

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SOTERA WIRELESS, INC.,
Petitioner,

v.

MASIMO CORPORATION,
Patent Owner.

IPR2020-00912
Patent 10,213,108 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. 10,213,108 B2 (“the ’108 patent,” Ex. 1001). Paper 1 (“Pet.”). The Petition challenges the patentability of claims 1–22 of the ’108 patent. Masimo Corporation (“Patent Owner” or “Masimo”) filed a Preliminary Response to the Petition. Paper 8.

On November 25, 2020, we instituted trial. Paper 15 (“Inst. Dec.” or “Decision to Institute”). Patent Owner filed a Response. Paper 22 (“PO Resp.”). Petitioner filed a Reply. Paper 26 (“Pet. Reply”). Patent Owner filed a Sur-Reply. Paper 31 (“Sur-Reply”). An oral argument was held on August 26, 2021, and a transcript was entered into the record. Paper 42 (“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 1–22) of the ’108 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 proceeding involving the ’108 patent. Pet. 2; Ex. 1009; Ex. 1010. Petitioner

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.

filed IPR2020-00954 on May 18, 2020, challenging claims of U.S. Patent No. 9,788,735, which is a continuation of the '108 patent. *See* IPR2020-00954, Ex. 1001, code (63).

C. The '108 Patent

The '108 patent is directed to an “Arm Mountable Portable Patient Monitor.” Ex. 1001, code (54). The '108 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]n arm mountable portable patient monitoring device configured to receive physiological information from a plurality of sensors attached to a patient via wired connections for on-patient monitoring of parameter measurements and wireless transmission of parameter measurements to separate monitoring devices.” *Id.* at code (57). Structurally, the “device includes a housing, a strap, a display, [and] a first sensor port positioned on a first side of the housing configured to face toward a hand of the patient.” *Id.* The device also includes “second and third sensor ports configured to receive signals from additional sensor arrangements via . . . wired connections and one or more signal processing arrangements configured to cause to be displayed measurements of oxygen saturation and pulse rate.” *Id.*

The Specification describes a drawback to “[c]onventional physiological measurement systems,” as being that they require a “patient cable connection between sensor and monitor.” *Id.* at 2:19–21. The Specification also describes the problems related to “disconnection of monitoring equipment and a corresponding loss of measurements,” when needing to move patients. *Id.* at 2:19–25. A goal of the '108 patent was to

allow wireless bedside pulse oximetry monitoring. Ex. 1001, 2:19–35; *compare id.* at Fig 1, *with id.* at Fig. 3.

As depicted in Figure 4A below, sensor module 400 is plug-compatible with conventional sensor 310. *Id.* at 3:55–58. Wrist-mounted module 410 has module connector 414 with auxiliary cable 420 running therefrom to mate with sensor connector 318. *Id.* at Fig. 4A, 5:26–37.

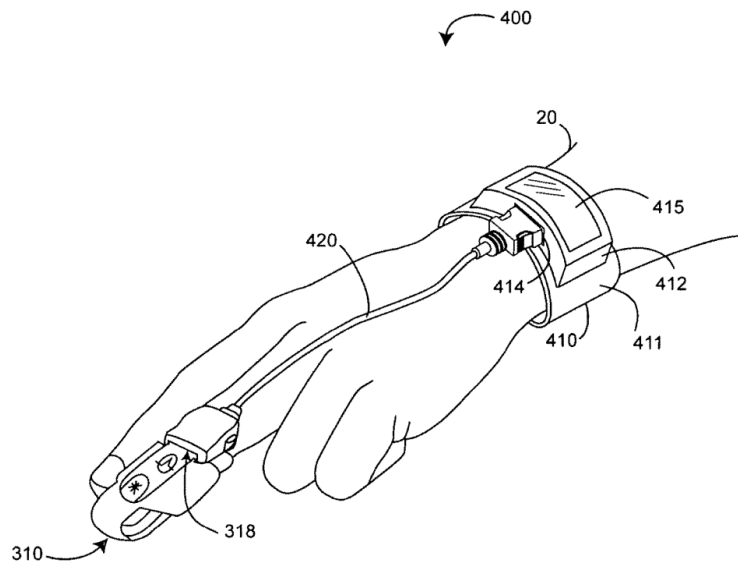


FIG. 4A

Figure 4A of the Specification illustrates an embodiment of the “communications adapter sensor modules.” *Id.* at 4:3–4. Wrist-mounted module 410 may have display 415 that shows sensor measurements, module status, and other visual indicators, such as monitor status. *Id.* at 5:37–40.

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 5:54–59. 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 11:52–66.

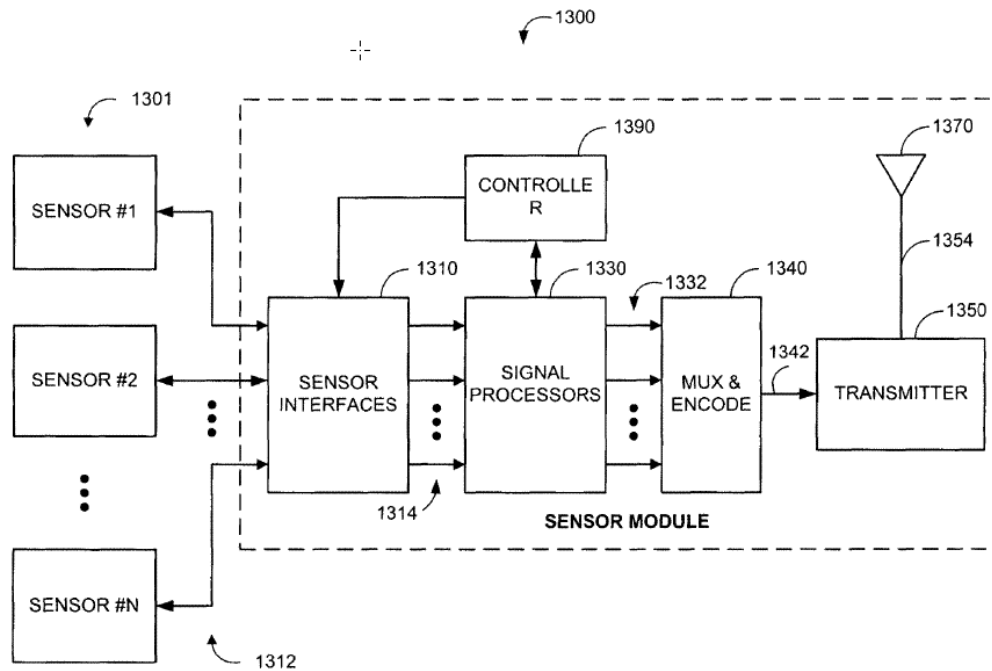


FIG. 13

Figure 13 depicts a functional block diagram of a sensor module configured for multiple sensors. *Id.* at 4:21–22.

