious to mount these processing components on a board (e.g., PCB) as was well-known in the art,” citing Pakula’s teachings to support this. *Id.* at 16 (citing Ex. 1113 ¶¶ 66, 69–70, 85–86). We agree with Petitioner that it would have been obvious to mount processing components on a processing board.

Pakula discloses that components of a portable computing device “can be electrically coupled using . . . a PCB [printed circuit board].” Ex. 1113 ¶ 66; *see also id.* ¶ 69 (“[T]he internal platform can be formed by a printed circuit board . . .”). Dr. Kenny testifies that a POSA “would have recognized that implementing at least the ADC and signal processor 510 of Poeze as components of a circuit board (along with front-end interface 508 in some embodiments) based on Pakula’s suggestions would be straightforward and within their capabilities.” Ex. 1109 ¶ 59. Dr. Kenny further testifies that the POSA would have “appreciated that this arrangement would allow the components to be in electrical communication in a reliable, well-known manner while securing the components within the assembly to provide the protection from damage.” *Id.* This testimony is consistent with the disclosure of Pakula, which Dr. Kenny describes in detail. It is also consistent with other examples Petitioner and Dr. Kenny provide showing processors and analog-to-digital converters mounted on a processing board within known physiological monitoring systems. *Id.* (citing Ex. 1092, 11:6–20); RMTA Opp. 15–16 (citing same). As such, we

credit this testimony as well as Dr. Kenny’s testimony that modifying Poeze to use a processing board (to the extent it doesn’t already do so) would provide “predictable benefits.” Ex. 1109 ¶ 59.

Patent Owner contends that “the ACD is not an internal component of Poeze’s monitor 118” and, therefore, Petitioner’s assertion that it would have been obvious to mount the internal components of Poeze’s monitor is untenable. RMTA Reply 24–25. Patent Owner elaborates, arguing that Petitioner “relies on Poeze embodiments where the front-end interface’s ACD converts the detector signal 524 into a digital signal *before* it reaches the monitor 118.” *Id.* at 25. Patent Owner’s argument here is much the same as an argument it made in connection with limitations 21[a] and 21[c], and we find unpersuasive for the reasons discussed in connection with that argument. *See supra* § III.B.3.(a).i. Namely, Poeze discloses that its ADCs can be in the monitor (Ex. 1110 ¶ 122), and Petitioner’s Opposition clearly contemplates that, in the system rendered obvious by the cited art, Poeze’s monitor would include an ADC (RMTA Opp. 15–16).

Patent Owner argues that “even if the ADC were an internal component of Poeze’s monitor 118, [Petitioner] fails to show a motivation to modify Poeze to put the ADC and the signal processor 510 ‘on a board’ in the monitor 118.” RMTA Reply 25. More specifically, Patent Owner argues that “merely stating generic advantages of mounting components on a PCB, such as reliable communication while securing components, . . . does not provide sufficient motivation for the specific claimed arrangement of components.” *Id.* This argument is not persuasive.

As discussed above, Dr. Kenny’s testimony supports that arranging

the components of Poeze's monitor on a processing board (to the extent they are not already so arranged) "would allow the components to be in electrical communication in a reliable, well-known manner while securing the components within the assembly to provide the protection from damage."

Ex. 1109 ¶ 59. We do not consider the benefit of reliability, particularly in the context of an electrical connection, to be "generic." Nor do we dismiss the benefit that using a processing board would secure the components of Poeze's monitor in a manner that protects them from damage as "generic." Patent Owner does not challenge these benefits beyond asserting that they are generic and insufficient. RMTA Reply 24–26. Considering the all of the evidence and argument of record, we find that both benefits independently provide sufficient reason to mount the components of Poeze's monitor on processing board.

