Trials@uspto.gov
571-272-7822

Paper 32
Date: April 11, 2022

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

MASIMO CORPORATION,
Patent Owner.

IPR2020-01523
Patent 8,457,703 B2

Before JOSIAH C. COCKS, ROBERT L. KINDER, and AMANDA F. WIEKER, *Administrative Patent Judges.*

COCKS, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining No Challenged Claims Unpatentable
35 U.S.C. § 318(a)
Dismissing Patent Owner's Motion to Exclude
37 C.F.R. § 42.64

I. INTRODUCTION

A. Background

Apple Inc. ("Petitioner") filed a Petition (Paper 2, "Pet.") pursuant to 35 U.S.C. §§ 311–319 to institute an *inter partes* review of claims 1–7, 9–18, and 20–24 ("challenged claims") of U.S. Patent No. 8,457,703 B1 (Ex. 1001, "the '703 patent"). We instituted the petitioned review (Paper 7).

Masimo Corporation ("Patent Owner") filed a Patent Owner Response (Paper 15, "PO Resp.") to oppose the Petition. Petitioner filed a Reply (Paper 18, "Pet. Reply") to the Patent Owner Response. Patent Owner filed a Sur-reply (Paper 20, "Sur-reply") to the Reply. Patent Owner filed a Motion to Exclude Petitioner's Evidence (Paper 25). Petitioner filed an Opposition to the Motion to Exclude (Paper 26). Patent Owner filed a Reply (Paper 27) to Petitioner's Opposition. We conducted an oral hearing on January 19, 2022. A transcript has been entered in the record (Paper 31, "Tr.").

We have jurisdiction under 35 U.S.C. § 6(b)(4) and § 318(a). This Decision is a final written decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73 as to the patentability of claims 1–7, 9–18, and 20–24 of the '703 patent. We determine Petitioner has not shown by a preponderance of the evidence that those claims are unpatentable.

B. Related Matters

The parties identify the following matters related to the '703 patent:

Masimo Corporation v. Apple Inc., Civil Action No. 8:20-cv-00048 (C.D. Cal.) (filed Jan. 9, 2020);

Apple Inc. v. Masimo Corporation, IPR2020-01520 (PTAB Aug. 31, 2020) (challenging claims of U.S. Patent No. 10,258,265 B1);

Apple Inc. v. Masimo Corporation, IPR2020-01521 (PTAB Sept. 2, 2020) (challenging claims of U.S. Patent No. 10,292,628 B1);

Apple Inc. v. Masimo Corporation, IPR2020-01524 (PTAB Aug. 31, 2020) (challenging claims of U.S. Patent No. 10,433,776 B2);

Apple Inc. v. Masimo Corporation, IPR2020-01526 (PTAB Aug. 31, 2020) (challenging claims of U.S. Patent No. 6,771,994 B2);

Apple Inc. v. Masimo Corporation, IPR2020-01536 (PTAB Aug. 31, 2020) (challenging claims of U.S. Patent No. 10,588,553 B2);

Apple Inc. v. Masimo Corporation, IPR2020-01537 (PTAB Aug. 31, 2020) (challenging claims of U.S. Patent No. 10,588,553 B2);

Apple Inc. v. Masimo Corporation, IPR2020-01538 (PTAB Sept. 2, 2020) (challenging claims of U.S. Patent No. 10,588,554 B2); and

Apple Inc. v. Masimo Corporation, IPR2020-01539 (PTAB Sept. 2, 2020) (challenging claims of U.S. Patent No. 10,588,554 B2).

Pet. 75; Paper 3, 2.

C. The '703 Patent

The '703 patent is titled "Low Power Pulse Oximeter," and issued on June 4, 2013, from U.S. Patent Application No. 16/174,144, filed November 13, 2007. Ex. 1001, codes (21), (22), (45), (54). The '703 patent relates to a pulse oximeter that may reduce power consumption in the

absence of certain parameters that may be monitored to trigger or override the reduced power consumption state. *Id*. at code (57). "In this manner, a pulse oximeter can lower power consumption without sacrificing performance during, for example, high noise conditions or oxygen desaturations." *Id.*

As depicted below, the low power pulse oximeter has signal processor 340 that derives physiological measurements 342, including oxygen saturation, pulse rate, and plethysmograph, from input sensor signal 322. Ex.1001, 4:64–5:10, Figs. 3, 4.

