

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SOTERA WIRELESS, INC.,
Petitioner,

v.

MASIMO CORPORATION,
Patent Owner.

IPR2020-00954
Patent 9,788,735 B2

Before JOSIAH C. COCKS, JENNIFER MEYER CHAGNON, and
ROBERT L. KINDER, *Administrative Patent Judges*.

KINDER, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)
Dismissing Petitioner's Motion to Exclude
37 C.F.R. §§ 42.155(c), 42.64

I. INTRODUCTION

A. *Background and Summary*

Sotera Wireless, Inc. (“Petitioner”)¹ filed a Petition requesting *inter partes* review of U.S. Patent No. 9,788,735 B2 (“the ’735 patent,” Ex. 1001). Paper 1 (“Pet.”). The Petition challenges the patentability of claims 1–20 of the ’735 patent. Masimo Corporation (“Patent Owner” or “Masimo”) filed a Preliminary Response to the Petition. Paper 7.

On November 25, 2020, we instituted trial. Paper 13 (“Inst. Dec.” or “Decision to Institute”). Patent Owner filed a Response. Paper 21 (“PO Resp.”). Petitioner filed a Reply. Paper 25 (“Pet. Reply”). Patent Owner filed a Sur-Reply. Paper 30 (“Sur-Reply”). An oral argument was held on August 26, 2021, and a transcript was entered into the record. Paper 40 (“Tr.”).

We have jurisdiction to conduct this *inter partes* review under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons discussed herein, we determine that Petitioner has shown, by a preponderance of the evidence, that all challenged claims (claims 1–20) of the ’735 patent are unpatentable.

B. *Related Proceedings*

Petitioner identifies *Masimo Corp. v. Sotera Wireless, Inc.*, Case No. 3:19-cv-01100-BAS-NLS (S.D. Cal.), served on June 13, 2019, as a related

¹ Petitioner identifies Hon Hai Precision Industry Co., Ltd. as a real party-in-interest “because Hon Hai agrees to be bound by the estoppel provisions of 35 U.S.C. § 315(e).” Pet. 1.

proceeding involving the '735 patent. Pet. 2; Ex. 1029; Ex. 1030. Petitioner also identifies IPR2020-00912, involving the same parties and U.S. Patent No. 10,213,108, which is a parent to the '735 patent. Pet. 2.

C. The '735 Patent

The '735 patent is directed to an “Body Worn Mobile Medical Patient Monitor.” Ex. 1001, code (54). The '735 patent claims priority through a series of continuation applications to Provisional Application No. 60/367,428, filed on March 25, 2002. *Id.* at codes (63), (60). The invention relates to “[a] body worn mobile medical monitoring device configured to minimize cable wiring from a sensor by placement of one or more sensor communication ports.” *Id.* at code (57). Structurally, the “device includes a housing securable on a lower arm of a patient, a display, and a sensor communication port positioned on a side of the housing.” *Id.* The body worn medical monitoring device may have other input or output ports that download software or provide a wired connection to other measurement instruments. *Id.* at 5:56–61.

The Specification describes a drawback to “[c]onventional physiological measurement systems,” as requiring a “patient cable connection between sensor and monitor.” *Id.* at 2:22–24. The Specification also describes the problems related with “disconnection of monitoring equipment and a corresponding loss of measurements,” when needing to move patients. *Id.* at 2:25–28. A goal of the '735 patent was to allow patient mobility by providing “wireless communication links between sensors and monitors.” *Id.* at 2:28–38; Fig. 3. The invention also sought “to provide a communications adapter that is plug-compatible both with existing

sensors and monitors and that implements a wireless link replacement for the patient cable.” *Id.*

As depicted in Figure 4A below, sensor module 400 is plug-compatible with conventional sensor 310. *Id.* at 4:58–59. Wrist-mounted module 410 has module connector 414 with auxiliary cable 420 running therefrom to mate with sensor connector 318. *Id.* at Fig. 4A, 5:27–61.

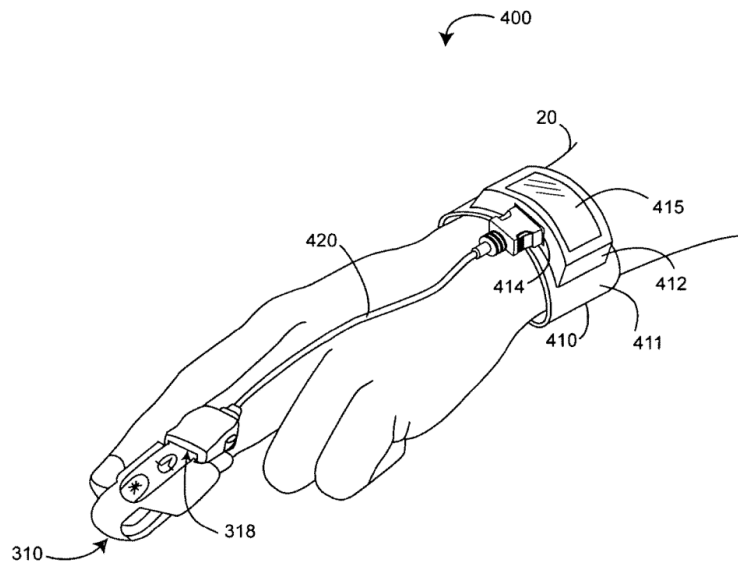


FIG. 4A

Figure 4A illustrates an embodiment of the “communications adapter sensor modules.” *Id.* at 4:5–6. Wrist-mounted module 410 may have display 415 that shows sensor measurements, module status, and other visual indicators, such as monitor status. *Id.* at 5:39–42.

The Specification explains that in certain embodiments wrist-mounted module 410 may have other input or output ports that download software, configure the module, or provide a wired connection to other measurement instruments or computing devices. *Id.* at 5:54–61. In such embodiments, the wearable device can communicate with multiple sensors, and a multiple

parameter sensor module with sensor interfaces and signal processors may be used as depicted in Figure 13, below. *Id.* at 11:56–66.

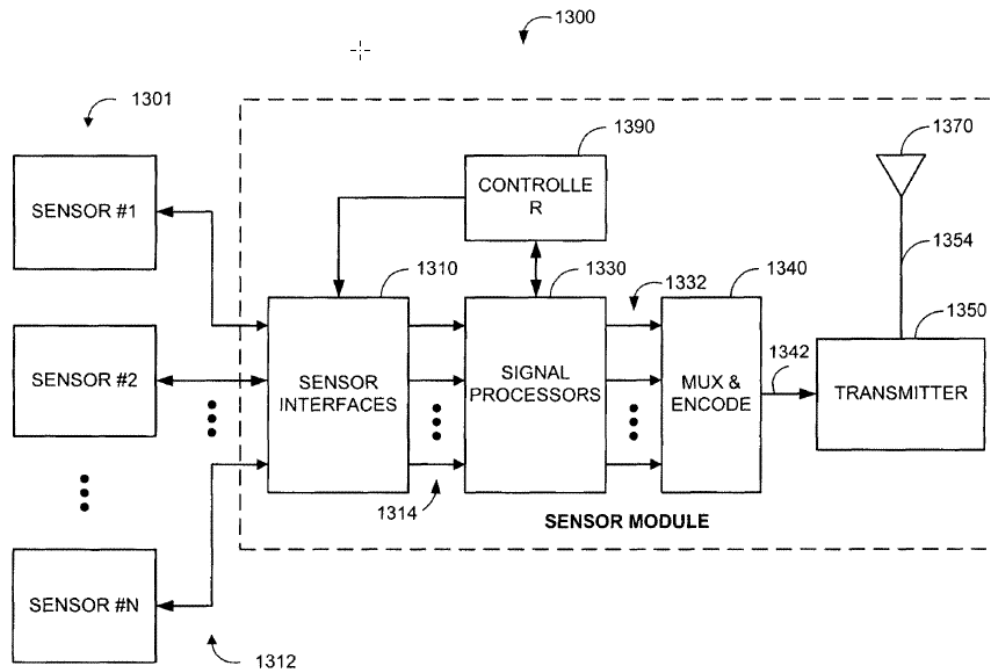


FIG. 13

Figure 13 depicts a functional block diagram of a sensor module configured for multiple sensors. *Id.* at 4:24–25. The Specification also notes that sensor signal conditioning may be performed in the analog domain or digital domain or both. *Id.* at 6:61–65.

D. Illustrative Claim

Claim 1, reproduced below in chart form with Petitioner’s added designations to identify each limitation, is illustrative of the claims at issue:

Designation	Claim Language
Claim 1 (Preamble) 1(a)	A body worn mobile medical monitoring device configured to minimize cable wiring from a sensor by placement of one or more sensor communication ports, the mobile medical monitoring device comprising:

Designation	Claim Language
Limitation 1(b)	a housing configured to be secured on a lower arm of a patient being monitored via a strap extending around the lower arm of the patient;
1(c)	a display positioned on a face of the housing, opposite the strap, so as to be visible to a user;
1(d)	a first sensor communication port positioned on a side of the housing and configured to face a hand of the lower arm of the patient when the mobile medical monitoring device is mounted to the lower arm of the patient, wherein: the side of the housing faces the hand of the lower arm of the patient of the patient when the mobile medical monitoring device is mounted to the lower arm of the patient,
1(e)	the first sensor communication port is configured to provide wired communication with a pulse oximetry sensor attached to a digit of the hand of the patient,
1(f)	the wired communication with the pulse oximetry sensor provided at least partly in the analog domain, and
1(g)	the first sensor communication port is positioned on the side of the housing such that a path from the first sensor communication port on the side of the housing to the digit of the patient is substantially perpendicular to the side of the housing and shorter than any other path from any other side of the housing to the digit of the patient;
1(h)	a plurality of additional sensor communications ports positioned on the housing and configured to provide wired communication with a plurality of additional physiological sensors at least partly in the digital domain; and
1(i)	one or more processors and a transmitter configured to:
1(j)	display, on the display, physiological measurements derived from the pulse oximetry sensor and the plurality of additional physiological sensors; and

Designation	Claim Language
1(k)	wirelessly transmit information indicative of the physiological measurements to a remote computing device.

Ex. 1001, 13:14–56; Pet. xiii–xiv (Listing of Claims).

Independent claim 13 (also challenged) is similar in scope to claim 1, but also requires the “a battery configured to provide power to the medical monitoring device” as well as “a case configured to house the battery.” Ex. 1001, 14:38–15:9. Independent claim 20 incorporates many of the limitations of the dependent claims and has unique limitations not found in claim 1, such as “the front side of the housing comprises a single user interface and a bezel,” and “a rechargeable battery.” *Id.* at 15:59–18:18.

E. Evidence

Petitioner relies on the following references:

Reference	Exhibit
U.S. Patent No. 6,840,904, filed on Oct. 11, 2001 and issued Jan. 11, 2005 (“Goldberg”)	1005
PCT Publication No. WO 00/42911, published on July 27, 2000 (“Kiani”)	1006
EP0880936A2, filed on Oct. 30, 1997 and published on Dec. 2, 1998 (“Akai”)	1007
U.S. Patent No. 5,919,141, filed on Sept. 13, 1996 and issued on July 6, 1999 (“Money”)	1008
PCT Publication No. WO 99/13698 filed on Aug. 28, 1998 and published Mar. 18, 1999 (“Estep”)	1009
U.S. Patent No. 4,425,921, filed on Sept. 11, 1981 and issued on Jan. 17, 1984 (“Fujisaki”)	1016

Petitioner also relies on the Declaration of George E. Yanulis, D.Eng. (Ex. 1003) in support of its arguments as well as the Reply Declaration of Bryan Bergeron, M.D. (Ex. 1040). Patent Owner relies on the Declaration of Alan L. Oslan (Ex. 2010) in support of its arguments. The parties rely on additional evidence and exhibits as further discussed below.