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)	An arm mountable portable patient monitoring device configured to receive physiological information from a plurality of sensors attached to a patient at at least two different measurement sites via wired connections for on-patient monitoring of parameter measurements and wireless transmission of parameter measurements to separate monitoring devices, the portable patient monitoring device comprising:

Designation	Claim Language
Limitation 1(b)	a housing configured to be secured to an arm of a patient under measurement;
1(c)	a strap mountable to a back side of the housing and configured to secure the housing to the arm of the patient;
1(d)	a display positioned on a front side of the housing, the display configured to show at least one status indicator of the portable patient monitoring device and one or more parameter measurements;
1(e)	a first sensor port positioned on a first side of the housing, the first side of the housing configured to face toward a hand of the arm of the patient when the housing is secured to the arm of the patient,
1(f)	the first sensor port configured to electrically receive a signal from a pulse oximetry sensor via a wired connection from the pulse oximetry sensor to the first sensor port,
1(g)	the wired connection configured to extend from the first sensor port along a path substantially perpendicular to the first side of the housing;
1(h)	a second sensor port positioned on the housing and configured to receive a signal from a second sensor arrangement via a wired connection;
1(i)	a third sensor port positioned on the housing configured to receive a signal from a third sensor arrangement via a wired connection;
1(j)	one or more signal processing arrangements configured to:
1(k)	receive the signal from the pulse oximetry sensor; and
1(l)	cause to be displayed, on the display, at least measurements of oxygen saturation and pulse rate derived from the signal; and
1(m)	a transmitter configured to:

Designation	Claim Language
1(n)	wirelessly transmit information indicative of the measurements of oxygen saturation and pulse rate to a separate monitoring device configured to receive the information indicative of the measurements of oxygen saturation and pulse rate.

Ex. 1001, 13:10–54; Pet. xii (Listing of Claims).

Claim 17 (also challenged) requires the “portable mounting device according to claim 1” but also claims “[a] method of portable patient monitoring,” involving steps of attaching the device to a patient, attaching wired connections, activating the device, and then wirelessly transmitting to the monitoring device. Ex. 1001, 14:53–15:5.

Claim 19, although similar in scope to claim 1, has unique limitations not found in claim 1, such as a requirement for the first sensor port to electrically receive a signal from a pulse oximetry sensor including analog information. *Id.* at 15:23–16:24. Claim 19 also requires the housing to receive a signal from the second sensor arrangement including digital information. *Id.* Claim 19 does not require that the wired connection from the first sensor be along a substantially perpendicular path. *Id.* Claim 21 is “[a] method of portable patient monitoring” first reciting “a portable patient monitoring device according to claim 19.” *Id.* at 16:31–49.

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
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 ’108 patent are unpatentable based on the following grounds (Pet. 5–6):

Claims Challenged	35 U.S.C. §	Reference(s)/Basis
1–5, 9–18	103(a)	Goldberg, Kiani
1–5, 9–18	103(a)	Akai, Kiani
6–8	103(a)	Goldberg, Kiani, Fujisaki
6–8	103(a)	Akai, Kiani, Fujisaki
19–22	103(a)	Goldberg, Kiani, Money
19–22	103(a)	Akai, Kiani, Money

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

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 patient monitoring systems.” Pet. 13 (citing Ex. 1003 ¶¶ 27–32). Patent Owner does not offer any rebuttal on the final record.

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 ’108 patent’s specification. Pet. 13. Petitioner further states that “the Board need not construe any claim terms to find the claims invalid.” Pet. 13 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 a first, second, and third “sensor port” (Ex. 1001, claim 1), and we asked the parties to “clearly identify what they contend the scope of a ‘sensor port’ encompasses,” if the term has “any special meaning or otherwise should be construed.” Inst. Dec. 22.

In its Response, Patent Owner contends that we “should construe ‘sensor port,’ according to its plain and ordinary meaning of a ‘connector that mates with a compatible connector from a sensor.’” PO Resp. 17. 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 17–18 (citing Ex. 1001, 4:65–5:2, 5:33–36, Fig. 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 18–19 (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 between the sensor 310 and the sensor module 400.” PO Resp. 19. Thus, Patent Owner contends that “a PHOSITA [person having ordinary skill in the art] would understand that the term ‘sensor port’ to involve a removable connection, and does not include hardwired connections.” *Id.* (citing Ex. 2010 ¶ 39). Patent Owner states that “[a]ll other terms in the ’108 Patent should also be given their plain and ordinary meanings.” *Id.* at 20.

Petitioner, in Reply, argues that “[t]he construction of ‘sensor port’ is not an issue that the Board must resolve to find the ’108 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 even if you look at slide 15 of their deck, 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 port.

Because we determine that Kiani in combination with Goldberg teaches the claimed sensor ports under any reasonable definition, including those offered by Patent Owner, we need not further elaborate on the scope of a “sensor port” or “sensor ports.” *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 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. 27 (“both experts now agree that Kiani 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

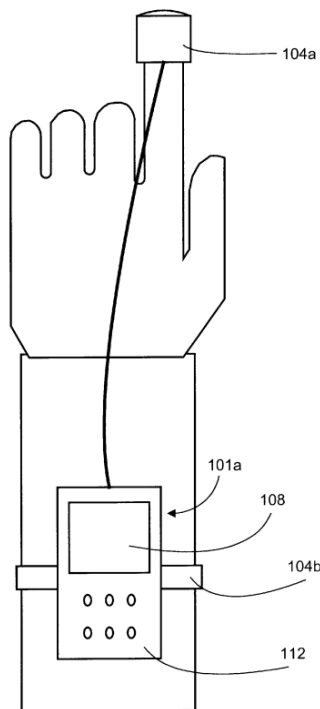


Figure 2 of Goldberg depicts portable device 101a mounted in an assembly or housing 112 that is sized to be carried by an individual and strapped to the wrist or forearm by any conventional strap apparatus. Ex. 1005, 4:57–60. In this embodiment, sensor 104a is a pulse oximetry sensor and blood pressure 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 in Figure 5, reproduced 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.

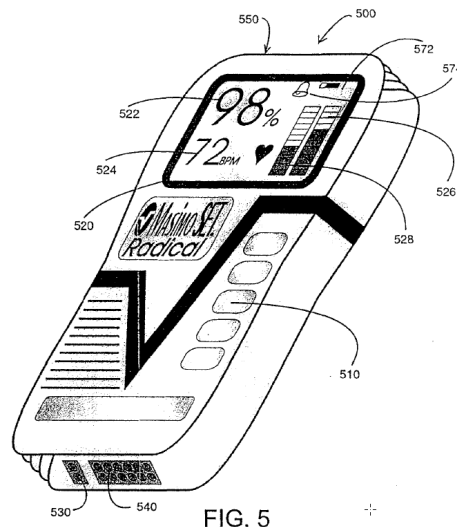


Figure 5 of Kiani depicts a handheld embodiment. As shown, Kiani’s display 520 shows measured oxygen saturation 522, pulse rate 524,

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.

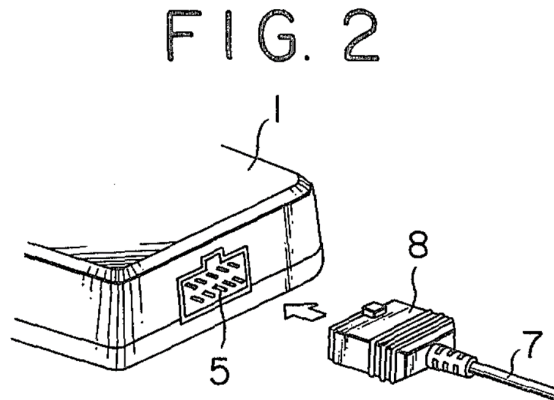


Figure 2 of Fujisaki depicts a partial perspective view of connector pin 5 provided for receiving connector plug 8 to create a removable connection for either a heart or pulse sensor. Ex. 1016, 5:37–44.