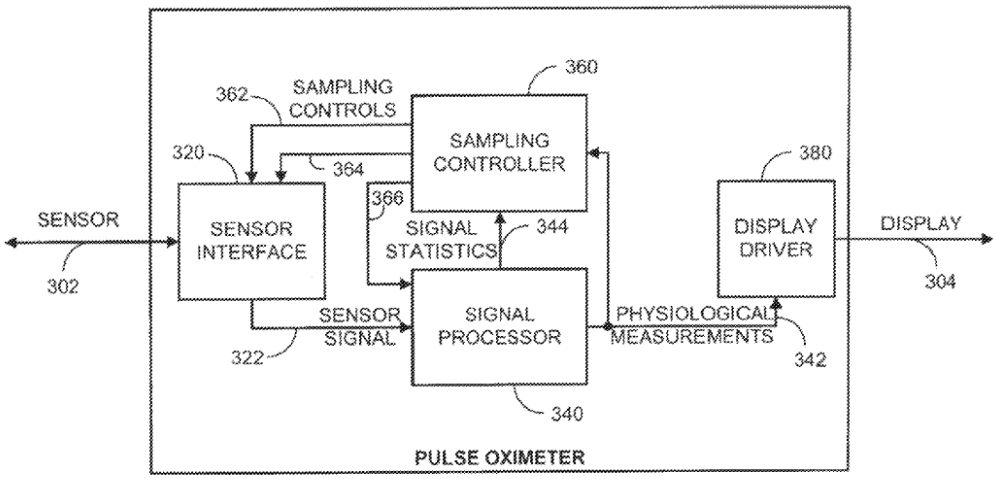

FIG. 3

Figure 3 above illustrates a top-level block diagram of a low power pulse oximeter. *Id.* at 4:40–41. Signal processor 340 may also derive signal statistics 344, such as signal strength, noise, and motion artifact. *Id.* at 5:14–15, Figs. 3, 4. Physiological measurements 342 and signal statistics 344 may be input into sampling controller 360, which outputs sampling controls 362 that in turn are used to regulate pulse oximeter power dissipation by causing sensor interface 320 to vary the sampling characteristics of sensor

port 302 and by causing signal processor 340 to vary its sample processing characteristics. *Id.* at 5:15–27, Figs. 3, 4. According to the '703 patent, power dissipation "is responsive not only to output parameters, such as the physiological measurements 342, but also to internal parameters, such as the signal statistics 344." *Id.* at 5:24–27.

The pulse oximeter uses the physiological measurements and signal statistics to determine "the occurrence of an event or low signal quality condition." Ex. 1001, 6:25–28. An event determination is based upon the physiological measurements and "may be any physiological-related indication that justifies the processing of more sensor samples and an associated higher power consumption level, such as an oxygen desaturation, a fast or irregular pulse rate or an unusual plethysmograph waveform." *Id.* at 6:28–34. A low signal quality condition is based upon the signal statistics and "may be any signal-related indication that justifies the processing or more sensor samples and an associated higher power consumption level, such as a low signal level, a high noise level or motion artifact." *Id.* at 6:34–41.

The pulse oximeter "utilizes multiple sampling mechanisms to alter power consumption." Ex. 1001, 5:59–61. One sampling mechanism is "an emitter duty cycle control" that "determines the duty cycle of the current supplied by the emitter drive outputs 482 to both red and IR sensor emitters." *Id.* at 5:61–66. The sampling mechanisms "modify power consumption by, in effect, increasing or decreasing the number of input samples received and processed." *Id.* at 6:9–11. "Sampling, including acquiring input signal samples and subsequent sample processing, can be reduced during high signal quality periods and increased during low signal

quality periods or when critical measurements are necessary." *Id.* at 6:11–15. "In conjunction with an intermittently reduced duty cycle or as an independent sampling mechanism, there may be a 'data off' time period longer than one drive current cycle where the emitter drivers . . . are turned off." *Id.* at 7:8–12. The occurrence of an event or low signal quality triggers a higher duty sensor sampling, allowing high fidelity monitoring of the event and providing a larger signal-to-noise ratio. *Id.* at 8:44–57.

D. Illustrative Claims

Of the challenged claims, claims 1, 9, 12, 15, 20, and 22 are independent. Claims 1 and 9 are illustrative and are reproduced below.

> 1. A method of managing power consumption during continuous patient monitoring by adjusting behavior of a patient monitor, the method comprising:
>
> [a] driving one or more light sources configured to emit light into tissue of a monitored patient;
>
> [b] receiving on or more signals from one or more detectors configured to detect said light after attenuation by said tissue;
>
> [c] continuously operating a patient monitor at a lower power consumption level to determine measurement values for one or more physiological parameters of a patient;
>
> [d] comparing processing characteristics to a predetermined threshold; and
>
> [e] when said processing characteristics pass said threshold, transitioning to continuously operating said patient monitor at a higher power consumption level,
>
> [f] wherein said continuously operating at said lower power consumption level comprises reducing activation of an attached sensor,
>
> [g] said sensor positioning said light sources and said detectors proximate said tissue.

> 9. A method of managing power consumption during continuous patient monitoring by adjusting behavior of a patient monitor, the method comprising:
>
> [a] driving one or more light sources configured to emit light into tissue of a monitored patient;
>
> [b] receiving one or more signals from one or more detectors configured to detect said light after attenuation by said tissue;
>
> [c] continuously operating a patient monitor at a lower power consumption level to determine measurement values for one or more physiological parameters of a patient;
>
> [d] comparing processing characteristics to a predetermined threshold; and
>
> [e] when said processing characteristics pass said threshold, transitioning to continuously operating said patient monitor at a higher power consumption level,
>
> [f] wherein said continuously operating at said lower power consumption level comprises reducing an amount of processing by a signal processor.

Ex. 1001, 11:32–51, 12:5–22 (bracketed identifiers [a]–[g] and [a]–[f] added).

Independent claim 12 is also a method claim that includes similar limitations, but its last clause recites "wherein said processing characteristics include an override condition." *Id.* at 12:29–46. Independent claims 15, 20, and 22 are corresponding apparatus claims, each directed to a "patient monitor." *Id.* at 12:53–67, 13:16–14:3, 14:6–21.