Patent Owner disputes Petitioner's reliance on "the benefits discussed in § III.A.4" for motivation to modify Poeze's monitor. *Id.* at 26 (citing RMTA Opp. 16). According to Patent Owner, § III.A.4 "is not about mounting components on a board." *Id.* We agree with Patent Owner that the bulk of § III.A.4 of Petitioner's Opposition does not relate to the processing board. Petitioner asserts that § III.A.4 includes a discussion of why it would have been obvious to use Pakula's electronic device housing and that this has relevance to the use of a processing board in that it "identified multiple benefits that would have resulted from applying Pakula's teachings to mount electrical components of Poeze's monitor 118 within Pakula's improved electronic device housing and Pakula further provides the details on how to mount such components: *by using a circuit*

board.” RMTA Sur-reply 14; *see also* Tr. 51–52.²⁴ We have already found persuasive Dr. Kenny’s testimony that the POSA would find benefit in securing the components of Peoze’s monitor in a manner that protects them from damage. *See supra*. Petitioner’s evidence regarding the use of Poeze’s housing is consistent with that finding, but does not provide additional independent motivation to use a printed circuit board.

Patent Owner argues that “none of [Petitioner’s] references even mention putting an ADC on the same board as the processor.” RMTA Reply 26; *see also* Ex. 2058 ¶ 67 (testimony of Dr. Duckworth to the same effect). Petitioner responds that “Goldreich describes a ‘processor 314,’ an A/D converter, and various other components of an SpO2 measuring device all ‘mounted on a PCB board 308.’” RMTA Sur-reply 14 (citing Ex. 1092, 11:6–20). The relevant portion of Goldreich reads as follows:

This signal is then received by processor 314, which preferably extracts medical information from the measurement of the physiological parameter. Processor 314 optionally and preferably features a crystal oscillator 312, for stabilizing the internal clock of processor 314. Processor 314 may communicate with the real time clock of the device (not shown). Also not shown are the extended memory, transceiver (communication unit), A/D converter and analog front end of the device.

Processor 314, oscillator 312 and push button 316 are all preferably mounted on a PCB board 308. PCB board 308 is then preferably sandwiched between battery 106 and a device cover 304. Device cover 304 preferably features a soft portion,

²⁴ Patent Owner does not challenge Petitioner’s assertion that it would have been obvious to incorporate Pakula’s electronic device housing. RMTA Opp. 22–24.

which may be rubber for example, for enabling the user to locate and depress the panic push button through push button 316.

Ex. 1092 11:6–20 (cited at RMTA Opp. 16). Although this passage does not expressly state that “processor 314” and “A/D converter” are mounted on the “PCB,” a fair reading of the passage supports that they are. Moreover, even if one were to read Goldreich as narrowly as Patent Owner and Dr.

Duckworth, the absence of a specific example of an ADC on the same board as the processor is not fatal to Petitioner’s case. Pakula broadly discloses coupling multiple components of an electronic device using a PCB. Ex. 1113 ¶ 66. We see no reason why this teaching would not apply to a processor and ADC. We find that the POSA would have recognized the benefits of using a PCB discussed above, even absent the teachings of Goldreich.

In sum, after considering all of the arguments and evidence of record, we find that Petitioner has established, by a preponderance of the evidence, that the cited art teaches or discloses a “processing board” as recited in limitations 21[a] and 21[c].

(iii) Combining Poeze, Kianl, and Baba to arrive at limitations 21[f]–21[l]

Limitations 21[f] and 21[g] recite “via an application configured to execute commands on the smartphone mobile computing device: generating a graphical user interface having a plurality of display portions on the touch-sensitive smartphone display.” RMTA Opp. xi (underlining omitted). Limitations 21[h] – 21[l] then recite displaying several types of data including SpO2 measurement values (limitation 21[h]), a graph of historical

SpO2 data (limitation 21[i]), a graph of historical heart rate data (limitation 21[j]), and a graphical representation of a heart (limitation 21[k]), as well as “a plurality of user inputs configured to allow the user to . . . interact with at least one of the plurality of display portions or the application” (limitation 21[l]). *Id.*

Petitioner asserts that Poeze’s sensor 116 and monitor 118 are part of health data collection device 112 that communicates with smartphone 126 via wired or wireless communication link 128. *Id.* at 18 (citing Ex. 1110 ¶¶ 31, 34–35). According to Petitioner, smartphone 126 has a “personal health organizer software module” application that executes commands as well as a touchscreen “for displaying ‘visualization of health data tracking or trending.’” *Id.* at 19 (citing Ex. 1110 ¶¶ 34, 39–40, 43, 47, 58, 62, 65–67, Fig. 4; Ex. 1109 ¶ 67).