5. *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 and Kiani*

Petitioner asserts that claims 1–5 and 9–18 would have been obvious in view of Goldberg and Kiani. *See* Pet. 15–32. We discuss below the parties’ arguments as to claim 1, as well as Petitioner’s contentions as to claims 2–5 and 9–18, 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 as teaching most of the features of claim 1. *See* Pet. 15–32. Petitioner relies on Kiani for its teachings that “portable electronic devices require battery power and wired connections often include ports,” which Petitioner also contends would be features a person of ordinary skill in the art would understand Goldberg to also implicitly disclose. Pet. 15–16. Petitioner also argues that “combining Kiani and Goldberg represents a combination of prior art elements according to known methods to yield predictable results.” Pet. 16.

Claim 1

For ease of reference, we refer to each claim limitation according to the labeling set forth above, and adopted by Petitioner. *See* Pet. xii.

Petitioner contends the preamble (1a) is not limiting, but even if it were limiting, Goldberg teaches an arm mountable, portable, patient monitoring device configured to receive physiological information from a plurality of sensors. Pet. 16; 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. 16; 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. Pet. 17; Ex. 1005, 4:57–67. According to Petitioner, Goldberg teaches that the sensors 104a, 104b are positioned at two different measurement sites (the finger and

wrist), and that connection with the sensors occurs via a cable making a wired connection. Pet. 17 (citing Ex. 1003 ¶¶ 56–58; Ex. 1005, 4:26–29, Fig. 2). Further, Goldberg discloses sensor data collected by the portable device is transmitted to a remote computer. Pet. 18 (citing Ex. 1003 ¶ 59; Ex. 1005, 5:9–24, 5:39–47).⁴

As for limitation 1(b) (“a housing”), Petitioner persuasively shows that Goldberg teaches a housing secured or strapped to the person being measured at the person’s wrist or forearm. Pet. 18 (citing Ex. 1003 ¶ 61; Ex. 1005, 4:19–30, 4:57–60). 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, thus meeting the requirements of limitation 1(c). Pet. 18–19 (citing Ex. 1005, 4:57–60, 4:64–67; Ex. 1003 ¶¶ 62–65).

Limitation 1(d) requires a display positioned on a front side of the housing that shows at least one status indicator and one or more parameter measurements. *See supra*. Petitioner explains persuasively how Goldberg teaches a display with measurement data, statistical data, and sensor data (e.g., blood pressure readings, oxygen saturation readings, pulse readings). Pet. 21 (citing Ex. 1003 ¶¶ 67–68; Ex. 1005, 6:32–45, Figs. 6A–B). As for the claimed status indicators, Goldberg’s display indicates whether it is displaying daily or weekly averages, thereby indicating the status of whether the device is operating in either a daily or weekly display mode. Pet. 22 (citing Ex. 1005, Figs. 6B–C). Petitioner notes that Goldberg does not use

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.

the word “status indicators,” but Kiani explicitly teaches displaying “status indicators,” such as low battery. Pet. 22–23 (citing Ex. 1006, 8:33–9:2). Petitioner reasons persuasively that “[i]t would have been obvious to display the status indicators of Kiani on the display of Goldberg to indicate visually to a user various status information, such as whether an alarm is enabled and whether the portable monitor has a low battery,” or “additional status information.” Pet. 23 (citing Ex. 1006, 8:33–9:2; Ex. 1003 ¶¶ 70–71).

Petitioner next shows how Goldberg teaches the limitations of 1(e) related to a first sensor port positioned on a first side of the housing, facing toward a hand of the arm of the patient when the housing is secured to the arm of the patient. Pet. 23. Dr. Yanulis testifies that “[a] port is typically a female connection or socket of a wired connection.” Ex. 1003 ¶ 73 (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.*

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. *Id.*; Pet. 25–26. Petitioner next contends that Kiani provides specific teachings and motivation for using a port in Goldberg:

To the extent that Goldberg doesn't explicitly recite a port, Kiani teaches that sensor input ports 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 often communicate with electrical devices via ports, such as the wired connection of the pulse oximetry sensor 104a shown in Goldberg. *Id.*; EX1003, ¶ 74. 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, ¶ 74.

Pet. 26. Similarly, Dr. Yanulis testifies that “Kiani shows that sensor input ports 540,^[5] 550 were a known vehicle for wired communication,” and including a port on Goldberg's housing would predictably enable wired communication with the pulse oximeter 104a while allowing easy removal and replacement of the sensor 104a providing the adaptability required by clinicians. Ex. 1003 ¶ 74.

Petitioner next 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 sensor port as required by limitation 1(f).

Pet. 27. Limitation 1(g) requires the wired connection configured to extend from the first sensor port along a path substantially perpendicular to the first side of the housing. Petitioner shows persuasively how Goldberg (Fig. 2) includes a wire between the pulse oximetry sensor 104a and the housing 112

⁵ We are mindful that Dr. Yanulis uses the term “sensor input ports” in reference to Kiani's components 540 and 550. We note, however, that Kiani uses the term “output port” to refer to oximeter output for connection to the external pulse oximeter 540 and the term “sensor input” to refer to component 550. *See* Ex. 1006, 8:31–33.

that extends from the first sensor port along a path substantially perpendicular to the first side (side facing the patient's hand) of the housing. *Id.* (citing Ex. 1003 ¶ 78; Ex. 1005, Fig. 2).

Limitation 1(h) next recites a second sensor port positioned on the housing and configured to receive a signal from a second sensor arrangement via a wired connection. Petitioner relies on Goldberg's sensors 104a, 104b that communicate with the controller 102 via a wired connection as teaching this second sensor arrangement. Pet. 28 (citing Ex. 1005, 4:19–29, 5:3–8). Petitioner notes that because the connection between the controller and the blood pressure sensor is a wired connection, Goldberg implicitly teaches that this wired connection includes a port. *Id.* (citing Ex. 1003 ¶¶ 79–80). Petitioner again relies on Kiani's teachings demonstrating that sensor ports were conventional for wired connections, asserting it would have been obvious to a person of ordinary skill in the art to include a port in Goldberg's portable device for any wired connection with a sensor. Pet. 29. As Dr. Yanulis explains, "it would have been obvious to combine Goldberg and Kiani to include a second port as part of the wired connection between the blood pressure sensor 104b and the housing 112 of Goldberg." Ex. 1003 ¶ 81. Dr. Yanulis reasons that "ports generally provide removable wired connections" and adding a port for the blood pressure sensor "would predictably enable wired communication with the blood pressure sensor 104b while allowing removal and replacement of the sensor 104b and providing a secure, wired connection between the blood pressure sensor 104b and the housing 112." *Id.*

Limitation 1(i) is generally directed to a system capable of communicating with a third sensor, and Petitioner shows how Goldberg

teaches a system capable of communicating with more than two sensors. Pet. 29 (citing Ex. 1003 ¶ 81; Ex. 1005, 4:19–29, 5:3–8). Petitioner relies on Goldberg’s teaching of how “the portable device 100a communicates with three or more sensors (SpO₂, blood pressure, and electrolyte),” and also “receives signals from a third sensor (e.g., electrolyte) via a wired connection via a third sensor port.” *Id.* (citing Ex. 1005, 4:19–29, 4:57–5:8; Ex. 1003 ¶¶ 83, 84). Petitioner again relies on Kiani’s teaching of sensor ports and also Petitioner reasons that adding a generic, third sensor port is duplication of parts. Pet. 29–30.