E. Evidence Relied Upon

Petitioner relies on the following references:

Reference	Publication/Patent Number	Exhibit
Diab	U.S. Patent No. 5,632,272 issued May 27, 1997	1007
Amano	U.S. Patent No. 6,293915 B1 issued Sept. 25, 2001	1004
Edgar	U.S. Patent No. 6,393,311 B1 issued May 21, 2002	1005
Turcott	U.S. Patent No. 6,527,729 B1 issued Mar. 4, 2003	1006

Pet. 3.

Petitioner also relies on the declaration testimony of Brian W. Anthony, Ph.D. (Exhibit 1003). Patent Owner relies on the declaration testimony of Vijay K. Madisetti, Ph.D. (Exhibit 2001).

F. Asserted Grounds

We instituted trial to determine if claims 1–7, 9–18, and 20–24 are unpatentable based upon the following grounds:

Claims Challenged	35 U.S.C. §	References/Basis
9, 10, 12–14, 20, 22–24	103	Diab, Amano
11, 21	103	Diab, Amano, Edgar
1–7, 15–18	103	Diab, Amano, Turcott
9, 10, 12–14, 20, 22–24	103	Diab and "the General Knowledge of a [person of ordinary skill in the art]" ("GK-POSITA")
11, 21	103	Diab, GK-POSITA, Edgar
1–7, 15–18	103	Diab, GK-POSITA, Turcott
9, 10, 12–14, 20, 22–24	103	Amano
1–3, 15–17	103	Amano, Turcott

II. ANALYSIS

A. Claim Construction

For petitions 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). The parties offer constructions for the following claim terms or phrases (1) "reducing/reduce activation of an attached sensor" (claims 1 and 15), and (2) "processing characteristics" (all challenged claims). We determine that it is only necessary to consider the meaning of "processing characteristics."

1. "processing characteristics"

The term "processing characteristics" is one that is required by all of the challenged claims. In the body of the Petition, Petitioner offers two apparent constructions of the term. In one instance, Petitioner sets forth a "limiting interpretation requiring 'processing characteristics' to be obtained from a signal provided by a photodetector." Pet. 50 (citing Ex. 1003 ¶ 97). In another instance, Petitioner expresses that "the plain meaning of 'processing characteristics' includes characteristics or features obtained from or used for processing information." *Id.* at 51 (citing Ex. 1003 ¶ 98; Ex. 1004, 21:9–49). Dr. Anthony characterizes this "plain meaning" construction as constituting "an alternative non-limiting interpretation." Ex. 1003 ¶ 98.

In its Response, Patent Owner lays out disagreement with Petitioner on the construction of "processing characteristics." Patent Owner contends that neither Petitioner nor Dr. Anthony has adequately taken a position as to

what is the proper or correct construction of "processing characteristics." Patent Owner indicates that on cross-examination, Dr. Anthony, "admitted he had not formed an opinion regarding the correct construction." PO Resp. 22 (citing Ex. 2003, 126:13–127:5). Because in Patent Owner's view, Dr. Anthony "never formed an opinion regarding the proper construction," Patent Owner submits that Petitioner's claim construction positions should be regarded with skepticism. *See id.* at 23. Patent Owner expresses that the panel should "construe 'processing characteristics' to require that the processing characteristics are determined from a signal received from one or more detectors configured to detect light." *Id.* at 23 (citing Ex. 2001 ¶ 44). Notably, Patent Owner likens its proposed construction to "Petitioner's 'limiting construction'" and characterizes that construction as "the plain and ordinary meaning" of "processing characteristics," rather than Petitioner's broader proposed construction of the term. *Id.* at 24. Patent Owner contends that its proposed construction draws supports from the claims themselves as well as the Specification of the '703 patent. *Id.* at 24–27.

In particular, Patent Owner notes that all of the challenged claims require that one or more signals are received from one or more detectors that are configured to detect the light after attenuation by body tissue. *Id.* at 24 (referencing independent claims 1, 9, 12, 15, 20, 22). Patent Owner also observes that all of the claims require "comparing processing characteristics to a predetermined threshold." *Id.* Patent Owner reasons the following:

> A POSITA would have understood that the processing characteristics are determined from the signal received from the detector because (1) the signal received from the detector is the only signal referenced in the claims, (2) all data processing in the claims depends on the signal from the detector, and (3) as discussed herein, the specification consistently describes

> determining the processing characteristics from the signal received [from] the detector.

Id. at 24–25 (citing Ex. 2001 ¶ 46).

Patent Owner also explains that throughout the Specification the characteristics that are described and shown as being processed are those conveyed via signals from light detectors. *Id.* at 24–27 (citing Ex. 1001, 5:28–30, 5:35–38, 5:40–41, 5:46–48, 11:43–47, 12:16–20, 12:40–44, 12:62–66, 13:25–41:1, 14:15–19, Fig. 4; Ex. 2001 ¶¶ 43–49).