Petitioner contends that Kianl discloses that a graphical user interface of a smartphone may have a plurality of display portions. *Id.* (citing Ex. 1006, 11:6–31, Fig. 10; Ex. 1109 ¶¶ 68–72). Petitioner further contends that Kianl teaches the display of “current and ‘minimum, average, and maximum SpO2 and pulse rate measurements,’” trend graph 1030 for SpO2 measurements versus time, and pulse rate trend graph 1050 for pulse rate measurements versus time.” *Id.* at 19–20 (citing Ex. 1006, 11:6–31, 12:18–26, Fig. 10; Ex. 1110 ¶ 51, 54, 62, 72; Ex. 1109 ¶¶ 73–76). Finally, Petitioner asserts that Kianl discloses a graphical user interface including a plurality of user inputs that permit a user to interact with an application using “soft key icons,” including “display view icons 810, menu icons 820, category icons 830, [] parameter icons 840,” and “trend-related icons 870-

890.” *Id.* at 21 (alteration in original) (citing Ex. 1006, 9:44–10:27, Figs. 8A–10; Ex. 1109 ¶ 79).

Petitioner asserts that Baba discloses displaying “heart icon 400 [that] changes according to the heart rate.” *Id.* at 20 (citing Ex. 1114 ¶¶ 96–97; Ex. 1109 ¶¶ 77–78).

Petitioner argues that the POSA would have modified Poeze in view of Kianl, Baba, and Pakula. RMTA Opp. 11–14. Specifically, Petitioner argues that, based on Kianl, the POSA would have modified Poeze to “display a user interface (UI) that includes graphs of histories of SpO₂ and heart rate measurement values and control icons.” *Id.* at 11. According to Petitioner, and Dr. Kenny, the POSA would have been motivated to make this change to:

- (1) allow health practitioners to readily identify abnormal patterns, conditions, and other health concerns based on SpO₂ and heart rate history data; (2) allow users to easily switch between various data views; (3) allow healthcare providers and other users to more easily mentally process SpO₂ and heart rate data; and (4) improve the overall usability of the system.

Id. at 11–12 (citing Ex. 1109 ¶¶ 28–36).

Petitioner argues that based on Baba, the POSA would have modified Poeze to display a heart icon. *Id.* at 12. The POSA would have been motivated to make this modification, Petitioner asserts, because it would allow “users to easily ‘determine the load on the heart by simply glancing at the heart icon’” and because this modification “would have readily and intuitively indicated to the user that the displayed measurement values are heart rate values and that the heart rate sensor is active.” *Id.* (citing Ex. 1109 ¶¶ 38–39; Ex. 1117, 2:27–30; Ex. 1116 ¶ 131, Fig. 88a).

We agree with Petitioner that it would have been obvious to modify Poeze to arrive at limitations 21[h] – 21[l] for the reasons set forth in Petitioner’s Opposition. We address Patent Owner’s arguments below.

Patent Owner argues that the POSA “would have appreciated the benefits of displaying the complex data and inputs generated by Kianl and Baba *on the same device that generates the complex data and inputs*, as taught by Kianl.” RMTA Reply 28. This argument presents us with dueling testimony on what the POSA would or would not have been motivated to do. *Compare* Ex. 1109 ¶¶ 28–36 (testimony of Dr. Kenny), *with* Ex. 2058 ¶ 71 (testimony of Dr. Duckworth). Here, we credit the well-reasoned testimony of Dr. Kenny as to the advantages of the proposed modification over Dr. Duckworth’s assertion, without elaboration, that the POSA “would have appreciated the benefits of displaying the complex data and inputs generated by Kianl and Baba *on the same device that generates the complex data and inputs* as Kianl teaches.” Ex. 2058 ¶ 71. Even if we were to credit Dr. Duckworth’s conclusory assertion, we see the possibility of displaying data and inputs on the same device that generates them as an alternative solution to the same problem that does not diminish the motivation of the POSA to modify Poeze as set forth in Petitioner’s Opposition. *PAR Pharm.*, 773 F.3d at 1197–98; *In re Mouttet*, 686 F.3d at 1334; *In re Fulton*, 391 F.3d at 1201; *see also In re Bozek*, 416 F.2d. 1385, 1390 (CCPA 1969) (“The test for obviousness is not whether the features of one reference may be bodily incorporated into the other to produce the claimed subject matter but simply what the combination of references makes obvious to one of ordinary skill in the pertinent art.”).