F. Asserted Grounds of Unpatentability

Petitioner asserts that the challenged claims of the '735 patent are unpatentable based on the following grounds (Pet. 6–7):

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1, 2, 7–9	103(a)	Goldberg, Kiani, Money
3–6, 13–19	103(a)	Goldberg, Kiani, Money, Fujisaki
10–12	103(a)	Goldberg, Kiani, Money, Estep
20	103(a)	Goldberg, Kiani, Money, Fujisaki, Estep
1, 2, 7–9	103(a)	Money, Akai, Kiani.
3–6, 13–19	103(a)	Money, Akai, Kiani, Fujisaki
10–12	103(a)	Money, Akai, Kiani, Estep
20	103(a)	Money, Akai, Kiani, Fujisaki, Estep

II. ANALYSIS

Petitioner bears the burden of establishing the unpatentability of any claim by a preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). This burden of persuasion never shifts to the patent owner.

Dynamic Drinkware, LLC v. Nat’l Graphics, Inc., 800 F.3d 1375, 1378 (Fed. Cir. 2015).

A. Principles of Law

1. Obviousness

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 said subject matter pertains. *See KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness.² *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). In that regard, an obviousness analysis “need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *KSR*, 550 U.S. at 418; *accord In re Translogic Tech., Inc.*, 504 F.3d 1249, 1259 (Fed. Cir. 2007).

2. Level of Ordinary Skill in the Art

Petitioner contends that a person of ordinary skill in the art “would have been a person with at least a B.S. degree in electrical or biomedical engineering or a related field with at least two years’ experience designing

² The parties have not directed our attention to any objective evidence of non-obviousness in the final record before us.

patient monitoring systems.” Pet. 14 (citing Ex. 1003 ¶¶ 25–32). “Patent Owner does not dispute Petitioner’s characterization of the level of ordinary skill in the art.” PO Resp. 14.

Based on the final record, we adopt Petitioner’s proposed description of the person of ordinary skill in the art.

B. Claim Construction

In an *inter partes* review for a petition filed on or after November 13, 2018, a claim “shall be construed 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) (2019). In applying this claim construction standard, we are guided by the principle that the words of a claim “are generally given their ordinary and customary meaning,” as understood by a person of ordinary skill in the art in question at the time of the invention. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc) (citation omitted). “In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17). Of course, “[t]here is a heavy presumption that claim terms are to be given their ordinary and customary meaning.” *Aylus Networks, Inc. v. Apple Inc.*, 856 F.3d 1353, 1358 (Fed. Cir. 2017). “Properly viewed, the ‘ordinary meaning’ of a claim term is its meaning to the ordinary artisan after reading the entire patent.” *Id.* (quoting *Phillips*, 415 F.3d at 1321).

Petitioner contends that the claim terms “are to be given their plain and ordinary meaning, as understood by one of ordinary skill in the art, in view of the ’735 patent’s specification.” Pet. 14. Petitioner further states that “the Board need not construe any claim terms to find the claims invalid.” Pet. 14–15 n.1.

In our Decision to Institute, we gave the claim terms their plain and ordinary meaning and determined that it was unnecessary to further construe any claim term. We did note, however, that the claims require “sensor communication port(s).” *See, e.g.*, Ex. 1001, claim 1. We invited the parties to address this term to the extent the parties contend that “sensor communication port” has any special meaning or otherwise should be construed. Inst. Dec. 21.

In its Response, Patent Owner contends that we “should construe ‘sensor communication port,’ according to its plain and ordinary meaning of a ‘connector that mates with a compatible connector from a sensor.’” PO Resp. 15. Patent Owner cites to various portions of the Specification describing how sensor ports connect to modules through use of a cable and also how a sensor connector mates with an auxiliary cable providing a wired link between a conventional sensor and a wrist-mounted module. *Id.* at 15–17 (citing Ex. 1001, 4:65–5:2, 5:33–38, Figs. 3, 4A). Patent Owner also cites to contemporaneous dictionaries to confirm that a port is a connector that mates with a compatible connector from a sensor. *Id.* at 17–18 (citing Exs. 2020, 2021, 2019).

Patent Owner argues that the Specification “distinguishes the ‘port’ type connection illustrated in Figure 4A from a hardwired or direct connection.” PO Resp. 18. Thus, Patent Owner contends that “a PHOSITA

[person having ordinary skill in the art] would understand that the term ‘sensor communication port’ involves a removable connection and does not include hardwired connections.” *Id.* (citing Ex. 2010 ¶ 39). Patent Owner states that “[a]ll other terms in the ’735 Patent should also be given their plain and ordinary meanings.” *Id.* at 19.

Petitioner, in Reply, argues that “[t]he construction of ‘sensor communication port’ is not an issue that the Board must resolve to find the ’735 Patent invalid,” and “Masimo makes no contention that the prior art ports are not ports under its construction.” Pet. Reply 1–2. Petitioner additionally argues that “Masimo’s expert freely admitted that ports were known,” and “[a]s such, construction of this term is not case dispositive.” *Id.* at 2 (citing Ex. 1042, 23:3–5). *See also* Tr. 35:16–23 (“[T]hey cite the dictionary definitions technically a port does not have to be removed. I think in the more normal sense of a port it’s removable but . . . the dictionary definitions don’t require removable. It does not matter. We’ve got prior art all over the place.”). We agree with Petitioner that it is not necessary to further define a sensor communication port.

Because we determine that Kiani in combination with Goldberg teaches the claimed sensor communication port under any reasonable definition, including those offered by Patent Owner, we need not further elaborate on the scope of a “sensor communication port.” *See* Tr. 34:23–35:23, 36:14–24, 40:20–41:16. That is to say that even if agree with Patent Owner that the term “sensor communication port” involves a removable connection, and does not include hardwired connections (PO Resp. 19), such a determination is not dispositive because Kiani clearly teaches a removable

connection as further explained below.³ Only those terms that are in controversy need be construed, and only to the extent necessary to resolve the controversy (*e.g.*, whether the claim reads on a prior art reference). *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017). We do not see the need to further construe any additional claim term.

C. The Asserted Prior Art

1. Goldberg

Goldberg is titled, “Medical Monitoring Device and System,” and it broadly discloses a wireless, wearable patient monitoring device. Ex. 1005, codes (54), (57). More specifically, Goldberg teaches portable device 100 that receives data from multiple sensors, displays the sensor data, and wirelessly transmits sensor data to a remote computer. *Id.* at 1:29–44, 2:27–29, 4:20–30, 4:50–56, 5:3–8, 2:37–42, 2:47–55. Goldberg discloses that “[v]arious sensors 104 are known in the art for converting physiological characteristics . . . into electrical signals,” and that “sensor(s) 104 can be coupled to the controller 102 and/or memory by wire or wirelessly, and such ways for coupling are well known in the art.” *Id.* at 4:23–30.

³ Indeed, we also note that Patent Owner itself describes Kiani as disclosing a sensor port, albeit in connection with other arguments discounting Kiani as disclosing multiple sensor ports. *See* PO Resp. 26 (“both experts now agree that Kiania teaches a single sensor port, **not** multiple ports.”). Furthermore, at the oral hearing, counsel for Patent Owner acknowledged that “Kiani would have a single sensor input port under our construction.” Tr. 53:18–19.

Figure 2 of Goldberg is reproduced below.

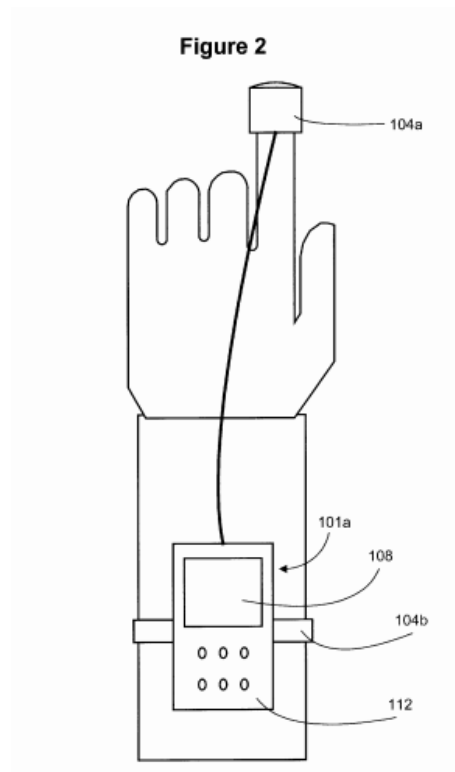


Figure 2 of Goldberg depicts portable device 101a mounted in an assembly or housing 112 that is sized to be carried by an individual and strapped to the wrist or forearm by any conventional strap apparatus. Ex. 1005, 4:57–60. In this embodiment, sensor 104a is a pulse oximetry sensor and blood pressure cuff sensor 104b monitors blood pressure. *Id.* at 4:63–67.

In other embodiments, “the medical monitoring device may contain one, all, or any combination of the above-mentioned sensor types,” including also a sensor to measure electrolyte levels. *Id.* at 5:1–8. The Specification states that the “invention may be comprised of any type of physiological sensor 104 suitable [f]or use with a portable monitoring device.” *Id.*

2. *Kiani*

Kiani discloses a portable pulse oximetry sensor that communicates with conventional bedside monitors. Ex. 1006, code (57). Kiani seeks to

provide a transportable pulse oximeter that can stay with and continuously monitor the patient as they are transported. *Id.* at 3:1–4. Kiani describes conventional pulse oximetry sensors, including sensors with sensor ports, as well as portable devices having both batteries and displaying status indicators. *Id.* at 3:21–23, 5:21–22, 8:31–9:2, Fig. 5. Kiani notes that its portable docking station combination is also universally compatible with pulse oximeters from various manufacturers. *Id.* at code (57). Kiani describes its portable portion as being “removably attached” and in communication with the docking station when the portable portion is attached to the docking station. *Id.* at 19:22–26.

As depicted below, Kiani describes handheld embodiment 500 of the universal/upgrading pulse oximeter that includes external power supply input 530, oximeter output port 540 for connection to the external pulse oximeter, and single sensor input 550 at the top edge. *Id.* at Fig. 5, 8:31–9:2.

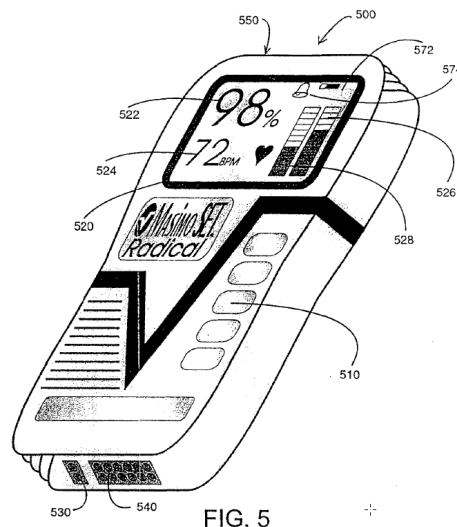


Figure 5 of Kiani depicts a handheld embodiment. As shown, Kiani’s display 520 shows measured oxygen saturation 522, pulse rate 524, confidence bar 528, low battery 572, and alarm enabled 574 status indicator. *Id.*

3. *Money*

Money is titled “Vital Sign Remote Monitoring Device.” Ex. 1008, code (54). Money teaches a portable, multi-parameter patient monitor that receives digital signals from some sensors and analog signals from other sensors. Ex. 1008, 5:48–51, 5:61–6:10, 7:4–8. An RF transmitter transmits both analog and digital vital sign data to a remote monitoring station. *Id.* at code (57). The remote patient monitoring device “must provide an electronic interface to a wide variety of vital sign transducers, and process both analog and digital data.” *Id.* at 7:4–6. Overall logic control and processing of data by the remote patient monitoring device is determined by a processor, which has “integral analog to digital (A/D) conversion capabilities . . . to allow direct connection of vital sign data in analog format.” *Id.* at 7:32–34, 7:49–52.

4. *Fujisaki*

Fujisaki is titled “Apparatus for Checking Pulse and Heart Rates.” Ex. 1016, code (54). Fujisaki is a small portable device for checking pulse rate and it teaches that wearable devices include removable cables to interface with sensors. *Id.* at code (57), 5:37–44, Figs. 2, 6.

Figure 2 of Fujisaki is reproduced below.