Petitioner relies on Goldberg’s controller configured to process signals from the sensors and the controller receiving signals from the pulse oximetry sensor as teaching the limitations of 1(j) and 1(k). Pet. 30 (citing Ex. 1003 ¶¶ 87, 88; Ex. 1005, 4:34–36, 4:19–23, 4:62–64). Similarly, for limitation 1(l), Petitioner demonstrates persuasively how Goldberg teaches that the controller derives and displays measurements of oxygen saturation and pulse rate based on the signals received from the pulse oximetry sensor. *Id.* (citing Ex. 1005, 4:19–23, 4:30–36, 4:50–56, Figs. 6A–C). Petitioner also relies on Kiani, arguing that “even if Goldberg doesn’t expressly teach that the pulse oximetry sensor detects both oxygen saturation and pulse, it would have been obvious to modify the pulse oximetry sensor 104a to detect both parameters in view of Kiani.” Pet. 31. Petitioner notes that “Kiani explicitly explains that conventional pulse oximetry sensors detect pulse and oxygen saturation simultaneously.” *Id.* (citing Ex. 1006, 6:7–9). Relying on the testimony of Dr. Yanulis, Petitioner reasons that a person of ordinary skill in the art “would have been motivated to include a sensor capable of detecting both pulse rate and oxygen saturation to minimize the number of

sensors attached to a patient, thereby decreasing patient discomfort.” *Id.* (citing Ex. 1003 ¶ 92).

Limitations 1(m) and 1(n) require a transmitter configured to wirelessly transmit information indicative of the measurements of oxygen saturation and pulse rate to a separate monitoring device. *See supra.* Petitioner explains persuasively how Goldberg’s “wireless communication unit 110 configured to send and receive data” and its ability to “wirelessly transmit[] sensor data or physiological measurements to the remote computer 302,” meets these limitations. Pet. 31–32 (citing Ex. 1005, 4:40–42, 5:9–24). “Goldberg teaches that the sensor data or physiological measurements include oxygen saturation and pulse rate,” and Petitioner explains how Goldberg’s remote computer is a separate monitoring device configured to receive the sensor information. Pet. 32 (citing Ex. 1003 ¶¶ 95–96; Ex. 1005, 4:19–23, 4:50–56, 5:15–17, Figs. 6A–C).

Remaining Claims

For each of the remaining claims examined below in this ground, Patent Owner does not specifically contest Petitioner’s arguments and evidence. For the reasons set forth below, we find Petitioner’s contentions persuasive for these remaining claims.

Claim 2

Claim 2 depends from claim 1 and further requires, “the wired connection from the pulse oximetry sensor to the first sensor port is provided at least in part via a tail of the pulse oximetry sensor.” Ex. 1001, 13:55–58.

Petitioner contends, and Patent Owner does not contest, that “a PHOSITA would assume that a tail is a wire,” and “Goldberg teaches a pulse oximetry sensor 104a that includes a wire connecting the pulse

oximetry sensor 104a to the controller 102.” Pet. 32 (citing Ex. 1003 ¶¶ 97, 98); Tr. 33:9–34:19.

Claim 3

Claim 3 depends from claim 2 and additionally requires, “the wired connection is configured to run from the first sensor port, at least part way down the arm of the patient, and to a digit of the patient to which the pulse oximetry sensor is configured to be attached.” Ex. 1001, 13:59–63.

Petitioner relies on Figure 2 of Goldberg that shows that the wired connection from the sensor 104a runs from the first sensor port on the housing 112 partially down the arm of the person to a finger where the sensor is attached. Pet 33 (citing Ex. 1005, 4:19–29, 4:60–62, Fig. 2).

Claim 4

Claim 4 depends from claim 3 and additionally requires that “the digit is a thumb of the patient.” Ex. 1001, 13:64–65.

Petitioner contends that Goldberg teaches that the sensor 104a can be positioned on any finger. Pet. 34 (citing Ex. 1005, 4:60–62). Dr. Yanulis testifies that it would have been obvious to position the pulse oximetry sensor on the person’s thumb because there is nothing different about detecting oxygen saturation via a thumb than any other finger. Ex. 1003 ¶ 100.

Claim 5

Claim 5 depends from claim 1 and additionally requires, “a cable providing the wired connection from the pulse oximetry sensor to the first sensor port.” Ex. 1001, 13:66–14:2.

Petitioner persuasively shows that Goldberg teaches that the wired connection between pulse oximetry sensor 104a and controller 102 is a wire (i.e., cable). Pet. 34 (citing Ex. 1005, 4:26–29; Ex. 1003 ¶ 102).

Claim 9

Claim 9 depends from claim 1 and additionally requires, “a battery configured to provide power to at least the display and the first sensor port.” Ex. 1001, 14:14–17.

Petitioner contends that “Goldberg teaches a portable electronic device 100a,” and “[w]ithout a battery, the portable, electronic device either wouldn’t be portable or wouldn’t be functional.” Pet. 35 (citing Ex. 1005, code (57); Ex. 1003 ¶ 103) (emphasis omitted). Petitioner alternatively argues that Kiani teaches that portable devices are battery powered, and Kiani teaches that all electrical components of the handheld device 500 are powered by the battery. *Id.* (citing Ex. 1006, 5:21–22, 9:11–13). Further, based on these teachings, “[i]t would have been obvious to include a battery in the portable device of Goldberg so that the portable device operates without being tethered to a wall outlet.” *Id.* (citing Ex. 1003 ¶ 104).

Claim 10

Claim 10 depends from claim 1 and additionally requires, “wherein the front side of the housing comprises a single user interface.” Ex. 1001, 14:18–20.

Petitioner persuasively shows that Goldberg teaches a single display 108 for displaying data and a display is a user interface. Pet. 35 (citing Ex. 1005, 4:30–34, 6:32–46; Ex. 1001, 14:21–22; Ex. 1003 ¶ 105).

Claim 11

Claim 11 depends from claim 10 and additionally requires, “wherein the single user interface comprises the display.” Ex. 1001, 14:21–22.

Petitioner additionally shows that Goldberg teaches a display 108 for displaying data. Pet. 35 (citing Ex. 1005, 4:30–34, 6:32–46; Ex. 1003 ¶ 106).

Claim 12

Claim 12 depends from claim 11 and additionally requires, “wherein the display is positioned centrally on the front side of the housing.” Ex. 1001, 14:23–25.

Relying on Figure 2 of Goldberg, Petitioner contends that the display 108 is centrally positioned on the housing 112. Pet. 36 (citing Ex. 1003 ¶ 107; Ex. 1005, Fig. 2).

Claim 13

Claim 13 depends from claim 12 and additionally requires, “wherein the display positioned on the front side of the housing is sized such that the display covers most of a length of a shortest dimension of the front side of the housing.” Ex. 1001, 14:26–29.

Petitioner contends that “Goldberg illustrates the display 108 on the front side of the housing 112 as covering most of the length of the shortest dimension (latitudinal) of the front side of the housing.” Pet. 36–37 (citing Ex. 1003 ¶ 108; Ex. 1001, Fig. 2).

Claim 14

Claim 14 depends from claim 1 and generally requires, “the one or more signal processing arrangements are further configured to: receive signals from the second and third sensor arrangements; and cause to be

displayed, on the display, at least measurements of one or more additional physiological parameters.” Ex. 1001, 14:30–38.