Patent Owner argues that there was no “reason to redundantly display the complex data and inputs on a smartphone touchscreen because that information was already displayed on Kianl’s handheld device.” RMTA Reply 28–29. This argument is unavailing. Petitioner proposes modifying Poeze. As Petitioner points out, Poeze already discloses displaying trending data in graphical format and receiving user input through an input or through display/touch panel. RMTA Opp. 12; RMTA Sur-reply 16; Ex. 1110 ¶ 62 (disclosing that “trending data is displayed to the user in various graphical formats on the display 206 through the medical data display module 344”). Petitioner posits that the POSA would have turned to Kianl because, although Poeze discloses data trending and receives user input, it “does not include examples in the figures” and “Kianl provides various examples of input icons and health data trend displays that were known to a POSITA that provide such details absent from Poeze.” RMTA Opp. 12. That Kianl’s handheld device already displays information does not provide a persuasive reason why the POSA would not have modified Poeze’s display based on the examples in Kianl.²⁵

²⁵ Poeze discloses that a “general purpose computing device,” e.g., a smartphone, may be wirelessly connected to the monitor. Ex. 1110 ¶¶ 34–45, Figs. 2A, 2B (cited at RMTA Opp. 10). In this circumstance, Patent Owner’s redundancy argument would have no application because the information on Poeze’s monitor would be in a different physical location than Poeze’s general purpose computing device. In addition, Poeze discloses that its monitor can be “provided without a user interface 112 and can simply output signal to a separate display or system.” *Id.* ¶ 128. In this circumstance, Patent Owner’s redundancy argument would also have no

Patent Owner argues that the POSA would not reasonably have expected success in modifying Poeze’s display based on Kianl. RMTA Reply 29. More specifically, Patent Owner argues that “Kianl’s user interface (with or without Baba’s heart icon) could not have been readily implemented on a smartphone’s touchscreen.” *Id.* Patent Owner points out that “[r]ather than a relatively small smartphone like Poeze, Kianl discloses a large, bedside device for real-time monitoring and display of complex physiological parameters in the hospital” and argues that a POSA would not have expected success in “adapting Kianl’s complex display of multiple physiological parameters and trend charts, to allow Poeze’s much smaller touchscreen to display the same information.” *Id.* at 29–31. In addition, Patent Owner argues that Kianl does not disclose a touchscreen and that “[b]ecause Kianl . . . requires physical buttons and knobs, a [POSA] would not have been able to implement Kianl’s interface on Poeze’s smartphone” and “would not have expected . . . the controls of . . . Kianl’s . . . complex data to fit on Poeze’s touchscreen.” *Id.* at 31–32. We do not find Patent Owner’s argument persuasive.

Petitioner’s proposed modification relates to the way information is displayed on a device. At oral argument, Petitioner’s counsel asserted that it was “pretty evident that by 2012, a POSITA would understand that information displayed on one screen could be displayed on the screen of another device.” Tr. 104. We agree. But we need not rely on this generality

application. Poeze’s monitor would not display any information, so there would be nothing to duplicate.

at least because, as Petitioner explains, “FIG. 1A of Kianl expressly shows its display device easily fitting in a user’s hand (with significant portions of the display being empty).” RMTA Sur-reply 17. This supports that the POSA would reasonably have expected that such information could be displayed on Poeze’s smartphone. In addition, we agree with Petitioner that “D’Angelo confirms that a POSITA would have had an expectation of success in fitting two graphs, two numeric values, four input icons, and additional information on a single iPhone display screen.” *Id.*; Ex. 1007, 1530–31, Fig. 4.