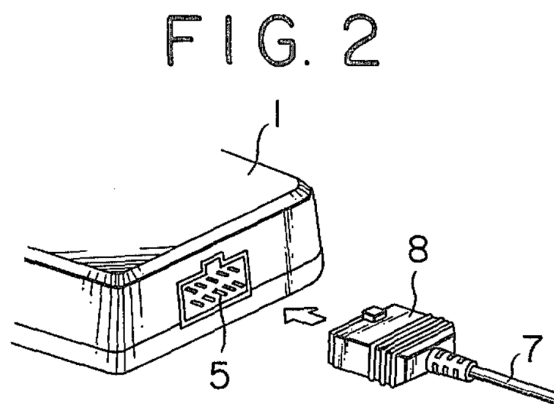


Figure 2 of Fujisaki depicts a partial perspective view of connector pin 5 provided for receiving connector plug 8 to create a removable connection for either a heart or pulse sensor. Ex. 1016, 5:37–44.

5. *Estep*

Estep teaches a wearable electric signal measurement device with a display 31 surrounded by a bezel (i.e., border). Ex. 1009, 4:24–27, Fig. 3C; Ex. 1003 ¶ 45.

6. *Akai*

Akai is titled “Monitoring physical condition of a patient by telemetry,” and it discloses a wearable monitoring device for monitoring blood glucose levels. Ex. 1007, codes (54), (57). Akai teaches a measurement unit that connects to three or more sensors, displays readings from the sensors, and wirelessly transmits those readings to a central computer. *Id.* at code (57). Akai’s housing has a wired connection with a pulse oximetry sensor that extends along a path substantially perpendicular to the side of housing 112 facing the hand. *Id.* at Fig. 1.

D. *Asserted Obviousness in View of Goldberg, Kiani, and Money*

Petitioner asserts that claims 1, 2, and 7–9 would have been obvious in view of Goldberg, Kiani, and Money. *See* Pet. 16–35. We discuss below the parties’ arguments as to claim 1, as well as Petitioner’s contentions as to claims 2 and 7–9, and then provide our analysis and determinations.

1. *Petitioner’s Arguments and Evidence*

As described in more detail in the Petition, Petitioner relies on Goldberg, Kiani, and Money for teaching the limitations of claim 1. *See* Pet. 16–35. For ease of reference, we refer to each claim limitation

according to the labeling set forth above, and adopted by Petitioner. *See* Pet. xiii–xiv.

Claim 1

Petitioner first notes that “Goldberg, Kiani, and Money are all related to the same field (portable, wearable patient monitoring) and describe the same device: a portable medical monitor,” and “all use portability to solve the same problem, namely, to portably monitor a patient.” Pet. 16. Petitioner relies on Kiani for its teachings that portable electronic devices require battery power, and wired connections often include sensor ports. Pet. 18, 22, 39. Petitioner also contends sensor ports would be features a person of ordinary skill in the art would understand Goldberg to also implicitly disclose. *Id.* Petitioner relies on Money for its teaching of a system that may receive both “analog signals from some sensors and digital signals from others,” as explained more below. Pet. 28. Petitioner also argues that combining Kiani and Goldberg represents a combination of prior art elements according to known methods to yield predictable results. Pet. 23. Petitioner likewise argues that “modifying Goldberg/Kiani with Money would have been a combination of familiar elements according to known methods yielding predictable results.” Pet. 29.

Petitioner contends the preamble (1a) is not limiting, but even if it were limiting, Goldberg teaches the claimed “body worn medical monitoring device to minimize cable wiring from a sensor by placement of one or more sensor communication ports.” Pet. 17; Ex. 1005, 4:57–67. Goldberg discloses portable device 100 strapped to a person’s wrist or forearm, which may receive data from at least a pulse oximetry sensor, a blood pressure cuff

sensor, and a third sensor such as an electrolyte sensor. Pet. 17; Ex. 1005, 4:57–67, 5:3–8, 5:39–47.

As shown in Figure 1, Goldberg teaches that the pulse oximetry sensor 104a is positioned on a user's finger, and the blood pressure cuff sensor 104b is positioned on a person's forearm or wrist. According to Petitioner, Goldberg teaches the wire between pulse oximetry sensor 104a and housing 112 is “at the closest possible location to the patient's hand, where a pulse oximetry sensor attaches to minimize the length of the wire using the shortest distance between two points.” Pet. 17–18 (citing Ex. 1003 ¶ 57; Ex. 1005, 4:26–29, 4:60–62, Fig. 2).⁴

As for the preamble discussion of one or more sensor communication ports, Petitioner argues that a person of ordinary skill in the art “would understand the wire electrically connects to the housing via a port, or it would have been obvious to include a port as part of this electrical connection in view of Kiani.” Pet. 18. These sensor communication port limitations are discussed more below. As explained more below, Petitioner establishes that the recitations in the preamble are satisfied by the prior art.

As for limitation 1(b), Petitioner shows that Goldberg teaches a housing secured or strapped to the person being measured at the person's wrist or forearm. Pet. 18–19 (citing Ex. 1003 ¶¶ 59–60; Ex. 1005, 4:19–30, 4:57–60, 4:64–67, Fig. 2). Goldberg's blood pressure cuff sensor 104b functions as both a sensor and a strap secured to the back of the housing to fix the portable device to the patient's wrist. *Id.*

⁴ The parties do not dispute that Goldberg teaches the subject matter recited in the preamble. We agree that the preamble is satisfied by the prior art. Accordingly, we need not decide whether the preamble is limiting.

Limitation 1(c) requires a “display positioned on a face of the housing.” *See supra*. Petitioner shows how Goldberg teaches a display 108 that displays sensor data and is located on a face of the housing opposite the strap and visible to a user. Pet. 19 (citing Ex. 1003 ¶ 62; Ex. 1005, 6:32–45, Figs. 6A–B).

Petitioner next shows how Goldberg teaches the limitations of 1(d) related to “a first sensor communication port positioned on a side of the housing and configured to face a hand of the lower arm.” Pet. 20–21. Dr. Yanulis testifies that “[a] port is typically a female connection or socket of a wired connection.” Ex. 1003 ¶ 64 (citing Ex. 1001, 5:33–36, Fig. 4B). Dr. Yanulis testifies that a person of ordinary skill in the art would assume that Goldberg would use a port to transmit the signals into the housing and to the controller because “the male-female relationship of wired connections is a preferred method of electrical connection because it provides a more secure connection than merely contacting two electrical conductors.” *Id.* Dr. Yanulis testifies that “[p]orts are also preferable over hardwiring a sensor to a monitor because hardwiring a sensor to a monitor provides no adaptability,” and patients benefit from the adaptability to connect wired connects through ports, which provide an end user the ability to disconnect and connect a variety of sensors as needed. *Id.*; Pet. 23 (a person of ordinary skill would understand how to “build wired connections that allow for sensors to be readily connected and disconnected as needed, and ports were known to provide such adaptability”).

Petitioner and Dr. Yanulis note that the types of connections Goldberg could use would be limited to a select few, including a hardwired connection

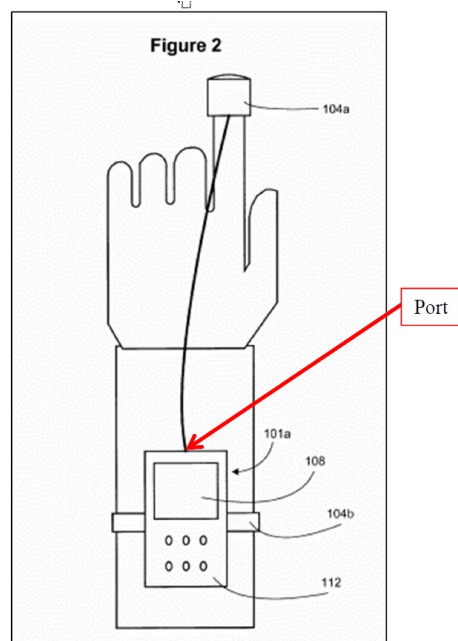
or a port. Ex. 1003 ¶ 64; Pet. 21–22. Petitioner contends that Kiani provides specific teachings and motivation for using a port in Goldberg:

To the extent Goldberg doesn't explicitly recite a port, Kiani teaches that sensor input ports 540,⁵ 550 were well-known for wired communication. EX1006, 3:21-27, 8:31-9:2. As such, Kiani explicitly explains that which was implicitly known to a PHOSITA: wired connections can communicate with electrical devices via ports, such as the wired connection of the pulse oximetry sensor 104a shown in Goldberg. *Id.*; EX1003, ¶ 65. It would have been obvious to include the port taught by Kiani on the portable device of Goldberg to establish easy removal and replacement of the sensor 104a, and predictably resulting in a secure, wired connection. EX1006, 2:34-3:4; EX1003, ¶¶ 64-65.

Pet. 22. Similarly, Dr. Yanulis testifies that Kiani shows that sensor input ports were a known vehicle for wired communication, and including a port on Goldberg's housing would predictably enable wired communication with pulse oximeter 104a while allowing easy removal and replacement of sensor 104a providing the adaptability required by clinicians. Ex. 1003 ¶ 65.

Figure 2 of Goldberg shows the first sensor communication port faces the hand and exists on the side of the housing facing the hand when the person is wearing the portable device as further required by this claim limitation 1(d) and as depicted below. Pet. 20 (citing Ex. 1003 ¶ 66).

⁵ Port 540 is the oximeter output for connection to the external pulse oximeter. Ex. 1006, Fig. 5, 8:31–9:2. A sensor input port is listed as 550 but not shown. *Id.*



Petitioner's annotated Figure 2 of Goldberg (Pet. 21) with added notation showing where Petitioner contends Kiani's sensor port would be located.

Petitioner shows how the combination of Goldberg and Kiani teaches that the pulse oximetry sensor 104a provides electrical signals representing oxygen saturation to the electronic controller 102 via a wired connection and through the first sensor communication port. Pet. 21, 23–24. As further required by limitation 1(e), Petitioner demonstrates that Goldberg's pulse oximetry sensor is attached to a finger of the patient's hand. Pet. 24.

Limitation 1(f) requires that “the wired communication with the pulse oximetry sensor provided at least partly in the analog domain.” *See supra*. Petitioner recognizes that Goldberg does not explicitly state whether the signal from the pulse oximetry sensor is analog or digital. Pet. 24. Petitioner relies on Kiani because “Kiani teaches a sensor interface 120 with an amplifier and a filter that receives an analog signal from a pulse oximetry sensor.” *Id.* (citing Ex. 1006, 1:26–28). Petitioner contends “the combination of Goldberg and Kiani represents a substitution of one

equivalent SpO2 [sic] sensor for another to achieve predictable results (transferring oxygen saturation data via an analog signal).” Pet. 25.

Relying on the testimony of Dr. Yanulis, Petitioner reasons that “it would have been obvious to provide the wired communication with the pulse oximetry sensor of Goldberg in the analog domain because there are only a finite number of options (two) for transmitting signals: analog or digital, and choosing analog would have been, at worst, obvious to try.” *Id.* (citing Ex. 1003 ¶¶ 71–73). Further, Dr. Yanulis testifies that “signals are either analog or digital. There are only two options, so it would have been obvious to transmit signals as either digital or analog signals.” Ex. 1003 ¶ 73.

Limitation 1(g) requires the first sensor communication port positioned on the side of the housing and wired connection path to extend from the first sensor communication port to the digit of the patient in a path that is substantially perpendicular to the side of the housing. *See supra.* Petitioner shows how Goldberg (Fig. 2) includes a wire between the pulse oximetry sensor 104a and the housing 112 that extends from the first sensor communication port along a path substantially perpendicular to the first side (side facing the patient’s hand) of the housing. Pet. 25. As shown in Figure 2, Goldberg’s “wire’s path is the shortest from any side of the housing when the sensor is attached to the patient’s finger because the wire’s path is the most direct path possible from the housing to the finger.” *Id.* (citing Ex. 1003 ¶¶ 74, 75; Ex. 1005, Fig. 2).

Limitation 1(h) next recites “a plurality of additional sensor communications ports positioned on the housing and configured to provide wired communication with a plurality of additional physiological sensors at least partly in the digital domain.” Petitioner contends “Goldberg teaches a

system capable of communicating with more than two sensors.” Pet. 26 (Ex. 1003 ¶ 76; Ex. 1005, 4:19–29, 5:3–8). According to Petitioner, “Goldberg explains the portable device 100a communicates with three or more sensors (SpO₂, blood pressure, and electrolyte), but the electrolyte sensor could also be replaced with an ECG, temperature, or respiration rate sensor.” *Id.* (citing Ex. 1005, 4:57–5:8, 1:37–44, 4:24–27). Further, “Goldberg teaches sensors communicate with the controller via wired connections.” *Id.* (citing Ex. 1005, 4:19–29, 5:3–8).