In its Reply, Petitioner characterizes Patent Owner's proposed construction as "unjustifiably limiting." Pet. Reply 1. In support of its view, Petitioner points to claims 4 and 8 that, according to Petitioner, convey a more expansive meaning of "processing characteristics." Specifically, Petitioner contends that because claim 4 recites "said processing characteristics comprise signal characteristics from one or more light sensitive detectors" the claim allegedly would be "meaningless" if "processing characteristics are already required to be 'determined from a signal received from one or more detectors.'" *Id.*

Claim 8 recites "said processing characteristics include determining an estimate of current power consumption and comparing said estimate with a target power consumption." Ex. 1001, 12:1–4. Petitioner contends that the meaning of that claim as informed by the Specification is that in determining an estimate of current power consumption, the processing characteristics are determined from control engine 440 rather than detector front-end 490 (i.e., a light detector). *Id.* at 2–3.

In its Sur-reply, Patent Owner responds to Petitioner's interpretation of claims 4 and 8 as allegedly informing the meaning of "processing

characteristics." Specifically, with respect to claim 4, Patent Owner argues that Petitioner's understanding of the claim is incorrect, stating the following:

> Petitioner assumes the limitation "from one or more light sensitive detectors" is the narrowing limitation of claim 4. However, Petitioner ignores that claim 4 is narrower than claim 1 because the "processing characteristics ***comprise signal characteristics***." The '703 patent discloses that processing characteristics can include (1) physiological measurements and (2) signal statistics, both of which are received from the one or more light sensitive detectors. (Ex. 1001, 4:11-27, Figs. 3-4.) Claim 4 is limited to signal characteristics (i.e., as opposed to physiological measurements).
>
> The clause identified by Petitioner, "from one more light sensitive detectors," ***supports*** Masimo's construction that the "processing characteristics" must come "from a signal received from one or more detectors configured to detect light." (*See also* POR 23-27.)

Sur-reply 4–5.

In connection with claim 8, and the portions of the Specification cited by Petitioner in construing the claim, Patent Owner expresses that Petitioner is incorrect in its view that a power consumption estimate is not determined from a signal received from detector 490. Patent Owner argues "[a]s illustrated by the red lines below, the 'process status calculator 460' [orange] estimates the current power consumption using a signal received from the detector front-end 490 [green]." *Id.* at 5–6. Patent Owner's annotated version of Figure 4 is reproduced below.

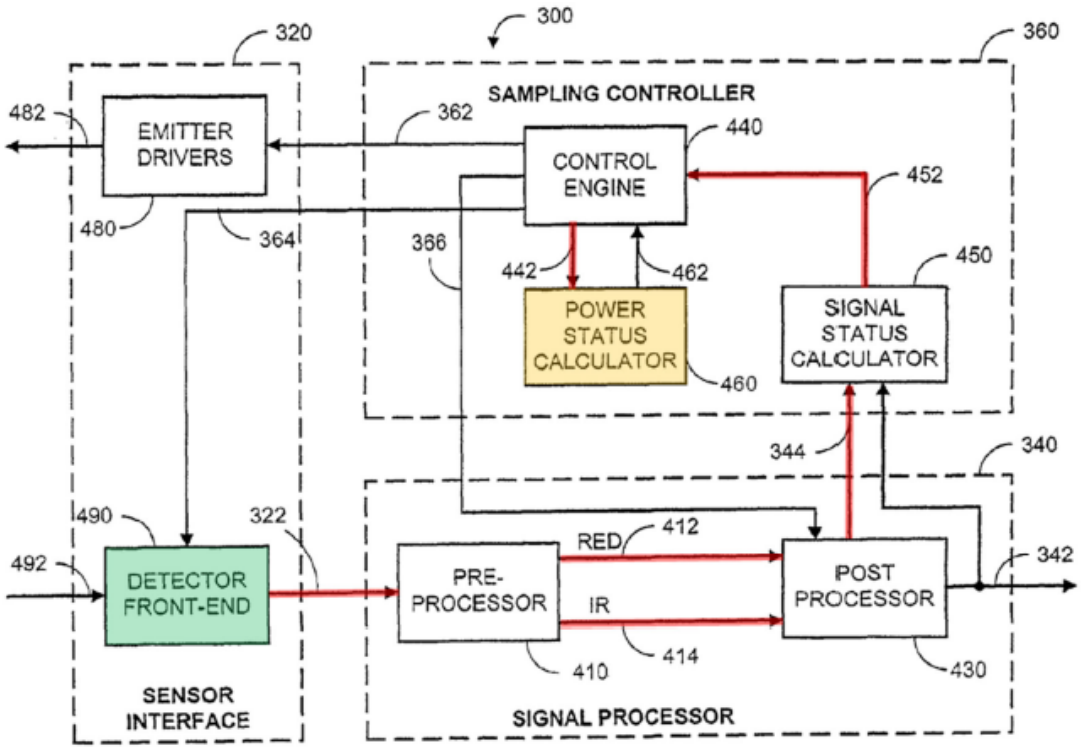

FIG. 4

The annotated version of Figure 4 above shows a signal path from detector front-end 490 to power status calculator 460. Patent Owner explains that, while the signal passes through other processing modules before reaching power status calculator 460, the power consumption estimate is still "determined from a signal received from one or more detectors [490] configured to detect light." *Id.* at 6.