We acknowledge Dr. Duckworth’s testimony opining that the POSA would not reasonably have expected success. Ex. 2058 ¶¶ 70–76. The basis for Dr. Duckworth’s testimony rests not on the unpredictability of the proposed combination, but on whether the POSA would have expected to be able to scale Kianl’s display to fit Poeze’s display. *See e.g., id.* ¶ 75 (testifying that a POSA “would not have reasonably expected both Kianl’s controls **and** detailed information to fit on Poeze’s touchscreen, much less fit on Poeze’s touchscreen in a sufficiently viewable or useable manner”). Dr. Duckworth’s testimony that the POSA would not reasonably have expected to be able to scale Kianl’s display to fit a smartphone is at odds with Figure 1A of Kianl and Figure 4 of D’Angelo. As discussed above, Figure 1A shows Kianl’s display device fitting in a user’s hand, and Figure 4 of D’Angelo shows an iPhone displaying detailed information as well as control icons. Accordingly, we give Dr. Duckworth’s testimony on this issue little weight.

(iv) Hindsight

Patent Owner argues that Petitioner relies on hindsight and “improperly treats the challenged claims as mere lists of disparate parts rather than as a whole.” RMTA Reply 16–17. We disagree. Petitioner’s Opposition provides a detailed analysis that addresses each of the individual limitations of the substitute claims and that provides persuasive reasons why the POSA would have combined the cited references to arrive at the substitute claims, including substitute claim 21.²⁶ See RMTA Opp. 14–33, 35–37.

(v) Conclusion with respect to Substitute Claim 21

Having reviewed all of the arguments and evidence of record, we find that Petitioner has demonstrated by a preponderance of the evidence that substitute claim 21 would have been obvious in view of Poeze, Kianl, Baba, and Pakula.

(b) Substitute Claim 23

As discussed *infra* § III.B.5, we find that substitute claim 23 would have been obvious over the combination of Poeze, Kianl, Baba, Pakula, and Teller. Because we determine that Petitioner met its burden to demonstrate that substitute 23 would have been obvious over Poeze, Kianl, Baba, Pakula, and Teller, we need not reach whether claim 23 would have been obvious

²⁶ Although we address Patent Owner’s broad-brush hindsight argument in the section addressing substitute claim 21, we have considered Patent Owner’s argument as it relates to each of the substitute claims. We are not persuaded that Petitioner improperly relies on hindsight in its challenge to any of the substitute claims.

over the combination of only Poeze, Kianl, Baba, and Pakula. *See SAS Inst. Inc. v. Iancu*, 584 U.S. 357 (2018) (holding that a petitioner “is entitled to a final written decision addressing all of the claims it has challenged”); *Bos. Sci. Scimed, Inc. v. Cook Grp. Inc.*, 809 F. App’x 984, 990 (Fed. Cir. 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”).

(c) Substitute Claim 24

Substitute claim 24 depends from claim 21 and further recites that “the protective assembly is configured to protect sensitive circuitry of the processing board from water damage.” RTMA Opp. xv (underlining and strike-through omitted). Petitioner asserts that Poeze “describes implementing ‘the personal heath organizer’ using ‘a water-proof case’” and that a POSA would have recognized that “implementing the case for the monitor 118” would have beneficially allowed “the resulting system to also be waterproof.” *Id.* at 31 (citing Ex. 1110 ¶ 37; Ex. 1114 ¶ 127; Ex. 1109 ¶ 116). Patent Owner does not dispute Petitioner’s challenge to substitute claim 24 as obvious over Poeze, Kianl, Baba, and Pakula. *See generally* RMTA Reply.

Poeze’s disclosures support Petitioner’s argument. Ex. 1110 ¶ 37.²⁷

²⁷ Petitioner also argues that “Pakula describes attaching the covers using a ‘liquid adhesive[,]’ which a POSITA would have recognized as providing at least some degree of protection against water damage to the internal

And Dr. Kenny provides persuasive testimony explaining the benefits of applying Poeze’s water-proof case to its monitor. Ex. 1109 ¶ 116.

Accordingly, we find that Petitioner has demonstrated by a preponderance of the evidence that substitute claim 24 would have been obvious in view of Poeze, Kianl, Baba, and Pakula.