Although Petitioner contends “Goldberg implicitly teaches these wired connections include ports,” Petitioner also argues that “sensor ports were conventional for wired connections,” asserting it would have been obvious in view of Kiani “to include sensor ports for all wired connections with sensors.” Pet. 27 (citing Ex. 1003 ¶¶ 77, 79; Ex. 1005, 4:19–29, 5:3–8, 3:21–27, 8:31–9:2). Relying on Dr. Yanulis, Petitioner contends “Kiani also teaches sensor ports are positioned on a monitor’s housing,” thus, “Goldberg as ‘modified’ by Kiani would predictably include a plurality of ports positioned on the housing 112 and configured to receive signals from the blood pressure and electrolyte (or others) sensors via wired connections.” *Id.* (citing Ex. 1005, 4:19–29, 5:3–8; Ex. 1003 ¶ 78).

Next, in addressing the requirement for digital communications, Petitioner argues “Goldberg doesn’t expressly teach whether the sensors communicate via digital (or analog) communications, but Goldberg teaches the portable device 100 can communicate with any sensor, which would include analog and digital devices.” Pet. 28 (citing Ex. 1005, 5:6–8). Petitioner relies on Money because it “teaches a system that receives analog signals from some sensors and digital signals from others,” and “Money

even describes the power requirements and requisite circuitry to communicate with both sensor types.” *Id.* (citing Ex. 1003 ¶¶ 81, 82; Ex. 1008, 5:48–51, 7:4–8, 7:16–20, 7:58–62, 12:4–7, 13:24–32).

Dr. Yanulis explains how Money teaches the requisite circuitry to output a digital signal representative of a patient’s temperature and how to send digital packets via the RS232 protocol to be received by a serial port. Ex. 1003 ¶ 83 (citing Ex. 1008, 10:59–11:5, Fig. 1, 7:49–52, 6:11–20, 11:51–53). Dr. Yanulis also testifies that data may be digitized in different locations and that determination is a simple design choice. Ex. 1003 ¶ 84 (“it is simply a design choice as to which sensor to connect to the RS232 port”). Dr. Yanulis testifies that “[i]t would have been obvious to modify Goldberg with Money so that the system of Goldberg would function with more sensors and more sensor types,” and Goldberg may communicate with any conventional sensor using either digital data, or analog data. Ex. 1003 ¶ 85 (citing Ex. 1008, 5:48–51, 7:4–8, 7:16–20, 13:24–32).

Petitioner demonstrates how Goldberg teaches controller 102 configured to process sensor signals, thus meeting limitation 1(i). Pet. 29 (citing Ex. 1003 ¶ 87; Ex. 1005, 4:34–36). Limitation 1(j) requires the display of “physiological measurements derived from the pulse oximetry sensor and the plurality of additional physiological sensors.” *See supra*. Petitioner contends, and we agree, that Goldberg’s controller derives and displays measurements of oxygen saturation, blood pressure, and glucose based on the signals received from the sensors. Pet. 30 (citing Ex. 1003 ¶ 88; Ex. 1005, 4:19–23, 4:30–36, 50–55, Figs. 6A–C).

As for limitation 1(k), Petitioner demonstrates how Goldberg wirelessly transmits information indicative of the physiological

measurements to the remote computing device. Pet. 30. More specifically, Goldberg discloses how “communication unit 110 wirelessly transmits sensor measurements, including oxygen saturation and blood pressure, to remote computer 302.” *Id.* (citing Ex. 1005, 4:19–23, 4:50–55, 5:9–24, Figs. 6A–C; Ex. 1003 ¶ 89).

Remaining Claims

For each of the remaining claims examined below in this ground, Patent Owner does not specifically contest Petitioner’s arguments and evidence. We find Petitioner’s contentions and evidence, which are summarized below, persuasive for these remaining claims.

Claim 2

Claim 2 depends from claim 1 and further requires, “the wired communication with the pulse oximetry sensor is provided via a tail extending from the pulse oximetry sensor.”

Petitioner contends that a POSITA would understand based on the ’735 patent that “a tail is a wire” and “Goldberg teaches a pulse oximetry sensor that includes a wire connecting the pulse oximetry sensor to the controller.” Pet. 30 (citing Ex. 1005 4:19–29, Fig. 2); Tr. 33:9–34:19, 38:16–39:8.

Claims 7 and 8

Claim 7 depends from claim 1 and further requires, “the face of the housing comprises a single user interface.” Claim 8 depends from claim 7 and further requires, “single user interface comprises the display.”

Petitioner contends Goldberg teaches a single display for displaying data and a display is a user interface. Pet. 31 (citing Ex. 1005, 4:30–34, 6:32–46; Ex. 1003 ¶ 92).

Claim 9

Claim 9 depends from claim 8 and additionally requires “the housing comprises a back side that is opposite the face of the housing,” and “the strap is mountable to the back side of the housing, and the face of the housing is raised from the strap and the lower arm of the patient to enable positioning of the first sensor communication port on the side of the housing between the lower arm of the patient and the face of the housing.”

Petitioner contends that Goldberg teaches a “box-shaped housing having six sides,” and “a back side of the housing (not shown but facing into the patient’s arm) opposite the face of the housing (where the display is positioned).” Pet. 31–32 (citing Ex. 1003 ¶ 94; Ex. 1005, Fig. 2). Figure 2 of Goldberg illustrates the housing positioned over the blood pressure strap, and Petitioner contends that “[b]ecause Goldberg illustrates the housing over the strap, a PHOSITA would understand the strap is mounted to the back side of the housing.” Pet. 32 (citing Ex. 1005, Fig. 2; Ex. 1003 ¶¶ 95–96). Petitioner also notes that Goldberg teaches “the housing can be strapped to the patient according to any conventional strap apparatus,” and as such “it would have been obvious to secure the blood pressure cuff to the back side of the housing because there are only a finite number (two) of identifiable places to mount a strap to Goldberg’s housing.” Pet. 33 (citing Ex. 1005, 4:57–60; 1003 ¶ 98).

2. *Patent Owner’s Arguments and Evidence*

Patent Owner argues that claims 1–20 are not obvious over the combination of Goldberg and Kiani. PO Resp. 22–44. Patent Owner first contends that the proposed combination fails to disclose all the claim limitations. *Id.* at 2. Specifically, Patent Owner contends Goldberg does not

disclose any claimed sensor ports and Kiani discloses only one sensor port. *Id.* “Thus,” according to Patent Owner, “neither Goldberg nor Kiani discloses a device with multiple ports or how multiple ports could be incorporated into a device mountable on the lower arm.” *Id.* Patent Owner also questions whether the combination of references, and specifically Money, teach the claimed data signal configurations (analog and digital). *Id.* at 42.

Second, Patent Owner contends that there is no credible motivation for the asserted combination and modifications, and that the combination is based on hindsight, because Petitioner fails to present a motivation to modify Goldberg to add sensor ports. *Id.* at 3. Patent Owner also argues that the motivations given for the combination of references ignore numerous obstacles and disadvantages to the proposed modifications. *Id.* Each of these arguments are discussed more below.

Patent Owner argues that the disclosure of Goldberg does not include any sensor ports. *Id.* at 23. Patent Owner relies on the testimony of Mr. Oslan and argues that Goldberg’s wire extending into the housing is a “wire directly connected to a circuit board,” and thus Figure 2 shows a “hardwired connection between sensor 104a and the housing 112,” which “cannot be readily replaced with another sensor.” *Id.* at 24 (citing Ex. 2010 ¶¶ 65–66). Thus, Patent Owner contends that Figure 2 “does not illustrate or teach any connector on the housing that mates with a compatible connector from the sensor 104a.” *Id.* Patent Owner notes that a port would typically require a female connection or socket of a wired connection, but “[n]owhere does Goldberg describe a female connection, a socket, a receptacle, or anything

else that could potentially be construed as a port.” *Id.* at 24–25 (citing Ex. 2010 ¶ 65; Ex. 2013, 102:5–108:12, 121:14–20).

Patent Owner takes issue with Petitioner’s contention that a POSITA would assume the wire shown in Figure 2 teaches a port because ports are a common and typical electrical connection for a housing. PO Resp. 25. Patent Owner alleges “[t]hat assumption . . . is unsupported and legally improper.” *Id.* Patent Owner argues that because “Goldberg does not meet either Dr. Yanulis’ explanation of a port or Patent Owner’s proposed construction, Petitioner’s arguments for the additional port limitations also fall short.” *Id.* Patent Owner alleges that Dr. “Yanulis admitted . . . that Goldberg does not show a second sensor port and that it was only ‘a conceivable arrangement,’” and thus, “Goldberg . . . does not show a third sensor, much less a third sensor port, in Figure 2.” *Id.* at 25–26 (citing Ex. 2013, 121:14–122:7, 122:17–123:10; Ex. 2010 ¶¶ 67, 69).

Patent Owner contends that Petitioner fails to explain why a POSITA would have modified Goldberg with Kiani to have multiple sensor ports. *Id.* at 26. Patent Owner argues that Kiani only discloses a single sensor port (550) and the Board should disregard not only Dr. Yanulis’ original opinion that element 540 is a sensor input port, but also his reliance upon that opinion to conclude that Kiani discloses multiple sensor ports. *Id.* at 27.

Patent Owner argues that Petitioner’s reasons for combining references are generic and conclusory. *Id.* at 28–29. Patent Owner asserts that the reasons for a POSITA to add a sensor port between Goldberg’s SpO₂ (pulse oximetry) sensor and the housing are only conclusory testimony and nothing in the record supports the conclusion that in a medical context, hardwired sensors are undesirable. *Id.* at 28. Patent Owner alleges that

ports have disadvantages that “Yanulis’ declaration failed to consider.” *Id.* at 29. Patent Owner relies on Mr. Oslan’s testimony that “port connections can be accidentally detached; may have faulty or loose connections; may require more space and hardware to accommodate than a hardwired cable; and introduce additional parts, expense, and points of failure.” *Id.* (citing Ex. 2010 ¶¶ 64–65, 73, 78; Ex. 2013, 117:18–118:19 (discussing possibility of a port connection becoming detached)). In short, Patent Owner contends “Petitioner and Yanulis fail to consider whether any disadvantages of adding a port would dissuade a PHOSITA from making the alleged combination.” *Id.* at 30–31.

Patent Owner further contends that Dr. Yanulis provides no reason to modify Goldberg’s hardwired sensor to include a port, nor does he explain how a general need to conform and adapt patient monitors would motivate the specific addition of the claimed sensor ports, where the reference itself elected a different approach. PO Resp. 32. Patent Owner contends that “[t]o the extent that clinicians did ‘demand and expect patient monitors that conform and adapt as needed,’ . . . there were already devices that fulfilled that demand and expectation—conventional, full-sized patient monitors.” *Id.* (citing Ex. 2010 ¶¶ 75–76). Patent Owner also contends that “a PHOSITA would not expect a clinician to swap out the sensors in Goldberg’s device because Goldberg’s device is intended for personal use directly by the monitored person, rather than for a clinician in a critical care setting.” *Id.* at 33 (citing Ex. 2010 ¶¶ 75–80).

Patent Owner argues that “Petitioner and Yanulis fail to explain how combining Goldberg and Kiani to add a sensor port would enable the Goldberg device to connect with different types of sensors other than the

SpO2 sensor 104a.” *Id.* at 34. According to Patent Owner, “[a] PHOSITA as of 2002 would not have expected such interoperability or adaptability between different types of sensors.” *Id.* (citing Ex. 2010 ¶¶ 82, 102–103). Patent Owner contends that “Kiani’s invention was driven because of the need for the ability to use his revolutionary technology with older monitors that did not provide interchangeability with the newer technology. *Id.* at 35 (citing Ex. 1006, 2:24–3:12) (emphasis omitted). Based on this premise, Patent Owner alleges that “a PHOSITA reading Goldberg and Kiani would not be motivated to simply add a sensor port to allow Goldberg’s device to work with other sensors because such interchangeability was not expected and would not have been a predictable result.” *Id.* (citing Ex. 2010 ¶¶ 82, 102–103).