Petitioner contends that “Goldberg teaches a controller 102 that receives signals from a pulse oximetry sensor 104a, a blood pressure sensor 104b, and an electrolyte sensor.” Pet. 37 (citing Ex. 1003 ¶ 109; Ex. 1005, 4:19–29, 4:57–5:8). Further, “Goldberg teaches that measurements from the three sensors are displayed based on signals received from the connected sensors.” Pet. 38 (citing Ex. 1003 ¶ 109; Ex. 1005, 4:19–29, 5:3–8, 5:36–53, 6:32–46, Figs. 6a-c).

Claim 15

Claim 15 depends from claim 14 and additionally requires, “the one or more signal processing arrangements are further configured to: receive signals from the second and third sensor arrangements; and cause to be displayed, on the display, measurements of all of the oxygen saturation, pulse rate, and the one or more additional physiological parameters.” Ex. 1001, 14:39–46.

Petitioner relies on Goldberg’s teaching that display device 108 displays measurements of oxygen saturation (labeled SpO₂ in Fig. 6b), pulse rate (labeled HR for “heart rate” in Fig. 6b), and an additional physiological parameter, namely blood pressure (labeled “BP” in Fig. 6b) based on signals received from sensors, as well as a glucose sensor. Pet. 38 (citing Ex. 1005, 4:19–29, 4:57–5:8, 5:3-6; Ex. 1003 ¶¶ 110–111).

Claim 16

Claim 16 depends from claim 15 and additionally requires, “the transmitter is further configured to: wirelessly transmit information indicative of the measurements of oxygen saturation, pulse rate, and the one

or more additional physiological parameters to the separate monitoring device.” Ex. 1001, 14:47–52.

Petitioner contends that “Goldberg teaches that the communication unit 110 wirelessly transmits sensor data and measurements to a remote computer 302 (i.e., separate monitoring device),” and “the sensor measurements include blood pressure (additional physiological parameter), oxygen saturation, and pulse rate.” Pet. 39 (citing Ex. 1005, 5:9–21, 4:50–56).

Claim 17

Claim 17 is a method claim providing a portable patient monitoring device according to claim 1. Claim 17 requires the additional steps of:

17(c) attaching the strap to the arm of the patient;

17(d) mounting the housing to the strap such that the first sensor port positioned on a first side of the housing faces toward the hand of the arm of the patient;

17(e) wrapping the pulse oximetry sensor around a digit of the hand of the patient;

17(f) attaching the wired connection from the pulse oximetry sensor to the first sensor port positioned on the first side of the housing; and

17(g) activating the portable patient monitoring device such that measurements of oxygen saturation and pulse rate are both: displayed on the display of the portable patient monitoring device on the patient; and

17(h) wirelessly transmitted to the separate monitoring device configured to receive the measurements of oxygen saturation and pulse rate.

Ex. 1001, 14:53–15:5 (limitation designations added).

Petitioner contends “Goldberg teaches a method for portable patient monitoring,” including “that the portable device 100a is strapped to a

patient's arm,” and “housing 112 mounts to the strap 104b such that the sensor port to the pulse oximetry sensor 104a faces towards the hand of the arm of the patient.” Pet. 39–40 (citing Ex. 1003 ¶¶ 113, 116; Ex. 1005, 1:6–18, 4:57–60, 4:64–67, Fig. 2).

Petitioner relies on the above analysis related to attaching the wired connection from the pulse oximetry sensor to the first sensor port, arguing “Goldberg’s housing includes a sensor port, or it would have been obvious to include a sensor port in view of Kiani.” Pet. 41.

Petitioner points out that Figure 2 of Goldberg shows the claim 17(e) limitation of “wrapping the pulse oximetry sensor around a digit of the hand of the patient,” and also “illustrates the pulse oximetry sensor 104a connecting to the portable device 100a via a wire positioned on the first side (side facing the patient’s hand) of the housing,” required by 17(f). *Id.*

As for the 17(g) requirement for the measurements of oxygen saturation and pulse rate to be displayed, Goldberg (Figures 6a–c for example) teaches and illustrates that oxygen saturation and pulse rate are both displayed on display 108 of portable device 100a, according to Petitioner. Pet. 42. As for the 17(h) transmissions limitation, Petitioner shows how Goldberg teaches that oxygen saturation and pulse rate are both wirelessly transmitted to a remote computer 302. *Id.* (citing Ex. 1005, 5:9–21).

Claim 18

Claim 18 depends from claim 17 and additionally requires:

18(a) attaching the second sensor arrangement to a second measurement site on the patient different from the hand of the patient;

18(b) attaching the wired connection from the second sensor arrangement to the second sensor port;

18(c) attaching the third sensor arrangement to a third measurement site on the patient different from both the hand of the patient and the second measurement site; and

18(d) attaching the wired connection from the third sensor arrangement to the third sensor port,

18(e) wherein the portable patient monitoring device is further activated such that measurements of one or more additional physiological parameters are both: displayed on the display of the portable patient monitoring device on the patient; and wirelessly transmitted to the separate monitoring device.

Ex. 1001, 15:6–23 (limitation designations added).

Petitioner first notes that “Goldberg teaches that a blood pressure sensor is also attached to the patient via a blood pressure cuff wrapped around a forearm or wrist,” and that “[t]he forearm or wrist is a second measurement location that is not the patient’s hand.” Pet. 42–43 (citing Ex. 1003 ¶ 122; Ex. 1005, 4:64–67, Fig. 2). For the second sensor port, Petitioner relies on its analysis above of claim 1, and further argues that “Goldberg teaches that the blood pressure cuff 104b communicates signals via a wired connection.” Pet. 43 (citing Ex. 1005, 4:26–29, 4:64–67, Fig. 2).

As for the claim 18(c) requirement of “attaching the third sensor arrangement to a third measurement site,” Petitioner relies on Goldberg “attaching a non-invasive electrolyte sensor (third sensor) to the patient to sense Na^{+1} and K^{+1} ions,” and “that the third (or fourth) sensor is temperature, glucose, electrocardiogram, or others.” *Id.* (citing Ex. 1005, 5:1–3, 1:28–44). Relying on the testimony of Dr. Yanulis, Petitioner argues that “[a]ny of these sensors would be positioned in a different location from the pulse oximetry sensor and the blood pressure sensor because these exemplary sensors need exposure to the patient’s skin to detect physiological parameters.” *Id.* (citing Ex. 1003 ¶ 124). “Thus, Goldberg teaches attaching

a third sensor arrangement to a third measurement site.” *Id.* (citing Ex. 1003 ¶¶ 124–125). Petitioner also explains how “Goldberg teaches that the housing connects to all sensors, including the electrolyte sensor, through a wired connection,” and “Goldberg’s housing 112 would include a third sensor port, or it would have been obvious to include a third sensor port in view of Kiani,” as explained above for claim 1. Pet. 43–44 (citing Ex. 1003 ¶ 126; Ex. 1005, 4:26–29).

2. Patent Owner’s Arguments and Evidence

Patent Owner argues that claims 1–5 and 9–18 are not obvious over the combination of Goldberg and Kiani. PO Resp. 23–44. Patent Owner first contends that “the proposed combination lacks all of the claim elements,” and “Goldberg does not disclose any claimed sensor ports and Kiani discloses one only sensor port.” *Id.* at 23–24. Second, Patent Owner contends that “there is no credible motivation for the asserted combination and modifications,” the combination is based on “hindsight,” and “Petitioner fails to present a motivation to modify Goldberg to add sensor ports as required by independent Claims 1 and 17.” *Id.* at 24.