4. Obviousness over the Combination of Poeze, Kianl, Baba, Pakula, and Diab

Petitioner contends that substitute claim 22 would have been obvious over the combination of Poeze, Kianl, Baba, Pakula, and Diab. RMTA Opp. 33–35. Substitute claim 22 depends from substitute claim 21 and adds limitations requiring “preforming a trend analysis on received SpO2 measurement values” (limitation 22[a]), “displaying results of the trend analysis” (limitation 22[b]), and “applying an advanced signal processing algorithm with data filtering” when “processing said one or more analog signals” (limitation 22[c]). *Id.* at xiii–xiv (underlining omitted).

Petitioner contends that Kianl discloses the additional limitations 22[a] and 22[b], as well as the preamble for claim 22. *Id.* at 33, 35. For the “advanced signal processing” requirement of limitation 22[c], Petitioner turns to Diab. Petitioner contends that Diab describes the use of “adaptive filtering” in combination with “frequency-domain techniques” and “parallel engines executing two or more . . . techniques in parallel” in the context of “pulse oximetry systems and methods.” *Id.* at 34–35 (alteration in original)

processing board.” RMTA Opp. 31 (citing Ex. 1113 ¶¶ 106, 110–111; Ex. 1109 ¶ 117). We need not reach this argument because Petitioner’s argument based on Poeze is persuasive.

(citing Ex. 1120, 9:48–10:14). According to Petitioner, the POSA would have further modified Poeze’s system in view of Diab to “correct for the ‘dramatic’ effects and ‘drawbacks’ of motion artifacts and any other ‘extraneous disturbing source that affects the shape or quality of the optically detected photopleth signal’ to ‘provide the best estimates of the saturation values’ and ‘best overall performance’ for the system.” *Id.* at 34–35 (citing Ex. 1120, 9:42–10:14; Ex. 1109 ¶ 132). Patent Owner does not dispute Petitioner’s challenge of substitute claim 22 over the combination of Poeze, Kianl, Baba, Pakula, and Diab. *See generally* RMTA Reply.

The disclosures of Kianl and Diab support Petitioner’s argument with respect to the additional limitations recited in substitute claim 22. *See, e.g.*, Ex. 1006, 11:6–31, 15:11–40, Fig. 10; Ex. 1120, 9:48–10:14.²⁸ And Dr. Kenny provides persuasive testimony explaining the benefits of applying

²⁸ Petitioner contends that limitation 22[c] is indefinite because the scope of the term “advanced signal processing” is unclear. *See* RMTA Opp. 9 (arguing “nowhere does the Original Disclosure establish what differentiates ‘an **advanced** signal processing algorithm,’ from other types of signal processing”). We need not address this argument in order to apply the cited art because Diab discloses the use of “adaptive filtering” and the parties agree that “advanced signal processing” includes at least the use of “adaptive filters.” RMTA Reply 12 (arguing that “advanced signal processing” includes the use of “adaptive filters”); RMTA Sur-reply 5 (arguing that although Dr. Duckworth testified that “adaptive filters” fall within the scope of the claim, he was “unable to determine if other forms of processing would fall within the scope of this term”); Ex. 1001, 6:7–12 (disclosure of the ’507 patent describing that “[t]he processing module 130, in some embodiments, employs advanced processing techniques, including parallel engines and adaptive filters”); Ex. 1120, 9:63 (Diab disclosing the use of “adaptive filtering”).

Diab's teachings to the monitoring system taught by Poeze, Kianl, Baba, and Pakula to "correct the effects of motion on vital sign readings." Ex. 1109

¶ 132. Accordingly, we find that Petitioner has demonstrated by a preponderance of the evidence that substitute claim 22 would have been obvious in view of Poeze, Kianl, Baba, Pakula, and Diab.

5. Obviousness over the Combination of Poeze, Kianl, Baba, Pakula, and Teller

Petitioner contends that substitute claims 23 and 24 would have been obvious over the combination of Poeze, Kianl, Baba, Pakula, and Teller. RMTA Opp. 35–37. Because we have already found that substitute claim 24 would have been obvious over the combination of Poeze, Kianl, Baba, and Pakula, we do not address it again here. *See SAS Inst. Inc.*, 138 S. Ct. at 1359; *Bos. Sci. Scimed, Inc.*, 809 F. App'x at 990. Instead, we focus our analysis on substitute claim 23.