Patent Owner further contends that “Petitioner has also failed to show any teaching or reason to add additional ports to Goldberg” because the aspirational statements in Goldberg do not disclose or imply ports. PO Resp. 35. Similarly, Patent Owner contends that “Goldberg as modified by Kiani would not predictably include a plurality of ports because neither reference discloses a plurality of sensor ports.” *Id.* at 35–36.

Patent Owner next contends that a person of ordinary skill in the art would not have been motivated to add a sensor port between Goldberg’s blood pressure cuff and housing because a wrist-worn blood pressure cuff needs “an airtight pneumatic connection to an air pump to inflate the cuff” and “attempting to add a pneumatic or electrical and pneumatic port would be complicated, difficult and require significant, valuable space.” PO Resp. 37 (citing Ex. 2010 ¶ 89). Patent Owner argues that Petitioner failed to “identify any type of port that could be implemented between the housing

and the blood pressure cuff. Instead, Yanulis relies on the generic disclosure of a ‘sensor input port 550’ in Kiani. . . . But Kiani’s sensor input port 550 was for the SpO2 sensor, not a blood pressure sensor.” *Id.* at 37–38 (citing Ex. 1006, 8:31–9:2, Fig. 5; Ex. 2013, 120:12–133:19 (Dr. Yanulis cross-examination regarding how this combination could be achieved)). Patent Owner argues that “[a] PHOSITA reading Goldberg would not assume that Goldberg’s blood pressure cuff is removable or is connected via a port.” *Id.* at 38 (citing Ex. 2010 ¶¶ 67–68, 88). Further, Patent Owner contends “[a]dding a sensor to the cuff is typically undesirable because a PHOSITA would not want to place a rigid electronic device within a flexible inflatable air bladder, and add an additional point of failure.” *Id.* at 38–39 (citing Ex. 2010 ¶ 97). Similarly, Patent Owner argues that “adding a sensor port between the housing and the cuff would not be desirable or feasible given the size limitations for a wrist-worn device and the need for an air-tight seal between the cuff and the housing.” *Id.* at 39 (citing Ex. 2010 ¶ 89). Patent Owner points out additional difficulties in making the blood pressure cuff removable or adding a sensor port for it and concludes that “a PHOSITA would have recognized these difficulties and would not have been motivated to add a sensor port to Goldberg’s blood pressure sensor.” *Id.* at 40 (citing Ex. 2010 ¶¶ 91, 94–101).

As for the claimed multiple sensor ports, Patent Owner makes similar arguments as to why a POSITA “would not have been motivated to add multiple sensor ports to Goldberg.” PO Resp. 40–41. Patent Owner contends that a POSITA “would not have expected a sensor port for a different sensor arrangement to be a duplicate of the first sensor port that receives a signal from a pulse oximetry sensor.” *Id.* at 41 (citing Ex. 2010

¶¶ 102–103). Patent Owner alleges that even if Goldberg’s blood pressure sensor was modified to include a port, such a modification “would have been unique to the blood pressure cuff,” and thus, “a third sensor port would not have been an obvious duplication of either the first or second sensor ports.” *Id.* at 41.

For the analog and digital requirements also recited in the claims, Patent Owner contends that Petitioner’s proposed combination of Goldberg, Kiani, and Money fails to disclose these limitations. PO Resp. 42–43 (citing Ex. 2010 ¶¶ 108–109). Patent Owner argues that none of the references disclose the specific data signal communications required by the claims, which require a physiological sensor, separate from a pulse oximeter sensor, that provides digital communications. *Id.* at 42. Patent Owner contends that Petitioner ignores the specific arrangement of analog and digital inputs required by the claims, namely “receiving digital data from any sensors other than a pulse oximeter sensor.” *Id.*

Patent Owner argues that Money’s sensor configuration is the opposite of the configuration recited because Money receives digital data from a pulse oximeter sensor (labelled as SpO₂) and analog data from all other sensors as shown in the annotated Figure 1 of Money below.



Patent Owner's annotated Figure 1 of Money showing all sensor data other than SpO₂ being sent through an A/D converter. PO Resp. 43.

According to Patent Owner, because Money does not teach receiving digital data from any sensors other than a pulse oximeter sensor, incorporating the teachings of Money into the Goldberg/Kiani combination would result in a device that receives analog information from a pulse oximetry sensor (as allegedly taught by Goldberg/Kiani) and analog information from additional sensors (as taught by Money). *Id.* at 44–46. Patent Owner argues, however, that is not the signal arrangement recited in claims 1, 13, and 20, and Petitioner provides no contemporaneous evidence that the analog versus digital presentation of Money is somehow interchangeable or a mere design choice. *Id.* Patent Owner further argues that a POSITA would not have been motivated to add a sensor port that receives digital information from Goldberg’s blood pressure cuff. *Id.* Patent Owner contends that Petitioner relies on Money’s disclosure of multiple sensors that communicate with both analog and digital information, yet,

Petitioner fails to explain how or why a POSITA would have been motivated to modify Goldberg's other sensors send digital signals. *Id.*

3. Discussion

Based on the final record, Petitioner has shown by a preponderance of the evidence that claim 1 would have been obvious over Goldberg, Kiani, and Money. Patent Owner attacks each of the references without fully considering the proposed combination and teachings as a whole. Patent Owner alleges that Goldberg does not teach a port because it must have been a hardwired connection (*see, e.g.*, Sur-Reply 3–7), yet Patent Owner does not dispute that removable port connections were known,⁶ and the record provides ample evidence of their recognized benefits (*see, e.g.*, Ex. 1003 ¶¶ 64, 65 (Dr. Yanulis explaining the desirability of sensors using ports as opposed to basic hard wiring.)). Patent Owner attacks Kiani as only teaching a single port connection (*see, e.g.*, PO Resp. 26–28, 41), yet Goldberg teaches the advantages of having multiple sensors and thus multiple connections. Goldberg explains that multiple physiological sensors, either wired or wireless, may be used in “any combination.” *See* Ex. 1005, 4:50–5:8.

Petitioner's evidence and supporting testimony show that there were only a few options for the wired sensor connections disclosed in Goldberg and, in light of the teachings of Kiani, using a sensor port would have predictably allowed for adaptability and flexibility in patient care that would

⁶ Patent Owner construes a sensor port to be a structure that is removable (PO Resp. 18), and acknowledges that Kiani discloses a sensor port. *See id.* at 26–27; Tr. 53:18–19 (“Kiani would have a single sensor input port under our construction.”).

have been desirable to a person of ordinary skill. *See* Ex. 1003 ¶¶ 64, 65. Petitioner demonstrates that using Kiani’s sensor port in Goldberg is adopting a well-known and preferred method of electrical connection that provides a more adaptable, yet secure, connection than merely contacting two electrical conductors. *Id.* ¶ 78. Based on the final record, and as discussed more below, we find Petitioner’s contentions persuasive.

Whether Goldberg itself only teaches hardwired connections⁷ is not dispositive because Kiani explicitly teaches the benefits of using removable sensor ports. Ex. 1006, 3:21–27, 8:31–9:2, 19:24–26, Fig. 5; Ex. 1003 ¶ 65 (“Kiani demonstrates the ubiquity of ports,” and “that sensor input ports . . . were a known vehicle for wired communication,” such that “it would have been obvious to combine Goldberg and Kiani to include a port on the housing as part of the wired connection between the pulse oximetry sensor 104a and the housing 112 of Goldberg”). Petitioner cited Kiani as evidence that ports were a known means for forming wired connections with medical sensors and we agree with this assessment. Pet. 26; Pet. Reply 10; Ex. 1003 ¶¶ 64, 65, 78. In view of Kiani, a POSITA would have been motivated to make each respective wired connection to a sensor ported because Kiani demonstrates ports were a known and improved method for forming wired

⁷ We determine it unlikely for Goldberg’s device to be hardwired because Goldberg teaches a device that communicates with “one, all, or *any combination of*” blood pressure, pulse, oxygen-hemoglobin saturation, glucose, body temperature, respiration, and electrolyte sensors. Ex. 1005, 4:13–16, 4:50–56, 5:3–8 (emphasis added). Accordingly, it is most logical for Goldberg’s ports to not be hardwired. Ex. 1040 ¶ 68 (“no POSITA would ever design Goldberg’s device to be hardwired” and “[a] hardwired system provides no adaptability whatsoever”).

connections. Ex. 1003 ¶¶ 64, 65, 78. We also find Dr. Bergeron’s testimony persuasive as to these contentions, specifically, “it is plausible and reasonable to assume that Goldberg has ports,” but more importantly, “[a] POSITA having knowledge of Kiani would know how to create a ported connection for each respective wired connection to a sensor that was taught by Goldberg.” Ex. 1040 ¶¶ 62, 72 (citing Ex. 1005, 4:50–56; Ex. 1006, 3:21–22).

Further, Kiani’s number of “sensor ports” is also not dispositive because Goldberg teaches multiple wired connections to sensors, and a POSITA would have been motivated to make each wired connection disclosed in Goldberg ported in view of Kiani. Ex. 1040 ¶¶ 78, 79. Goldberg is explicit that its device “may contain one, *all, or any combination* of the above-mentioned sensor types, as well as other sensors,” and “may be comprised of any type of physiological sensor 104 suitable or [sic] use with a portable monitoring device.” Ex. 1005, 5:3–8 (emphasis added). We disagree with Patent Owner that these are mere “aspirational statements” that do not disclose or imply using multiple sensors in the same device. PO Resp. 35; Sur-Reply 13. We rely upon Goldberg’s explicit teachings of the advantages of using all, or any combination, of the sensor types combined with Kiani’s teaching of the benefits of having a removable ported connections. *See* Ex. 1040 ¶ 72.

We find Petitioner has provided several persuasive rationales for the proposed combination of Kiani’s sensor port into Goldberg and for employing a second and third sensor with sensor ports in Goldberg. *See, e.g.,* Ex. 1003 ¶¶ 64, 65, 78 (“including second and third ports on Goldberg’s housing would have predictably enabled wired communication

with the second and third sensors while allowing easy removal and replacement of the third sensor and providing a secure, wired”), 79 (“inclusion of a generic third port would have been obvious as a mere duplication of parts”).

Patent Owner makes several arguments related to the sizing of the portable device and how adding up to three sensor ports would be undesirable to minimizing size. *See* PO Resp. 32, 36. These arguments are countered by Kiani, which shows three connectors (regardless of type) while still remaining handheld in size. Ex. 1006, Fig. 5, 8:31; Ex. 1042, 116:15–117:7.⁸ We have seen no persuasive evidence that including multiple ports would somehow cause Goldberg’s device to be too big for wrist attachment. To the contrary, the final record before us establishes that even if Goldberg’s device increased in size to accommodate a third port, such increase would be minor and still allow the monitor to be arm mountable as set forth in the ’735 patent. *See* Ex. 1040 ¶ 76 (“A POSITA would know that the electronics necessary to form wired connections are relatively simple and do not take up much space.”).

Patent Owner also challenges Petitioner’s motivation to combine the teachings of Goldberg and Kiani by arguing that clinicians are not the end-user for Goldberg’s device. Sur-Reply 14–15; Ex. 2010 ¶¶ 76–78. Whether the end-user is a clinician, or a patient acting at the direction of a clinician, we see no dispositive difference as to how a person of ordinary skill in the art would perceive the combinability of these prior art references and the reasons for that combination. Dr. Bergeron persuasively explains that “the

⁸ Exhibit 1042 is the deposition of Patent Owner’s declarant, Alan Oslan, taken April 28–29, 2021.

motivation to combine arguments in the Petition apply equally to both at-home use and clinical use.” Ex. 1040 ¶ 81. For example, the advantages of interchangeability and adaptability discussed below would be desired by the clinician, but appreciated by both the clinician and the patient in use. *See id.* (“a POSITA would be motivated to use a port to allow a user or a clinician to remove and replace a sensor”), ¶ 71 (“I am a clinician, and I agree with Dr. Yanulis. A POSITA designing a multi-parameter monitor would design it to have ports and adaptability via ports. If given the choice between a static, hardwired monitor and a monitor that offered flexibility, a POSITA would choose the monitor that offered adaptability for patients.”).