In our view, Patent Owner has the better explanation for what a person of ordinary skill in the art would understand from the '703 patent as to what constitutes the "processing characteristics" that factor into the patient monitoring described by the claims. In that respect, we agree with Patent Owner's above-noted assessments of the requirements of claims 4 and 8. Patent Owner persuasively explains that claim 4 does not emerge as meaningless based on Patent Owner's construction of "processing

characteristics" but instead claim 4 further refines the understanding of the type of processing characteristics that are received from the light detectors, i.e., signal characteristics rather than physiological measurements. We also share Patent Owner's view that the understanding of claim 8 taken in the context of the Specification (e.g., Fig. 4), establishes that the estimate of power consumption is determined based on signals from light detector 490. We agree that Petitioner's views as to how claims 4 and 8 inform the meaning of "processing characteristics" lack support and fall short.

We conclude that it is inconsistent with the '703 patent to tease out the sweeping premise advanced by Petitioner that simply any information that is processed, regardless of its source, can constitute the "processing characteristics" that are employed as a part of all of the challenged claims to monitor a patient based on light signals. Rather, we rely on the written description of the '703 patent as a useful guide in informing the meaning of "processing characteristics," and conclude that the proper understanding of the term is that such characteristics are derived from signals from light detectors. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1317 (Fed. Cir. 2005) ("It is therefore entirely appropriate for a court, when conducting claim construction, to rely heavily on the written description for guidance as to the meaning of the claims.").

Accordingly, we conclude that, in the context of the '703 patent, "processing characteristics" are determined from a signal received from one or more detectors configured to detect light.

2. Other Claim Terms

Upon consideration of the entirety of the arguments and evidence presented, we conclude no further explicit construction of any claim term is

needed to resolve the issues presented by the arguments and evidence of record. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (per curiam) (claim terms need to be construed "only to the extent necessary to resolve the controversy" (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

B. Principles of Law

A claim is unpatentable under 35 U.S.C. § 103 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." *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 skill in the art; and (4) objective evidence of non-obviousness.[1] *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). When evaluating a combination of teachings, we must also "determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue." *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). Whether a combination of prior art elements would have produced a predictable result weighs in the ultimate determination of obviousness. *Id.* at 416–417.

[1] Neither party presents objective evidence of non-obviousness.

In an *inter partes* review, the petitioner must show with particularity why each challenged claim is unpatentable. *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016); 37 C.F.R. § 42.104(b). It is Petitioner's burden to show unpatentability by a preponderance of the evidence. 35 U.S.C. § 316(e). The burden of persuasion never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

We analyze the challenges presented in the Petition in accordance with the above-stated principles.

C. Level of Ordinary Skill in the Art

Petitioner identifies the appropriate level of skill in the art as that possessed by a person having

> a Bachelor of Science degree in an academic discipline emphasizing the design of electrical, computer, or software technologies, in combination with training or at least one to two years of related work experience with capture and processing of data or information, including but not limited to physiological monitoring technologies or a Master of Science degree in a relevant academic discipline with less than a year of related work experience in the same discipline.

Pet. 5 (citing Ex. 1003 ¶ 33).

Patent Owner does not offer its own assessment of the level of ordinary skill. Patent Owner, however, does level a measure of criticism of Petitioner's assessment of the level of skill in the art as being inconsistent with Petitioner's own declarant, Dr. Anthony, in not accounting for experience in "non-invasive optical biosensors." PO Resp. 16–17. Nevertheless, Patent Owner expresses that it "applies the asserted level of skill identified in the Petition." *Id.* at 17 (citing Ex. 2001 ¶ 22). We

determine that the Petitioner's expressed level of ordinary skill in the art is consistent with the '703 patent and the prior art of record. Accordingly, we adopt it in this Decision.

D. Ground Based on Diab and Amano

Petitioner contends that claims 9, 10, 12–14, 20, and 22–24 of the '703 patent would have been obvious over the combined teachings of Diab and Amano. Pet. 6–28. Patent Owner challenges that obviousness contention. *See generally* PO Resp.; Sur-reply.

1. Overview of Diab (Ex. 1007)

Diab is a U.S. Patent titled "Signal Processing Apparatus." Ex. 1007, code [54]. Diab discloses a "method and apparatus for analyzing two measured signals that are modeled as containing primary and secondary portions" particularly with respect to blood oximetry measurements. *Id.* at code [57]. Diab further presents "[a] physiological monitor particularly adapted to pulse oximetry oxygen saturation measurement comprises two light emitting diodes (LED[]s) which emit light at difference wavelengths to produce first and second signals." *Id.* at 4:51–54.

Diab's Figure 11 is reproduced below:

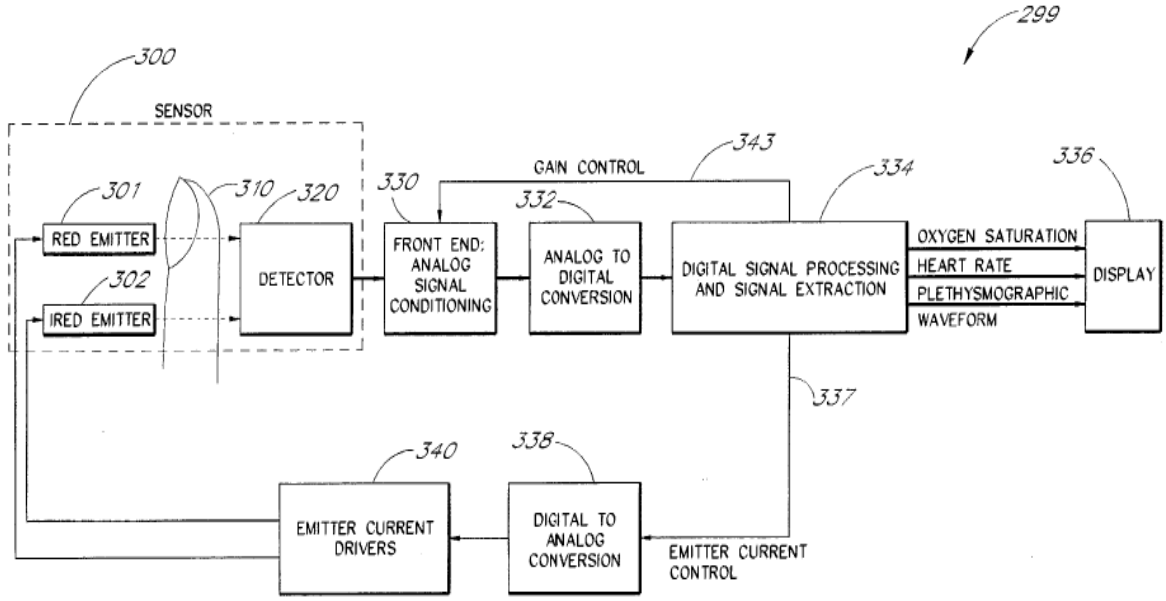

FIG. 11

Figure 11 above shows "[a] schematic of a physiological monitor for pulse oximetry" that "depicts a general hardware block diagram of a pulse oximeter 299." *Id.* at 34:10–12. Pulse oximeter 299 includes sensor 300 with light emitters 301 and 302, digital signal processing system 334, and display 336. *Id.* at 34:12–25. Digital signal processing system 334 provides outputs to display 336 that may include "blood oxygen saturation, heart rate, and a clean plethysmographic waveform." *Id.* at 34:25–29.

Diab's Figure 14 is reproduced below:

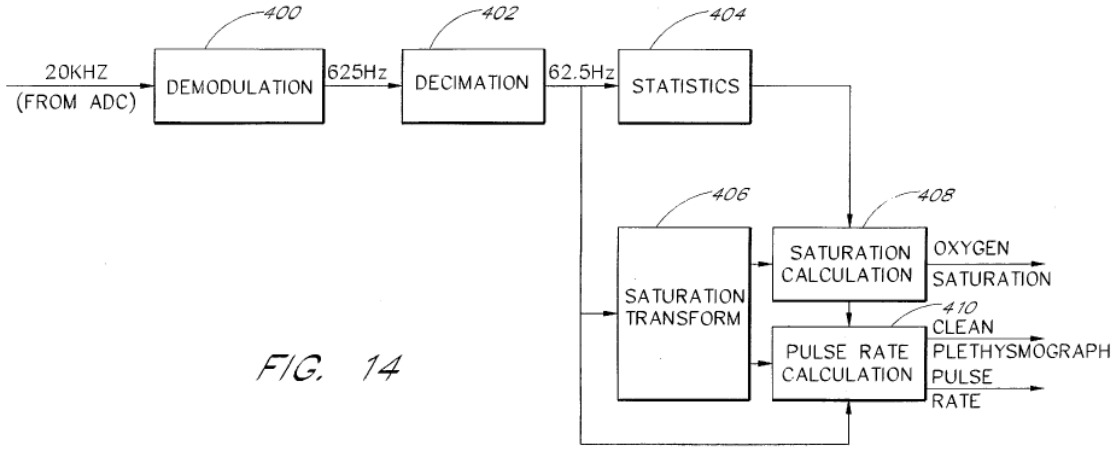

FIG. 14

Figure 14 depicts a "functional block diagram[] of the operations of the pulse oximeter 299 carried out by the digital signal processing system 334." *Id.* at 38:61–63. Data entering processing system 334 undergoes various operations including "demodulation" by demodulation module 400, "decimation" by decimation module 402, certain statistical calculations by statistics module 404, and a "saturation transform" by saturation transform module 406. *Id.* at 38:66–39:10. "The data subjected to the statistics operations and the data subjected to the saturation transform operations are forwarded to the saturation operations as represented by a saturation calculation module 408 and pulse rate operations as represented in a pulse rate calculation module 410." *Id.* at 39:10–15.

Diab's Figure 20 is reproduced below:

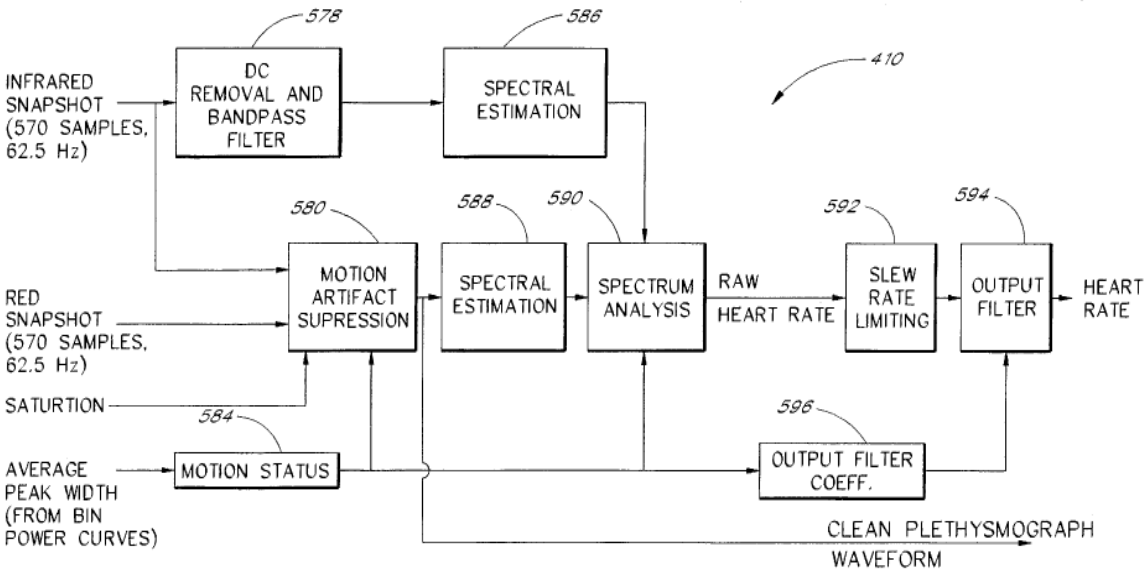

FIG. 20

Figure 20 shows pulse rate module 410. *Id.* at 47:30. Pulse rate module 410 includes, *inter alia*, motion status module 584 and "motion artifact suppression module 580." *Id.* at 47:33–34. An "average peak width value" is provided to motion status module 584 and, "if the peaks are wide, this is taken as an indication of motion." *Id.* at 47:50–52. "In the case of motion, motion artifacts are suppressed using the motion artifact suppression module 580." *Id.* at 47:55–56. "If motion is not detected, spectral estimation on the signals is carried out directly without motion artifact suppression." *Id.* at 47:52–54.

2. Overview of Amano (Ex. 1004)

Amano is a U.S. Patent titled "Pulse Wave Examination Apparatus, Blood Pressure Monitor, Pulse Waveform Motion, and Pharmacological

Action Monitor." Ex. 1004, code (54). Amano characterizes its disclosure as follows:

> The present invention relates to a pulse wave examination apparatus suitable for specifying the type of human pulse wave, a blood pressure monitor using the mean blood pressure and pulse pressure as its parameters and a pulse waveform monitor and a pharmacological action monitor which use a parameter related to a dicrotic notch part of an arterial pressure waveform.

Id. at 1:7–13.[2]

Amano's Figures 37A and 37B are reproduced below:

FIG. 37A

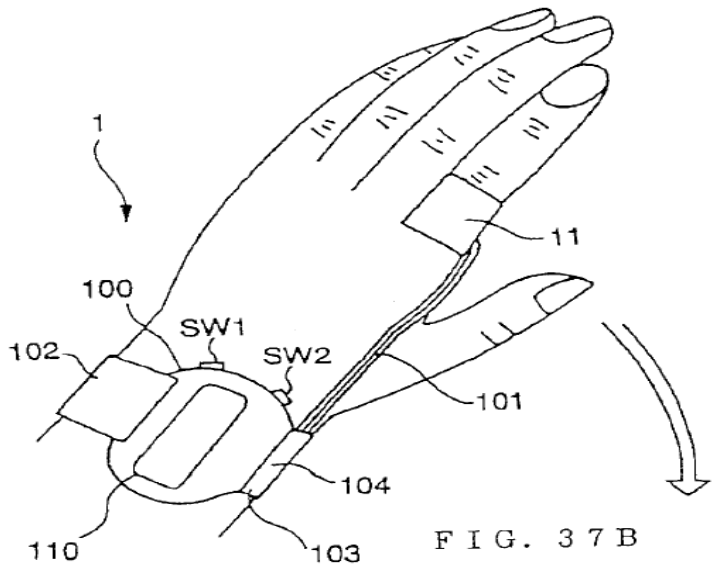

FIG. 37B

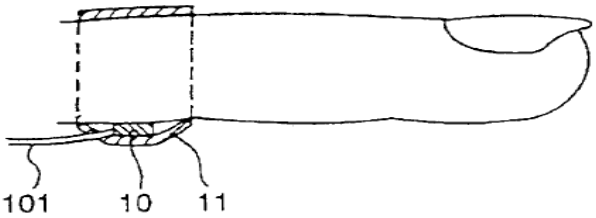

Figure 37A "is a view showing the condition of a wrist watch-type pulse wave examination apparatus which is installed." *Id.* at 16:38–40.

[2] A "pulse wave is usually defined as a wave of blood which is output from the heart and propagates through a blood vessel." *Id.* at 1:17–19.

Figure 37B "is a view showing a pulse wave detecting section of a wrist watch-type pulse wave examination apparatus" that is mounted on "the root of a finger." *Id.* at 16:41–43, 40:44–45. Wrist watch-type pulse examination apparatus 1 includes device body 100 with cable 101 connecting to pulse wave detecting section 10. *Id.* at 40:23–27.