Substitute claim 23 depends from substitute claim 21 and adds limitations requiring that the application "update[e] the representation of the physiological parameter to comprise one or more of a plurality of graphical representations of the SpO₂ measurement values . . ." (limitation 23[a]), that the "rectangular enclosure" comprise "first" and "second" "transition[s] from the enclosure to a tapered flexible support member" (limitation 23[b]), and that the "the sensor and processing board are provided together with a wrist-mounted device" (limitation 23[c]). RMTA Opp. xiv (underlining omitted).

Petitioner contends that the combination of Poeze, Kianl, Baba, and Pakula discloses limitation 23[a]. *Id.* at 36.

For limitation 23[b], Petitioner turns to Teller. Petitioner contends that “Teller’s assembly includes ‘flexible wing body 410’ having tapered support members on opposite sides of housing 405 that **support** the housing on the user’s arm.” *Id.* at 36–37. According to Petitioner, “[t]he flexible wing body 410 further includes a flexible ring that provides respective first and second transitions to the tapered flexible support members.” *Id.* at 37. Petitioner argues that it would have been obvious to “modify Poeze’s monitor enclosure (as modified based on Pakula) to include the arm straps and water resistant features of Teller.” *Id.* at 35. Specifically, Petitioner asserts that “Poeze discloses that the monitor 118 can include ‘straps that facilitate attachment to a patient’s . . . arm’ and Teller provides details on tapered support straps that ‘can be adjusted to fit arms of various sizes’ and uses ‘soft foam fabric’ to ‘fit comfortably’ during exercise and allow for easy attachment and removal using simple pull tabs and velcro loops.” *Id.* at 35–36 (alteration in original). In addition, Petitioner contends that “[a]pplying a water tight seal would have beneficially allowed the monitor ‘to be worn while swimming without adversely affecting the performance thereof’ while ‘maintain[ing] the integrity of [the] housing’ to protect sensitive internal components from water damage.” *Id.* at 36 (alterations in original).

For limitation 23[c], Petitioner contends that the POSA “would have recognized that it would have been beneficial and obvious to position the armband on the user’s wrist based on Baba’s suggestion.” *Id.* at 37.

Patent Owner does not dispute Petitioner’s challenge of substitute claim 23 over the combination of Poeze, Kianl, Baba, Pakula, and Teller.

See generally RMTA Reply.

The disclosures of the cited art support Petitioner’s argument. *See e.g.*, Ex. 1104 ¶¶ 93–101, 116, Figs. 12–19; Ex. 1114 ¶ 52. And Dr. Kenny provides persuasive testimony explaining the benefits of applying Teller’s tapered arm support strap to Poeze’s monitor and for positioning Teller’s armband on a user’s wrist. *See e.g.*, Ex. 1109 ¶¶ 138, 143–144.

Accordingly, we find that Petitioner has demonstrated by a preponderance of the evidence that substitute claim 23 would have been obvious in view of Poeze, Kianl, Baba, Pakula, and Teller.

6. Remaining Grounds

Because we have determined Petitioner has met its burden of demonstrating that substitute claims 22–24 would have been obvious for the reasons discussed above, we need not reach the remaining grounds in Petitioner’s Opposition for purposes of our Decision. *See SAS Inst. Inc.*, 138 S. Ct. at 1359; *Bos. Sci. Scimed, Inc.*, 809 F. App’x at 990.

C. Conclusion on Revised Contingent Motion to Amend

For the foregoing reasons, we deny Patent Owner’s Revised Motion to Amend the ’507 patent to include substitute claims 21–24.

IV. MOTION TO STRIKE

Petitioner moves to strike what it identifies as new arguments in Patent Owner’s Sur-reply. Pet. MTS 1. According to Petitioner, in its Sur-Reply, Patent Owner “asserts *for the first time* that the one or more signals are required to be ‘analog’ and that ‘analog-to-digital conversion[’] falls outside the scope of ‘one or more signals responsive to light.’” *Id.* at 2.

Petitioner points out that in its Response, Patent Owner relied on the alleged averaging of signals to distinguish Mendelson (*id.*) and characterizes the analog-to-digital distinction as a belated claim construction argument (*id.* at 1–2; *see also id.* at 1 (citing case law prohibiting new claim construction arguments in a sur-reply and arguing that Patent Owner “proposes a new scope for the claims in its Sur-Reply and, thus, prevents Petitioner from addressing its new arguments”))).