Patent Owner argues that “the disclosure of Goldberg does not include any sensor ports under the proper construction.” *Id.* 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 25 (citing Ex. 2010 ¶¶ 63–64). 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 26 (citing Ex. 2010 ¶ 64; 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. 26. Patent Owner alleges “[t]hat assumption is unsupported and legally improper.” *Id.* Patent Owner argues that “[b]ecause Goldberg does not meet either Yanulis’ explanation of a port or Patent Owner’s proposed construction, Petitioner’s arguments for the second and third sensor 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 27 (citing Ex. 2013, 121:14–122:7, 122:17–123:10; Ex. 2010 ¶¶ 63, 98).

Patent Owner contends that Petitioner fails to explain why a POSITA would have modified Goldberg with Kiani to have three sensor ports. *Id.* Patent Owner argues that Kiani only discloses a single sensor port (550) and the Board should disregard not only 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 28.

Patent Owner argues that Petitioner’s reasons for combining references are generic and conclusory. *Id.* at 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.* Patent Owner alleges that ports have disadvantages that “Yanulis failed to consider.” *Id.* at 30. Patent Owner relies on Mr. Oslan’s testimony that “port connections can be accidentally detached, may introduce contact noise caused by unstable electrical connections which could cause a measurement gap or error, require more space and hardware to accommodate than a hardwired cable, and introduce additional parts, expense, and points of failure to a device.” *Id.* (citing Ex. 2010 ¶¶ 66–68; 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 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 “to 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 ¶ 70). 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 ¶¶ 70–72).

Patent Owner argues that “Petitioner and Yanulis fail to explain how combining Goldberg and Kiani to add sensor ports 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 ¶¶ 75–76, 104–105). 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). 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 ¶¶ 75–76, 104–105).

Patent Owner next contends that a person of ordinary skill in the art would not be motivated to add a second sensor port between Goldberg’s blood pressure cuff and housing because “a wrist-worn blood pressure cuff needs to inflate in order to measure blood pressure,” and “a pressure sensor would be located within a housing in order to measure the cuff pressure.” PO Resp. 35–36 (citing Ex. 2010 ¶ 84). “Thus,” according to Patent Owner, “if Goldberg’s blood pressure cuff were to be removable from the housing, a PHOSITA would know that there would also need to be an air-tight pneumatic connection between the housing and the blood pressure cuff.” *Id.* at 36. 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, they merely rely on the same 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 cuff.” *Id.* at 37 (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 sensor port.” *Id.* (citing Ex. 2010 ¶¶ 80–83). 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 (citing Ex. 2010 ¶¶ 93, 113). Similarly, Patent Owner argues “that adding a sensor port between the housing and the blood pressure 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 blood pressure cuff and the housing.” *Id.* (citing Ex. 2010 ¶¶ 84, 88).

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 cuff when the more reasonable approach would have been to integrate the blood pressure cuff directly into Goldberg’s housing.” PO Resp. 39–40 (citing Ex. 2010 ¶¶ 86, 93). Patent Owner disagrees with the premise that the ability to replace a faulty blood pressure sensor would motivate the addition of a sensor port because a POSITA would understand that adding a sensor port would increase the likelihood of a failure. *Id.* at 40 (citing Ex. 2010

¶¶ 83, 86, 87). Patent Owner also alleges that “[a] broken sensor port or loose connection, caused by wear and tear, would prevent an air-tight seal for the cuff or an unreliable electrical connection.” *Id.* Because of the increased likelihood of failure, Patent Owner argues that a POSITA would not be motivated to add a sensor port between Goldberg’s housing and cuff. *Id.*

As for the claimed third sensor port, Patent Owner makes similar arguments as to why a POSITA would not be motivated to add a third sensor port to Goldberg. PO Resp. 41. Looking back to the time of the invention, 2002, Patent Owner further contends that simultaneous monitoring at the time was accomplished with a multiparameter monitor, rather than a wrist-worn monitor and the use of wrist-worn devices would entail significant trade-offs for size and battery life such that a POSITA would not have expected a wrist-worn monitor to provide the same level of multiple, simultaneous parameter monitoring that a multiparameter monitor could provide. *Id.* at 42. Patent Owner also notes that adding a third sensor port contradicts Dr. Yanulis’ opinion that “the best way to improve patient comfort would be to **minimize** the size of the wearable device and **the number of sensors attached to the patient.**” *Id.* (quoting Ex. 1003 ¶ 29).

For the remaining claims, Patent Owner relies on the arguments made for claim 1. PO Resp. 44 (“Thus, for the same reasons as discussed with respect to Claim 1, Petitioner has not demonstrated the obviousness of Claim 17. Additionally, because Petitioner has not demonstrated the obviousness of independent Claims 1 and 17, Petitioner also has not demonstrated the obviousness of dependent Claims 2-5, 9-16, and 18.”).

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 and Kiani. 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 ¶¶ 73, 74 (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. 27, 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 have been desirable to a person of ordinary skill. *See* Ex. 1003 ¶¶ 73, 74. Petitioner demonstrates that using Kiani’s sensor port in Goldberg is adopting a well-known and preferred method of electrical connection that

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.”).

provides a more adaptable, yet secure, connection than merely contacting two electrical conductors. *Id.* ¶ 73. 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 ¶ 74 (“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 ¶ 74. In view of Kiani, a POSITA would have been motivated to make each respective wired connection to a sensor port because Kiani demonstrates ports were a known and improved method for forming wired connections. Ex. 1003 ¶¶ 81, 86. 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

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”).

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 ¶ 72. 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. 41; 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 connection. *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 ¶¶ 72–86, 85 (“including a third port on Goldberg’s housing would have predictably enabled wired communication with the third sensor 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”), 86 (“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. 42. 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 ’108 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 13–15. 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 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.*

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

(“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. 30 (“Yanulis failed to consider whether ports have any disadvantages compared to hardwired connections.”), 31 (“fail to consider whether any disadvantages of adding a port would dissuade a PHOSITA from making the alleged combination”); Ex. 2010 ¶¶ 66–74, 68 (“adding a connector increases cost . . . adds an additional point 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 ¶ 81 (“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 ¶ 74 (“including a port on Goldberg’s housing . . . would . . . allow[] easy removal and replacement of the sensor 104a while providing a secure, wired connection between the pulse oximetry sensor 104a and the housing 112, 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.

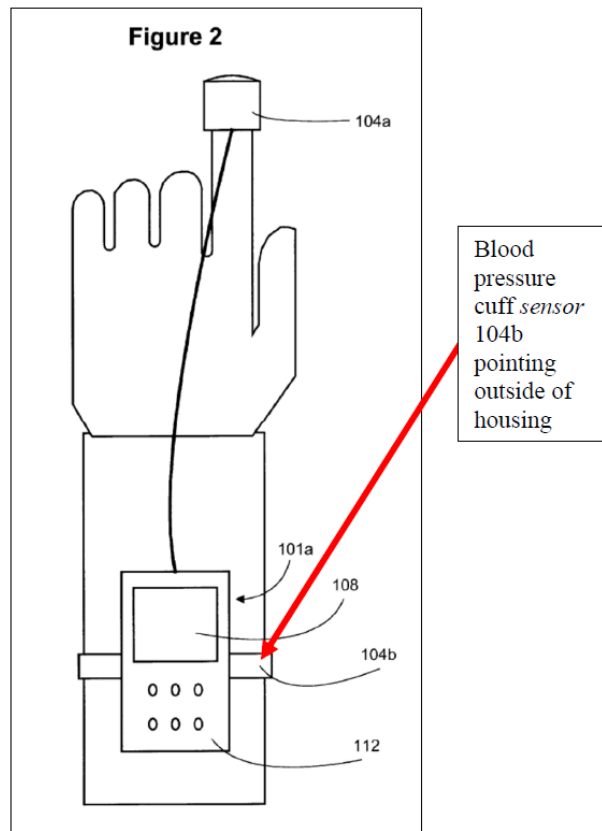
We have considered Patent Owner's arguments, and Mr. Oslan's testimony, related to potential disadvantages but determine that in the aggregate Petitioner presents stronger evidence as to advantages of the proposed combination that a person of ordinary skill in the art would have considered in 2002. *See 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.