Patent Owner criticizes Petitioner for not weighing potential disadvantages with ports, such as: accidental disconnection, ports being complicated, faulty connections, require more space, additional parts, and other potential drawbacks. PO Resp. 29–30 (“Yanulis’ declaration failed to consider whether ports have any disadvantages compared to hardwired connections.”), 30–31 (“fail to consider whether any disadvantages of adding a port would dissuade a PHOSITA from making the alleged combination”); Ex. 2010 ¶¶ 73–74, 68 (“adding a connector increases cost . . . introduces possible points of failure . . . may introduce contact noise due to poor or unstable electrical connections”). Petitioner cites evidence and testimony calling into question these perceived disadvantages with ports, noting that in 2002 “ports often included locks or tabs to securely connect cables to ports,” “shields and error checking prevented noise,” and “there is nothing complicated about plugging a wire into a slot.” Pet. Reply 15; Ex. 1040 ¶ 78. Dr. Bergeron addresses each of the alleged disadvantages and concludes that ports are not complications, but benefits. Ex. 1040 ¶ 78.

Further, Patent Owner's own prior art technology, Kiani, teaches ports and the benefits of using ported connections despite these perceived disadvantages. *See* Ex. 1006, codes (71), (57).

Examining the potential advantages versus disadvantages of the proposed combination, Petitioner has persuasively shown that the downsides are not outweighed by the distinct advantages of having a port, which enables removal of a faulty sensor without replacing the entire unit. As explained by Dr. Bergeron, “[s]ensors can fail. Ease of replacing a failed port is the primary advantage of using a removable port over a hardwired, non-removable connection.” Ex. 1040 ¶ 78; *see also* Ex. 1003 ¶ 65 (“ports generally provide removable wired connections, so a medical worker would replace the blood pressure 104b with a new blood pressure sensor if the blood pressure sensor was faulty”). The proposed combination would also achieve the significant advantages of interchangeability and adaptability. Ex. 1003 ¶ 65 (testifying that including a port on Goldberg's housing would allow easy removal and replacement of the sensor while providing a secure, wired connection between the pulse oximetry sensor and the housing thereby providing the adaptability required by clinicians). We agree with Dr. Bergeron that “[p]orts had clear advantages over hardwired connections, such as the ability to replace a faulty sensor without replacement of the entire system,” and “ports would allow for connections to ‘one, all or any combination of’ any known physiological sensor.” Ex. 1040 ¶ 70 (quoting Ex. 1005, 4:50–56, 5:3–8). Further, “[i]f Goldberg were hardwired, Goldberg would not be capable of communicating with ‘any type of physiological sensor’ because it could only communicate with *one* combination of sensors physically soldered to the device.” *Id.* Thus,

Petitioner establishes that a POSITA would have been motivated to choose ported connections, especially for a flexible system like the one Goldberg taught.

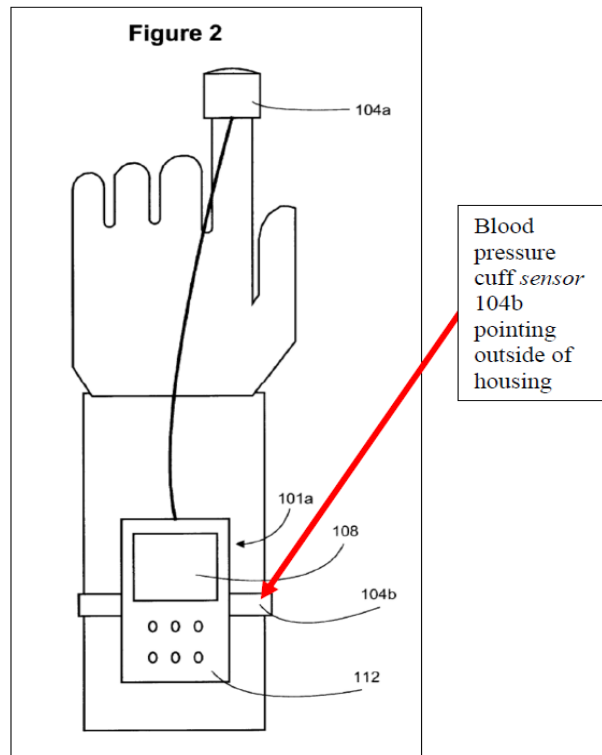
We have considered Patent Owner's arguments, and Mr. Oslan's testimony, related to potential disadvantages but determine that in the aggregate Petitioner presents stronger evidence as to advantages of the proposed combination that a person of ordinary skill in the art would have considered in 2002. *See Winner Int'l Royalty Corp. v. Wang*, 202 F.3d 1340, 1349 n.8 (Fed. Cir. 2000) ("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."). We address Patent Owner's arguments against modifying Goldberg to include a sensor port for its blood pressure cuff, and the alleged disadvantages with that arrangement more below.

As noted above, Patent Owner argues that a POSITA would not have added a port for Goldberg's blood pressure sensor because if Goldberg's blood pressure sensor is positioned between the housing and blood pressure cuff it would create several issues and potentially not work as intended. PO Resp. 37–40; Sur-Reply 8–12.

We first note that Goldberg teaches that all sensors, including pulse oximetry sensor 104a and blood pressure sensor 104b, may communicate with the controller 102 via a wired connection, thus, the connection between controller 102 and the blood pressure sensor 104b may be a wired

connection. Ex. 1003 ¶ 79 (citing Ex. 1005, 4:19–29, 5:3–8).⁹ Further, Goldberg teaches blood pressure cuff *sensor* 104b, not just the blood pressure cuff, and Goldberg teaches and illustrates the blood pressure cuff sensor as outside of the housing as illustrated below. Ex. 1040 ¶ 83 (“Goldberg teaches that the blood pressure cuff *sensor* 104b is outside of the housing and that the communications with the sensor is wired. . . . This wired connection and the sensor’s location outside the housing would necessarily include a port.” (citing Ex. 1005, 4:26–29, 4:64–67, Fig. 2)). Goldberg explains that sensors may be coupled to the controller by wire and the blood pressure cuff sensor may be used to sense the monitored person’s blood pressure and the strap also functions to secure the mountable device to a person’s forearm or wrist. Ex. 1005, 4:26–29, 4:64–67. Relying on Dr. Bergeron’s testimony, Petitioner persuasively shows that a POSITA would have understood the electrical sensor is outside the portable device, and the sensor provides the signal to the controller 102 via a wire, as illustrated in the annotated Figure 2, reproduced below. Pet. Reply 17–18 (citing Ex. 1005, 4:26–29; Ex. 1040 ¶ 83).

⁹ To the extent that any of Patent Owner’s arguments suggest that Goldberg does not teach that a wired connection is an available option for all of Goldberg’s sensors, we disagree. Goldberg clearly contemplates that sensors may be connected either wirelessly or via wired connection. Ex. 1005, 4:27–29. That is not disclosure that conveys restriction as to either one of those connection styles.



Petitioner’s annotated Figure 2 of Goldberg depicts portable device 101a mounted in an assembly or housing 112 with an added annotation stating “Blood pressure cuff *sensor* 104b pointing outside of housing.” *Id.* at 18. Based on the final record before us, we discern no requirement that the blood pressure sensor be mounted directly between the cuff and the housing as Patent Owner alleges. *See* Sur-Reply 8–9.

Patent Owner’s arguments related to mounting a second sensor port on Goldberg would be stronger if Petitioner relied solely on Goldberg. As explained above, however, Petitioner relies on the teachings of Kiani for showing the benefits of adding sensor ports into Goldberg’s multiple wired connections. As Dr. Yanulis explains, Kiani shows that sensor input ports were known electrical structures for wired communication and “it would have been obvious to combine Goldberg and Kiani to include a second and third port on the housing 112 as part of the wired connections with the

second and third sensors.” Ex. 1003 ¶ 78. We find persuasive Dr. Yanulis’ explanation that “including second and third ports on Goldberg’s housing would have predictably enabled wired communication with the second and third sensors while allowing easy removal and replacement of the third sensor and providing a secure, wired connection between the blood pressure sensor 104b and the housing 112.” *Id.* Thus, we disagree with Patent Owner’s contention that Petitioner “relies on inherency to argue that a sensor port exists between Goldberg’s cuff and housing.” Sur-Reply 9. As explained above, Goldberg provides the express disclosure of using any combination of sensor types as well as any type of physiological sensor for use with a portable monitoring device. In view of Kiani, the blood pressure cuff sensor is connectable to the portable monitoring device through a second sensor port. The combined teachings of Goldberg and Kiani are express and the motivations for making the combined modifications are well supported.

For the analog and digital requirements also recited in the claims, Patent Owner’s main argument is that Money teaches the opposite data signal configuration from the one claimed. *See* PO Resp. 42–46. Patent Owner’s arguments ignore the teachings of the combination as a whole. Petitioner’s proposed combination for the obviousness contention considers that analog and digital signals are obvious signal variants that each transmit data. *See* Ex. 1003 ¶ 73. We find persuasive Dr. Yanulis’ testimony that “signals are either analog or digital. There are only two options, so it would have been obvious to transmit signals as either digital or analog signals,” and “Goldberg provides the motivation to adopt the teachings of Money . . . [to] be able to communicate with any conventional sensors (both analog and

digital).” Ex. 1003 ¶¶ 70–73, 84–86 (citing Ex. 1005, 4:50–56; Ex. 1006, 1:26–28, Ex. 1008, 7:49–52); Ex. 1040 ¶ 86. Thus, Petitioner’s case is based on selecting one of a finite number (two) of known options based on the teachings of Money and Kiani.

We made an initial determination that Goldberg teaches a system that can communicate with any sensor, which would include analog and digital sensors, and nothing in the final record persuasively undermines that determination. *See* Ex. 1003 ¶ 85 (“Goldberg teaches that it wishes to communicate with any conventional sensor.”). On the final record, we find persuasive Dr. Yanulis’ testimony that “Money teaches a system that receives analog signals from some sensors and digital signals from others” and further explains the circuitry and power requirements that are necessary to communicate with both analog and digital sensors. *Id.* ¶ 81 (citing Ex. 1008, 5:48–51, 5:61–6:10, 7:4–8). Similarly, Dr. Yanulis also relies on Kiani and testifies that “[t]ypically, light-based pulse oximetry sensors operate in the analog domain and transmit analog signals,” and “Kiani expressly explains this well-known fact.” *Id.* ¶ 70 (citing Ex. 1006, 1:26–28). Further, Money teaches the benefits of adopting a portable, wearable patient monitoring device that receives analog data from one sensor and digital data from another sensor. *Id.* ¶ 81 (citing Ex. 1008, 5:48–51, 7:4–8, 7:16–20, 7:58–62, 12:4–7, 13:24–32).

Money and Kiani teach the ability to operate a sensor in the analog domain such that any of Goldberg’s sensor signals, including the one from its pulse oximeter sensor, could include analog information as required by the claims. *See id.* ¶ 227 (“Goldberg provides the motivation to adopt the teachings of Money . . . [to] be able to communicate with any conventional

sensors (both analog and digital).” Ex. 1003 ¶¶ 70–73, 84–86 (citing Ex. 1005, 4:50–56)). Because one representative example of a pulse oximeter sensor in Money is operating in the digital domain (*see* Ex. 1008, Fig. 1), does not negate Money’s comprehensive teachings that sensor data may be reported in “two modes,” either digitized or in analog waveform and the device must “process both analog and digital data,” or Kiani’s teaching of a pulse oximetry sensor operating in the analog domain. Ex. 1008, 5:61–6:10, 7:4–7; Ex. 1003 ¶¶ 71–73 (“it would have been obvious for [Goldberg’s] pulse oximeter 104a to transmit analog information in view of Kiani”).