Patent Owner responds that it “never argued that” “the one or more signals are required to be ‘analog.’” PO MTS Opp. 1. Patent Owner argues that Petitioner “ignores and selectively quotes POR portions to argue that Masimo relies solely on the averaging step to distinguish Mendelson.” *Id.* at 2. According to Patent Owner, its analog-to-digital distinction is “[f]ront [a]nd [c]enter” in its Response. *Id.* (emphasis omitted). Patent Owner also argues that it’s analog-to-digital distinction is a proper response to Petitioner’s argument accusing Patent Owner of drawing an arbitrary line between preprocessing of signals and averaging of signals. *Id.* at 3.

For the reasons discussed *supra* § II.E.3, we agree with Petitioner that the argument regarding analog-to-digital conversion in Patent Owner’s Sur-reply is new. Because it is a new argument, we decline to consider it. *See supra* § II.E.3. In addition, we determine that even if we were to consider Patent Owner’s new argument, we would still find that Mendelson discloses the claimed “one or more signals” limitations. *Id.* Accordingly, we dismiss Petitioner’s request to strike Patent Owner’s new argument regarding analog-to-digital conversion as moot.

V. CONCLUSION²⁹

In summary, we determine that Petitioner shown by a preponderance of the evidence that claims 1–20 of the '507 patent are unpatentable for the reasons discussed above. We deny Patent Owner's Revised Contingent Motion to Amend. These determinations are shown in the following table.

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
13, 15, 18, 19	102(b)	Mendelson	13, 15, 18, 19	
16, 18, 20	103	Mendelson, Tran	16, 18, 20	
14, 17	103	Mendelson, Kianl	14, 17	
1, 2, 5, 7, 9, 12–15, 17–19	103	Mendelson, D'Angelo	1, 2, 5, 7, 9, 12–15, 17–19	
3	103	Mendelson, D'Angelo, Ording	3	
4–6, 8, 16, 18, 20	103	Mendelson, D'Angelo, Tran	4–6, 8, 16, 18, 20	
2, 7, 14,	103	Mendelson,	2, 7, 14, 17	

²⁹ 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. 16,654 (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).

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
17		D'Angelo, Kianl		
3	103	Mendelson, D'Angelo, Kianl, Ording	3	
10, 11	103	Mendelson, D'Angelo, Goldsmith	10, 11	
13, 15, 18, 19	102(b)	Mendelson, Moon ³⁰		
16, 18, 20	103	Mendelson, Tran, Moon		
14, 17	103	Mendelson, Kianl, Moon		
1, 2, 5, 7, 9, 12–15, 17–19	103	Mendelson, D'Angelo, Moon		
3	103	Mendelson, D'Angelo, Ording, Moon		
4–6, 8, 16, 18, 20	103	Mendelson, D'Angelo, Tran, Moon		
2, 7, 14, 17	103	Mendelson, D'Angelo, Kianl, Moon		

³⁰ As discussed *supra* § II.H, because all challenged claims are determined to be unpatentable based on other asserted grounds, we decline to further address the grounds including Moon.

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
3	103	Mendelson, D'Angelo, Kianl, Ording, Moon		
10, 11	103	Mendelson, D'Angelo, Goldsmith, Moon		
Overall Outcome			1–20	

Motion to Amend Outcome	Claim(s)
Original Claims Cancelled by Amendment	
Substitute Claims Proposed in the Amendment	21–24
Substitute Claims: Motion to Amend Granted	
Substitute Claims: Motion to Amend Denied	21–24
Substitute Claims: Not Reached	

VI. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that Petitioner has proved by a preponderance of the evidence that claims 1–20 are unpatentable;

FURTHER ORDERED that, based on the entirety of the record, proposed substitute claims 21–24 have been shown, by a preponderance of the evidence, to be unpatentable, and therefore, Patent Owner's Revised Contingent Motion to Amend is denied;

FURTHER ORDERED that Petitioner's Motion to Strike is dismissed as moot; and

FURTHER ORDERED that, because this is a Final Written Decision, 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.

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