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. 38; 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 port

as part of the wired connection between the blood pressure sensor 104b and the housing 112 of Goldberg.” Ex. 1003 ¶ 81. We find persuasive Dr. Yanulis’ explanation that “including a port on Goldberg’s housing (if it wasn’t already there) would predictably enable wired communication with the blood pressure sensor 104b while allowing removal and replacement of the sensor 104b and providing a secure, wired connection between the blood pressure sensor 104b and the housing 112.” *Id.* (“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”).

Thus, we disagree with Patent Owner’s contention that Petitioner “relies on inherency to argue that a second 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.

Based on the final record, Petitioner has shown persuasively that the combination of Goldberg and Kiani 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 '108 patent would have been obvious in view of Goldberg and Kiani.

We have reviewed Petitioner's contentions and supporting evidence regarding claims 2–5 and 9–18, and determine Petitioner has demonstrated by a preponderance of the evidence how each of these claims would have been obvious over Goldberg and Kiani. *See* Pet. 32–44. As noted above, Patent Owner does not separately address Petitioner's contentions for these claims.

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

Petitioner contends that claims 6–8 are unpatentable under 35 U.S.C. § 103 as obvious in view of Goldberg, Kiani, and Fujisaki. Pet. 5, 73–74. 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 ¶¶ 201–207. Petitioner adds Fujisaki for its teaching of wearable devices with removable cables as required by claim 6, and Petitioner contends it would have been obvious to make Goldberg's cable removable from the first sensor port in view of Fujisaki. Pet. 73; Ex. 1016, 5:37–44, Figs. 2, 6.

Claim 6 depends from claim 5 and further requires “the cable is configured to be removably coupled to the housing via the first sensor port.” Ex. 1001, 14:3–5. Claim 7 adds a limitation onto claim 6 that the cable is configured to run from the first sensor port down the arm of the patient to a digit of the patient. *See id.* at 14:6–11. Claim 8 further limits claim 7 by requiring that the digit be a thumb of the patient. *See id.* at 14:12–13.

Petitioner establishes that Fujisaki shows a wearable device having a cable removably connected with a connector plug (i.e., port), and it would have been obvious to make the Goldberg's cable removable from the first sensor port in light of Fujisaki in order to be able to change out sensors efficiently. Pet. 73 (citing Ex. 1003 ¶¶ 73, 203; Ex. 1016, 5:37–44, Figs. 2, 6). Fujisaki also allows for a port to communicate with a variety of different sensors, and as such, Petitioner argues persuasively that a POSITA would have combined the teachings of Goldberg and Fujisaki to build a set of medical sensors appropriate for a patient's condition. Pet. 74.

As for claim 7, Petitioner relies on Figure 2 of Goldberg that shows that the wired connection from the sensor 104a runs from the first sensor port on the housing 112 partially down the arm of the person to a finger where the sensor is attached. Pet 33 (citing Ex. 1005, 4:19–29, 4:60–62, Fig. 2). Addressing claim 8's limitations, Petitioner contends that Goldberg teaches that the sensor 104a can be positioned on any finger. Pet. 34 (citing Ex. 1005, 4:60–62). Dr. Yanulis testifies that it would have been obvious to position the pulse oximetry sensor on the person's thumb because there is nothing different about detecting oxygen saturation via a thumb than any other finger. Ex. 1003 ¶ 100.

For this ground, Patent Owner argues that “[b]ecause Petitioner has not demonstrated obviousness of Claim 1, and because the arguments in Ground 3 do not address the deficiencies in Ground 1, Petitioner also has not shown a reasonable likelihood of success on Ground 3.” PO Resp. 45.

Based on the final record, Petitioner has established by a preponderance of the evidence that claims 6–8 would have been obvious over Goldberg, Kiani, and Fujisaki.

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

Petitioner contends that claims 19–22 are unpatentable under 35 U.S.C. § 103 as obvious in view of Goldberg, Kiani, and Money. Pet. 6, 76–84. 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 ¶¶ 215–248. As noted above, claim 19 has several distinct limitations as compared to claim 1. Claim 19 requires the first sensor port to electrically receive a signal from a pulse oximetry sensor including analog information and the housing to receive a signal from the second sensor arrangement including digital information. Ex. 1001, 15:23–16:24.

1. Petitioner’s Arguments and Evidence

Petitioner presents argument and evidence showing how each limitation of claim 19 is taught by the combination Goldberg, Kiani, and Money. Pet. 76–81. Except for limitations 19(f) and (g), discussed in detail below, Patent Owner does not challenge the remaining limitations of claim 19.

Adopting Petitioner’s listing of claim limitations (Pet. xvi), claim limitation 19(f) requires “the signal from the pulse oximetry sensor including analog information.” Petitioner argues “it would have been obvious to receive an analog pulse oximetry sensor in view of Kiani,” and further, “it would have been obvious to receive both analog and digital information from different sensors in view of Money.” Pet. 78–79. Notably, Petitioner relies on Kiani’s teaching of a sensor interface with an amplifier and a filter that receives an analog signal from a pulse oximetry

sensor as teaching this “analog information” limitation and not the pulse oximetry sensor of Money. Pet. 78 (citing Ex. 1006, 1:26–28).

As for limitation 19(g) requiring the second sensor port to receive “a signal from a second sensor arrangement . . . including digital information,” Petitioner reasons that Money teaches a portable, multi-parameter patient monitor that receives digital signals from some sensors and analog signals from other sensors. Pet. xvii, 78–79; Ex. 1008, 5:48–51, 5:61–6:10, 7:4–8. According to Petitioner, Money explains its system seeks to connect to a wide variety of devices, transmitting both analog and digital information, including the power requirements and requisite circuitry to communicate with both signal types. Pet. 79 (citing Ex. 1008, 7:4–8). Petitioner contends that modifying the combination of Goldberg and Kiani with Money would have predictably resulted in a system that receives both analog and digital information from various sensors, and a person of ordinary skill in the art would have been motivated to modify Goldberg with Money to expand the number of devices with which the portable device of Goldberg can communicate. *Id.* (citing Ex. 1003 ¶¶ 227–228).

Claim limitation 19(l) requires determining digital transmit information based at least in part on: the analog information included in the signal from the pulse oximetry sensor, and the digital information from the second sensor. *See* Pet. xvii. Petitioner explains how Goldberg discloses packet based wireless transmissions that transmit digital data and controller 102 determining packets for transmission to remote computer 302. Pet. 97.

The remaining limitations of claim 19 are similar to those already addressed for claim 1, or other dependent claims. *See* Pet. 91–98.

Claim 20 requires that the display is positioned centrally on the front side of the housing as well as sized to comprise most of the length of the shortest dimension. *See* Ex. 1001, 16:25–30. Petitioner contends that Goldberg in view of Kiani teaches this limitation for the reasons set forth for claim 13. Pet. 82.