Patent Owner makes arguments as to the disadvantages of the physical combinability of the proposed combination such as questioning whether and where a “rigid” pressure sensor and analog-to-digital converter (“ADC”) could be placed inside a blood pressure cuff. *See* PO Resp. 38; Ex. 2010 ¶ 97. We find persuasive Dr. Yanulis’ testimony that “[t]he circuitry described by Money provides exactly the necessary electrical infrastructure to allow for this compatibility with both analog and digital sensors,” in “a portable, wearable patient monitoring device.” Ex. 1003 ¶¶ 86, 82 (citing Ex. 1008, 5:48–51, 5:61–6:10, 7:4–8). Further, we find reasonable Dr. Bergeron’s testimony that a POSITA would understand Goldberg’s controller that communicates with all sensors via wires may have a “controller connected to a blood pressure sensor that is not also functioning as a strap that secures the device to a person’s wrist.” Ex. 1040 ¶ 84. Instead, “Goldberg envisioned communication with a blood pressure sensor having a microphone positioned outside the housing and against the person’s skin within the blood pressure cuff.” *Id.* ¶ 85. Additionally, even if both a

sensor and ADC were positioned inside a blood pressure cuff as Patent Owner argues, Petitioner has produced convincing rebuttal evidence showing how similar sensors were placed within a blood pressure cuff. *See id.*

Based on the final record, Petitioner has shown persuasively that the combination of Goldberg, Kiani, and Money teaches all the limitations of claim 1 and has articulated several reasoned rationales for combining the teachings of the references, with a reasonable expectation of success in making the combination. Accordingly, for the reasons discussed above, we are persuaded that Petitioner has demonstrated by a preponderance of the evidence that claim 1 of the '735 patent would have been obvious in view of Goldberg, Kiani, and Money.

We have reviewed Petitioner's contentions and supporting evidence regarding claims 2 and 7–19, and determine Petitioner has demonstrated by a preponderance of the evidence how each of these claims would have been obvious over Goldberg, Kiani, and Money. *See* Pet. 30–35 and contentions above. Patent Owner does not separately address Petitioner's contentions for these claims.

E. Asserted Obviousness in view of Goldberg, Kiani, Money, and Fujisaki

Petitioner asserts that claims 3–6 and 13–19 would have been obvious in view of Goldberg, Kiani, Money, and Fujisaki. *See* Pet. 35–47. Relying on the testimony of Dr. Yanulis, Petitioner contends that the combined references teach or suggest the subject matter of the challenged claims and that a person having ordinary skill in the art would have combined the teachings of the references in the manner asserted. *Id.* Petitioner adds Fujisaki for its teaching of wearable devices with removable cables as

required by these claims, and Petitioner contends it would have been obvious to make Goldberg's cable removable from the first sensor port in view of Fujisaki. Pet. 36.

Patent Owner also does not present separate arguments regarding the claims for this ground. Based on Petitioner's uncontested contentions, summarized below, we determine that Petitioner has shown by a preponderance of the evidence that these claims are unpatentable.

Claim 3

Claim 3 depends from claim 2 and additionally requires, "the tail comprises a cable that is configured to be removably attachable to the first sensor communication port."

Petitioner establishes that it would have been obvious to make Goldberg's cable removable from the first sensor port in view of Fujisaki. Pet. 35–36. Petitioner shows persuasively that Fujisaki teaches removable wired connections and a wearable device having a cable removably connected with a connector plug (i.e., port). *Id.* (citing Ex. 1016, 5:37–44, Figs. 2, 6; Ex. 1003 ¶ 103). Petitioner also establishes that a POSITA would have made the modifications to allow for a port to communicate with a variety of different sensors, or gain the ability to remove a faulty sensor. *Id.* at 35–36 (citing Ex. 1003 ¶ 105).

Claim 4

Claim 4 depends from claim 3 and additionally requires the "length of the cable corresponds to the path from the sensor communication port on the side of the housing to the digit of the patient."

Petitioner establishes that Goldberg (Figure 2) illustrates the length of the wire between the sensor and the housing corresponds to the length

between the housing and the patient's finger. Pet. 37 (citing Ex. 1005, Fig. 2; 4:19–29, 4:60–62; Ex. 1003 ¶ 107).

Claim 5

Claim 5 depends from claim 3 and additionally requires, “the cable is appropriately sized based on the path from the sensor communication port on the side of the housing to the digit of the patient.”

Petitioner persuasively shows that Goldberg teaches that the length of the wire between the sensor and the housing is appropriately sized based on the length between the side of the housing facing the patient's hand and the patient's finger. Pet. 37 (citing Ex. 1005, Fig. 2; 4:19–29, 4:60–62).

Claim 6

Claim 6 depends from claim 3 and additionally requires, “the path from the sensor communication port on the side of the housing to the digit of the patient runs at least partly along a backside of the hand of the patient.”

Petitioner relies on Goldberg Figure 2, which shows how the wired connection to the sensor runs partially along the backside of the person's hand to the finger where the sensor is attached. Pet. 38 (citing Ex. 1005, Fig. 2; 4:19–29, 4:60–62; Ex. 1003 ¶ 109).

Claim 13

Claim 13 is independent and similar in scope to claim 1. Petitioner has persuasively shown by a preponderance of the evidence how the combined references teach each limitation of claim 13 and Petitioner further provides persuasive rationales for the proposed combinations. Pet. 38–42. We address the few unique limitations of claim 13 below, but our analysis above for claim 1 equally applies to claim 13's similar limitations.

Instead of claiming multiple communications ports, claim 13 requires, “a first communications port,” “a second communications port,” and “a third communications port.” Our analysis above is equally applicable to these three communications ports. Similar to claim 3 above, claim 13 requires “the first communications port configured to removably couple with a cable of a finger- or thumb-type pulse oximetry sensor,” and the analysis above for claim 3 is equally applicable.

Claim 13 also requires “a battery configured to provide power to the medical monitoring device such that the medical monitoring device may operate without a wired power connection.” Petitioner infers that because Goldberg is portable, it must implicitly require a battery or it would not work. Pet. 39. Regardless, Petitioner relies on Kiani’s teaching of a portable device that is battery powered, and Petitioner shows how all electrical components of Kiani’s handheld device are powered by the battery. *Id.* (citing Ex. 1006, 5:21–22, 9:11–13). Petitioner establishes that it would have been obvious the POSITA to include a battery in the portable device of Goldberg so the portable device operates without being tethered to a wall outlet. *Id.* (“This combination of Goldberg and Kiani is proper because Kiani expressly discloses that which Goldberg implicitly teaches.”) (citing Ex. 1003 ¶¶ 112–113).

The data configuration of claim 13, similar to claim 1, requires the “second communications port configured to provide wired communications with a second physiological sensor arrangement at least partly via digital communications.” For this particular limitation, Patent Owner makes similar arguments as those made for claim 1 addressed above. *See* PO Resp.

26, 36 (noting claim 13's data signal configuration compared to claim 1 and making identical arguments). Patent Owner further contends:

Claim 13 differs slightly from Claims 1 and 20, but nonetheless also requires a second sensor arrangement, *separate from the pulse oximetry sensor*, that provides digital communications. As explained above, the only digital sensor communications described in any of the asserted references is the pulse oximeter sensor in Money. None of the asserted references describe a second sensor arrangement, separate from the pulse oximetry sensor, that provides the digital sensor communications required by Claim 13.

PO Resp. 43. The analysis above for claim 1 applies in the same manner here and we incorporate our prior determinations. The remaining limitations of claim 13 are persuasively shown to be taught by the combination of prior art as set forth in Petitioner's contentions and Petitioner again provides a sufficient reasoned basis for the proposed combination. Pet. 35–40

Claim 14

Claim 14 depends from claim 13 and additionally requires, “the path from the first communications port to a digit of the hand is shorter than any path from any communications port located on any other side of the case to the digit of the hand.”

Claim 14 has the same scope as claim limitation 1(g) examined above. Petitioner shows how Goldberg's wire's path is the shortest from any side of the housing when the sensor is attached to the patient's finger because the wire's path is the most direct path possible from the housing to the finger. Pet. 25 (citing Ex. 1003 ¶¶ 74, 75; Ex. 1005, Fig. 2), 42.

Claim 15

Claim 15 depends from claim 13 and additionally requires, “one or more hardware processors configured to: process the data obtained from the

pulse oximetry sensor; and determine, based at least in part on the data, the real time measurements of patient physiological parameters.”

Petitioner establishes that Goldberg teaches the controller processes data obtained from the pulse oximetry sensor and the controller determines real time oxygen saturation measurements, including oxygen saturation measurements. Pet. 42–43 (citing Ex. 1005, 4:30–36, 4:62–64; Ex. 1003 ¶¶ 129, 130).

Claim 16

Claim 16 depends from claim 15 and requires several additional limitations:

Limitation 16(a) – The medical monitoring device of claim 15, wherein: the one or more hardware processors are further configured to: receive additional data from at least the second physiological sensor arrangement and the third physiological sensor arrangement;

Limitation 16(b) – determine, based at least in part on the additional data, real time measurements of additional patient physiological parameters; and

Limitation 16(c) – cause to be displayed, on the display, the real time measurements of additional patient physiological parameters; and

Limitation 16(d) – the transmitter is further configured to: wirelessly transmit information indicative of real time measurements of additional patient physiological parameters based at least in part on the additional data.

Pet. xvi–xvii. Petitioner contends “Goldberg teaches a patient monitoring system that receives signals from three or more sensors and a controller that receives signals from a pulse oximetry sensor, a blood pressure sensor, and an electrolyte sensor.” Pet. 43 (citing Ex. 1005, 1:37–44, 4:19–29, 4:57–5:8;

Ex. 1003 ¶¶ 76–79, 131, 137). Petitioner notes that Goldberg teaches the controller can communicate with any sensor, including an EKG sensor. *Id.* As for the real time measurements limitations, Petitioner demonstrates that Goldberg teaches that “the controller determines real time blood pressure and glucose or EKG measurements based on the signals received from the connected sensors (e.g., blood pressure and glucose or EKG).” Pet. 43 (citing Ex. 1005, 2:30–32, 4:34–36, 4:50–55, 4:56–5:8, 1:37–44; Ex. 1003 ¶ 132). The measurements from sensors are displayed based on signals received from the connected sensors as shown in Figure 6b. Pet. 44.

Petitioner shows persuasively how Goldberg teaches the communication unit wirelessly transmitting sensor data and measurements, including oxygen saturation, blood pressure, and glucose/electrolyte or ECG, to a remote computer. *Id.* (citing Ex. 1005, 4:19–29, 4:57–5:8, 6:15–17; Ex. 1003 ¶ 134).

Claim 17

Claim 17 depends from claim 16 and requires, “the display is positioned on a front, user-facing side of the case to enable a user to view the real time measurements of patient physiological parameters and the real time measurements of additional patient physiological parameters.”

Petitioner shows how “Goldberg teaches a display positioned on a front, user-facing side of the housing to enable a user to view patient physiological parameters” such as “pulse oximetry, blood pressure, and glucose.” Pet. 45 (citing Ex. 1005, 4:19–29, 5:3–8, 5:36–53, 6:32–46, Figs. 6a–c; Ex. 1003 ¶¶ 135–136). Petitioner notes that Goldberg further teaches the display includes real time data. *Id.*

Claim 18

Claim 18 depends from claim 17 and additionally requires, “the second physiological sensor arrangement comprises an EKG sensor arrangement and the third physiological sensor arrangement comprises a blood pressure sensor arrangement.”

Petitioner relies on Goldberg’s teaching that the portable device can receive data from both a blood pressure sensor and an EKG sensor. Pet. 45 (citing Ex. 1005, 4:64–67, 1:37–44, 4:50–56, 5:5–8, Fig. 2; Ex. 1003 ¶ 137).

Claim 19

Claim 19 depends from claim 18 and requires additional limitations related to the communication ports. Specifically, “the first, second, and third communication ports are communicatively coupled to respective first, second, and third sensor interfaces; and the first, second, and third sensor interfaces are uniquely configured to receive signals from the respective pulse oximetry sensor, EKG sensor arrangement, and blood pressure sensor arrangement.”

Petitioner contends Goldberg teaches the portable device receiving data from a plurality of sensors and that a POSITA would understand a sensor interface is circuitry that decodes signals from the sensors and provides the data represented by the signals to the controller. Pet. 45–46 (citing Ex. 1005, 4:34–36, 4:50–55, 4:57–5:8; Ex. 1003 ¶ 138). Petitioner relies on Money for its teaching of sensor interfaces that are circuits for connection between a device and sensors and having a respective interface for each connected sensor. *Id.* (citing Ex. 1008, code (57), 3:14–24, 5:38–51; Ex. 1003 ¶ 139). Relying on the testimony of Dr. Yanulis, Petitioner establishes that it would have been obvious to include respective sensor

interfaces, as taught by Money, in the portable device of Goldberg so the portable device of Goldberg could communicate with various sensors.

Pet. 46 (citing Ex. 1005, 5:3–8; Ex. 1008, 2:15–25; Ex. 1003 ¶ 140).

Petitioner further shows how Money teaches a pulse oximetry sensor interface for receiving a signal from a pulse oximetry sensor, a blood pressure sensor interface for receiving a signal from a blood pressure sensor, and an ECG sensor interface for receiving a signal from an ECG sensor. *Id.* (citing Ex. 1008, 5:28–44). Thus, Petitioner establishes that Goldberg in view of Money teaches this claim limitation. *See* Ex. 1003 ¶ 141.

Based on the final record, Petitioner has established by a preponderance of the evidence that claims 3–6 and 13–19 would have been obvious over Goldberg, Kiani, Money, and Fujisaki.

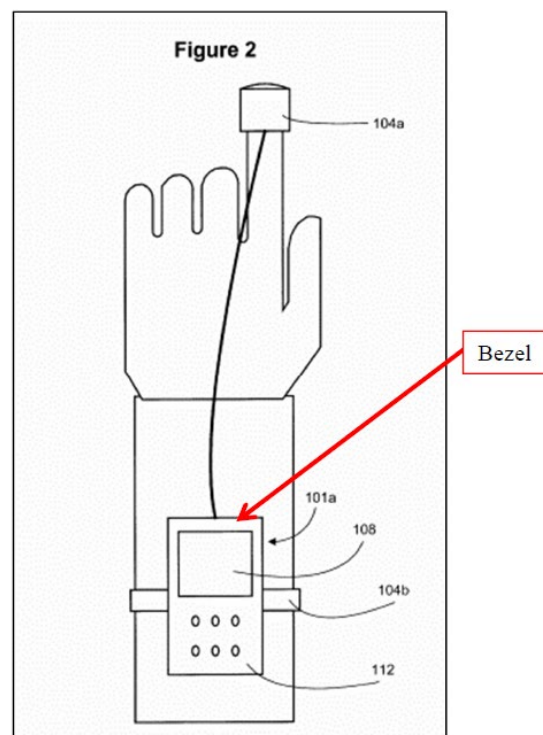
F. Asserted Obviousness in view of Goldberg, Kiani, Money, and Estep

Petitioner contends that claims 10–12 are unpatentable under 35 U.S.C. § 103 as obvious in view of Goldberg, Kiani, Money, and Estep. Pet. 6, 47–50. Relying on the testimony of Dr. Yanulis, Petitioner contends that the combined references teach or suggest the subject matter of the challenged claims and that a person having ordinary skill in the art would have combined the teachings of the references in the manner asserted. *Id.*; Ex. 1003 ¶¶ 142–145.

Claim 10 depends from claim 9 and adds the unique limitation requiring “the front side of the housing comprises a bezel and the display, and a top of the first sensor communication port is located below the face of the housing.” Claim 11 depends from claim 10 and additionally requires “the display is positioned centrally on the face of the housing.” Claim 12, depending from claim 11, further recites “the display positioned on the face

of the housing is sized such that the display covers most of a length of a shortest dimension of the face of the housing.”

As for the bezel limitation, Petitioner contends that Goldberg teaches a display and the housing has a border around the display, which a POSITA would understand to be a bezel because a bezel is simply a border around a screen as depicted in Figure 2 of Goldberg below. Pet. 47 (citing Ex. 1003 ¶ 143; Ex. 1005, Fig. 2).



Petitioner provides annotated Figure 2 of Goldberg showing a red arrow pointing to the border of the display screen with the annotation of “Bezel” added. Pet. 47. Likewise, Dr. Yanulis testifies that Goldberg illustrates a bezel because “a bezel is simply a border around a display 108.” Ex. 1003 ¶ 143. We find this testimony persuasive.

Patent Owner does not challenge whether Goldberg teaches a bezel as argued by Petitioner. *See* PO Resp. 50–51 (challenging only whether Estep

is analogous prior art). According, Petitioner has persuasively shown how the combination of Goldberg, Kiani, and Money teach all the limitations of claim 10, without regard to Estep.¹⁰

Petitioner also persuasively shows how Goldberg illustrates the display as being centrally positioned on the housing, as required by claim 11. Pet. 48 (citing Ex. 1005, Fig. 2; Ex. 1003 ¶ 147). Similarly, Petitioner establishes how Goldberg illustrates the display on the front side of the housing as covering most of the length of the shortest dimension (latitudinal) of the front side of the housing. *Id.* at 49 (citing Ex. 1003 ¶ 148).

Based on the final record, Petitioner has shown by a preponderance of the evidence that claims 10–12 would have been obvious over Goldberg, Kiani, Money, and Estep.

G. Asserted Obviousness in view of Goldberg, Kiani, Money, Fujisaki, and Estep

Petitioner contends that claim 20 is unpatentable under 35 U.S.C. § 103 as obvious in view of Goldberg, Kiani, Money, Fujisaki, and Estep. Pet. 6, 50–61. Relying on the testimony of Dr. Yanulis, Petitioner contends that the combined references teach or suggest the subject matter of the challenged claim and that a person having ordinary skill in the art would have combined the teachings of the references in the manner asserted. *Id.*; Ex. 1003 ¶¶ 151–189.

Claim 20 is a long claim (*see* Pet. xvii–xx) because it incorporates most of the dependent claims already addressed above. Further, for this ground, Patent Owner does not challenge claim 20 individually, but instead

¹⁰ Patent Owner argues that Estep is non-analogous art, but Petitioner has shown that all of the pertinent features of the claims are accounted by prior art that is not asserted to be non-analogous art. *See* PO Resp. 50–51.

rests its case on prior arguments. *See* PO Resp. 7, 20 (addressing alleged inconsistent claim construction but offering no reasons against the obviousness challenge), 37, 47. For these reasons, we only highlight the distinctions from claim 20 below that have not been previously addressed. Otherwise, our analysis from above applies equally to each claim 20 limitation and the rationales for combining the references.

Claim 20 requires a “light emitter” and a “light detector.” *See* Pet. xviii. Petitioner establishes how Goldberg teaches a pulse oximetry sensor that measures oxygen saturation while attached to a patient’s finger, and Kiani teaches pulse oximetry sensors include a light emitter to detect oxygen saturation by emitting light into finger tissue. Pet. 51 (citing Ex. 1003 ¶¶ 152, 153; Ex. 1005, 4:60–64, Fig. 2; Ex. 1006, 1:15–23). Further, Kiani teaches the pulse oximetry sensor includes a light detector configured to output a signal responsive to an amount of light attenuated by tissue. *Id.* (citing Ex. 1003 ¶ 155). Petitioner proves that it would have been obvious for a POSITA to modify Goldberg with Kiani because this modification represents a simple substitution of one known equivalent element (a pulse oximetry sensor) for another (a light-based pulse oximetry sensor) to yield predictable results. *Id.* (citing Ex. 1003 ¶ 154).

Claim 20 requires a display, as fully addressed in other claims above, but additionally recites “the display configured to show a status of the portable patient monitoring device,” which was not addressed above. Petitioner shows how Goldberg displays status because the display indicates whether it is showing daily or weekly averages, thereby indicating the status of whether the device is operating in either a daily or weekly display mode. Pet. 54 (citing Ex. 1005, Figs. 6b-c; Ex. 1003 ¶ 162). Further, Petitioner

relies on Kiani’s teaching of status indicators such as low battery and alarm enabled status indicators, which would have been obvious to display on the display of Goldberg to indicate visually to a user whether an alarm is enabled and whether the portable monitor has a low battery. *Id.* (citing Ex. 1006, 8:33–9:2; Ex. 1003 ¶¶ 162–164).

As previously addressed Kiani teaches use of a battery, but claim 20 additionally requires “a rechargeable battery.” Petitioner establishes that Kiani expressly discloses the battery is rechargeable and it would have been obvious to use a rechargeable battery to prevent repeated discarding of used batteries. Pet. 57 (citing Ex. 1006, 5:21–22; Ex. 1003 ¶ 175).

Claim 20 requires receiving the third signal (responsive to the at least one additional physiological parameter of the patient) from the additional sensor arrangement and “the third signal is provided at least partly as a digital signal.” Petitioner establishes Money teaches signals received via an RS232 port that are digital signals and it would have been obvious to modify Goldberg to communicate with a digital temperature sensor and transmit any discrete physiological parameter as a data packet. Pet. 59. Further, it would have been obvious and within the ordinary skill of a POSITA to transmit data digitally via an RS232 serial connection and a temperature sensor would be an obvious choice to transmit digital data because a temperature sensor transmits discrete data (patient’s temperature) that gets digitized. *Id.* (citing Ex. 1003 ¶ 186; Ex. 1008, 6:11–20, 6:27–33, 10:67–11:5, 13:24–32).

Based on the final record, Petitioner has established by a preponderance of the evidence that claim 20 would have been obvious over Goldberg, Kiani, Money, Fujisaki, and Estep.

H. Asserted Obviousness Grounds Based on Money and Akai

Because each of claims 1–20 have been found to be unpatentable based on the grounds with Goldberg, Kiani, and Money as the primary references, we determine it unnecessary to reach the remaining grounds based on Money, Akai, and Kiani. *See Boston Scientific SCIMED v. Cook Group*, 809 Fed. Appx. 984, 990 (April 30, 2020) (nonprecedential) (“We agree that the Board need not address issues that are not necessary to the resolution of the proceeding.”); *see also SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1359 (2018) (holding that a petitioner “is entitled to a final written decision addressing all of the claims it has challenged”).

I. Petitioner’s Motion to Exclude

Petitioner filed a Motion to Exclude (Paper 35, “Pet. Mot.”), to which Patent Owner filed an Opposition (Paper 36), and Petitioner filed a Reply (Paper 37).

Petitioner seeks to exclude Exhibits 2016, 2027, 2028, paragraphs 94–96, 98, and 100 of Exhibit 2010 (the Declaration of Mr. Oslan) on the grounds of relevancy to this proceeding. Pet. Mot. 2–7. Petitioner seeks to exclude Exhibits 2024, 2025, and paragraphs 78, 80, and 103 of Exhibit 2010 on the grounds of inadmissible hearsay. *Id.* at 8–10.

The exhibits and testimony identified by Petitioner as a part of its Motion to Exclude have either not been relied upon as a part of this Final Written Decision, or have not been considered in a manner that is adverse to Petitioner. Accordingly, we determine that Petitioner’s Motion to Exclude is moot, and we *dismiss* it as such.

III. CONCLUSION

For the foregoing reasons, we determine Petitioner has established by a preponderance of the evidence the unpatentability of claims 1–20 of the '735 patent.¹¹ In summary:

Claims	35 U.S.C. §	Reference(s)/Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1, 2, 7–9	103(a)	Goldberg, Kiani, Money	1, 2, 7–9	
3–6, 13– 19	103(a)	Goldberg, Kiani, Money, Fujisaki	3–6, 13–19	
10–12	103(a)	Goldberg, Kiani, Money, Estep	10–12	
20	103(a)	Goldberg, Kiani, Money, Fujisaki, Estep	20	
1, 2, 7–9	103(a)	Money, Akai, Kiani ¹²		
3–6, 13– 19	103(a)	Money, Akai, Kiani, Fujisaki ¹²		

¹¹ 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).

¹² As explained above, we do not reach this ground of unpatentability. See *supra*.

Claims	35 U.S.C. §	Reference(s)/Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
10–12	103(a)	Money, Akai, Kiani, Estep ¹²		
20	103(a)	Money, Akai, Kiani, Fujisaki, Estep ¹²		
Overall Outcome			1–20	

IV. ORDER

Accordingly, it is

ORDERED that claims 1–20 of U.S. Patent No. 9,788,735 B2 are unpatentable;

ORDERED that Petitioner’s Motion to Exclude is *dismissed* as moot; and

FURTHER ORDERED that parties to the proceeding seeking judicial review of this Final Written Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

IPR2020-00954
Patent 9,788,735 B2

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