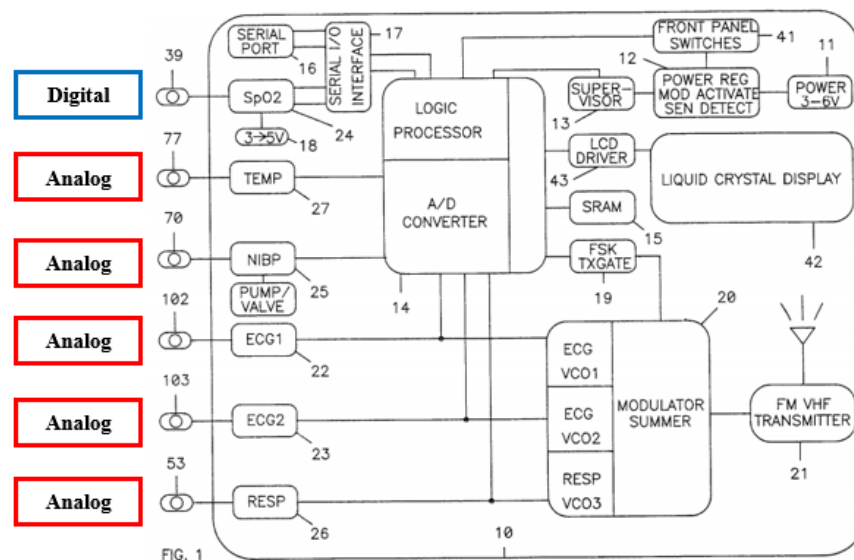
Claim 21 requires the process of physically attaching the housing to a patient and then attaching all the components to one another, and attaching the sensors to a patient, such that the portable patient monitoring device can be activated to take measurements of oxygen saturation and pulse rate to display. *See* Ex. 1001, 16:31–49. Petitioner relies on Goldberg’s method for portable patient monitoring having the portable device strapped to the patient’s forearm or wrist and the housing mounting to the strap such that the sensor port to the pulse oximetry sensor faces towards the patient’s hand. Pet. 82 (citing Ex. 1003 ¶ 242; Ex. 1005, 4:57–60, 4:64–67). Goldberg also teaches methods for attaching a pulse oximetry sensor and a blood pressure (second) sensor to the patient such that each communicate with signals via a wired connection to display measurements from all sensors on a display screen. Pet. 83–84.

Claim 22 requires causing the digital transmit information to be wirelessly transmitted to the separate monitoring device (*see* Ex. 1001, 16:50–54), and Petitioner shows how Goldberg teaches that all sensor measurements are wirelessly transmitted to a remote computer. Pet. 84 (citing Ex. 1003 ¶ 248; Ex. 1005, 5:9–21).

2. Patent Owner’s Arguments and Evidence

Patent Owner first notes that claim 19 differs from claim 1 by further requiring “the signal from the second sensor arrangement including digital

information.” PO Resp. 45. Patent Owner contends that Petitioner’s proposed combination of Goldberg, Kiani, and Money fails to disclose this limitation. *Id.* (citing Ex. 2010 ¶¶ 108–118). Patent Owner points out that the only sensor disclosed in Money that includes digital information is a pulse oximeter sensor, which cannot serve as the second sensor arrangement according to the claim. *Id.* at 46. Patent Owner contends Petitioner ignores the specific arrangement of analog and digital inputs required by claim 19, namely that the signal from the pulse oximetry sensor includes analog information and that the signal from the second sensor arrangement includes digital information. *Id.* Patent Owner argues that Money’s sensor configuration is the opposite of the configuration recited in claim 19 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. 47.

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.* Patent Owner argues, however, that is not the signal arrangement recited in claim 19, 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 second sensor port that receives digital information from Goldberg's blood pressure cuff. PO Resp. 48. 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 blood pressure cuff to send digital signals. *Id.* Patent Owner contends that the reasons for making the combination are illogical because expanding the number of devices (i.e., the ability to swap the blood pressure cuff with a different type of sensor altogether) would entail the removal of the very strap used to secure Goldberg's device to a wrist. *Id.* at 49 (Ex. 2010 ¶ 79). Patent Owner further contends that there is no port in Money that could receive both analog and digital signals from different sensors. *Id.*

Patent Owner further argues that modifying Goldberg's blood pressure cuff to send digital signals to the second sensor port would have

been an undesirable design decision because if a sensor port receives digital information from the blood pressure cuff, the blood pressure cuff would contain both a pressure sensor and an analog-to-digital converter (“ADC”). *Id.* at 50 (citing Ex. 2010 ¶¶ 112–113). Patent Owner contends that because a pressure sensor and an ADC are both rigid, Petitioner should have explained where a sensor or an ADC could be placed inside a blood pressure cuff or why a POSITA would put one in the cuff. *Id.* Patent Owner also argues that a POSITA would not have had a reasonable expectation of success in making the proposed combination because Petitioner identifies no elements in Money that could be combined with Goldberg and Kiani to result in a device that meets the claim limitation. *Id.* at 51.

3. Discussion

Based on the final record, Petitioner has shown by a preponderance of the evidence that claims 19–22 would have been obvious over Goldberg, Kiani, and Money.

Patent Owner’s main argument is that Money teaches the opposite data signal configuration from the one claimed. *See* PO Resp. 47. 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 ¶ 223. 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 ¶¶ 223, 227 (citing Ex. 1005, 4:50–56). 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 ¶ 227 (“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.* ¶ 226 (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, pulse oximetry sensors operate in the analog domain and transmit analog signals,” and “Kiani expressly explains this well-known fact.” *Id.* ¶ 220 (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.*

Money teaches the ability to operate any 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 claim 19. *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).” (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 ¶ 220 (“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 ADC could be placed inside a blood pressure cuff. 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 ¶¶ 226, 228 (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.*

G. Asserted Obviousness Grounds Based on Akai

Because each of claims 1–22 have been found to be unpatentable based on the grounds with Goldberg and Kiani as the primary references, we determine it unnecessary to reach the remaining grounds based on Akai. *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”).

H. Petitioner’s Motion to Exclude

Petitioner filed a Motion to Exclude (Paper 36, “Pet. Mot.”), to which Patent Owner filed an Opposition (Paper 37), and Petitioner filed a Reply (Paper 38).

Petitioner seeks to exclude Exhibits 2016, 2027, 2028, paragraphs 90–92, 94, and 96 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 72, 74, 105, and 131 of Exhibit 2010 on the grounds of inadmissible hearsay. Pet. Mot. 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 1–22 of the '108 patent.¹⁰ In summary:

Claims	35 U.S.C. §	Reference(s)/Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1–5, 9–18	103(a)	Goldberg, Kiani	1–5, 9–18	
1–5, 9–18	103(a)	Akai, Kiani ¹¹		
6–8	103(a)	Goldberg, Kiani, Fujisaki	6–8	
6–8	103(a)	Akai, Kiani, Fujisaki ¹¹		
19–22	103(a)	Goldberg, Kiani, Money	19–22	
19–22	103(a)	Akai, Kiani, Money ¹¹		
Overall Outcome			1–22	

¹⁰ 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).

¹¹ As explained above, we do not reach this ground of unpatentability. See *supra*.

IV. ORDER

Accordingly, it is

ORDERED that claims 1–22 of U.S. Patent No. 10,213,108 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.

IPR2020-00912
Patent 10,213,108 B2

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