Amano's Figure 1 is reproduced below:

FIG. 1

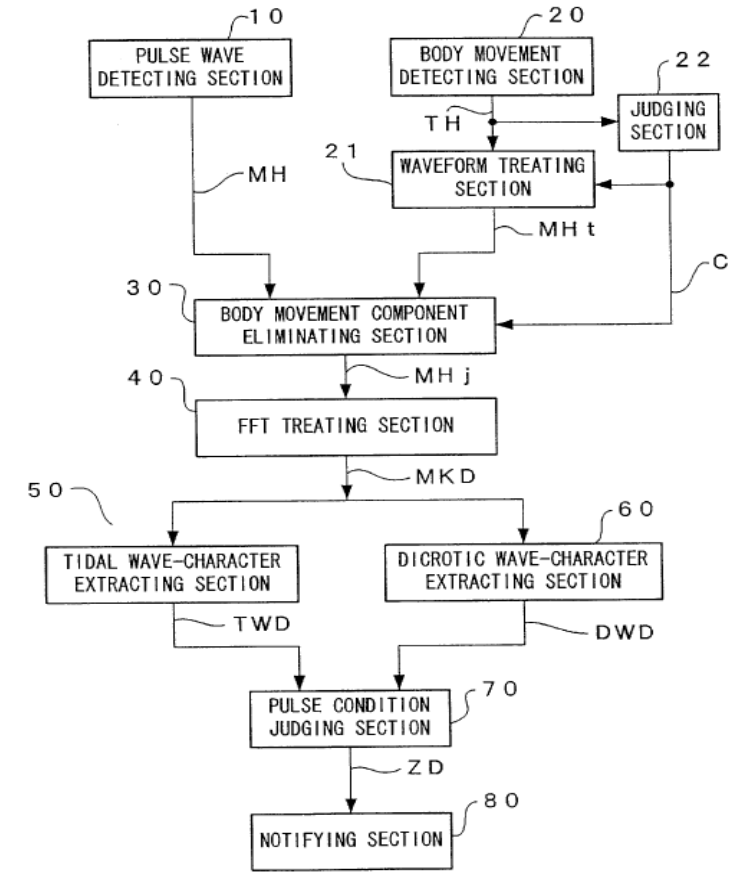

Figure 1 above "is a block diagram showing the functional structure of the pulse wave examination apparatus according to" an embodiment. *Id.* at 21:3–5. Pulse wave detecting section 10 detects a pulse waveform and outputs the detected signal to body movement elimination section 30. *Id.* at 21:5–8. The pulse wave examination apparatus also includes, *inter alia*,

body movement detecting section 20, waveform treating section 21, and judging section 22. "[B]ody movement detection section 20 comprises, for instance, an acceleration sensor and detects the body movement of a subject to output the detected signal as a signal TH to . . . waveform treating section 21." *Id.* at 21:9–12. "[J]udging section 22 determines whether body movement is present or not, based on the body movement waveform TH, to yield a control signal C." *Id.* at 21:58–60. "[W]hen control signal C indicates that no body movement is present the operations of the waveform treating section 21 and body movement component elimination section 30 are suspended." *Id.* at 21:64–22:2. Such suspension can result in "reduce[d] power consumption in the apparatus." *Id.* at 22:6.

3. Discussion

Petitioner takes the position that Diab and Amano satisfy all the features required by claims 9, 10, 12–14, 20, and 22–24. Pet. 6–28. Patent Owner disagrees. *See generally* PO Resp.; Sur-reply. Patent Owner expresses that each of independent claims 9, 12, 20, and 22 requires "(1) operating a patient monitor 'at a lower power consumption level to determine measurement values for one or more physiological parameters of (a/said) patient,' and (2) 'transitioning to continuously operating . . . at a higher power consumption level.'" PO Resp. 29. Patent Owner contends that Petitioner's ground based on Diab and Amano fails to account for those features characterized by Patent Owner as the "power consumption

limitations." *Id.* at 30.[3] We focus first on the parties' views as to Diab's disclosure.

i. Diab's Motion Artifact Suppression Module

A principal basis of disagreement between the parties with respect to the power consumption limitations centers on operation of Diab's "motion artifact suppression" module 580. Petitioner contends that Diab describes that when motion is detected, "motion artifacts are suppressed using the motion artifact suppression module 580," but "[i]f motion is not detected, spectral estimation on the signals is carried out directly without motion artifact suppression." Pet. 17 (citing Ex. 1007, 47:52–56). In Petitioner's view, that means that Diab "teaches not executing the motion artifact suppression module 580 if motion is not detected." *Id.* It is clear that this view plays a role in Petitioner's general proposal that Diab contemplates reduced power consumption when the motion artifact suppression module allegedly is not executing or operating.

Patent Owner contends that Petitioner misunderstands Diab's disclosure. For instance, Patent Owner submits that Petitioner's statement that Diab "teaches not executing the motion artifact suppression module 580 if motion is not detected" is inaccurate. PO Resp. 31 (quoting Pet. 17). Rather, Patent Owner explains the following:

> Diab merely discloses that "spectral estimation on the signals is carried out directly without motion artifact suppression" to calculate the heart rate when motion is not detected. The continuous operation of the motion artifact suppression module is still necessary to generate the clean plethysmograph

[3] For convenience, at times we also refer to the noted features collectively as the power consumption limitations in this Decision.

> waveform. This is why Diab ***never*** discloses "suspend[ing] and not execut[ing]" the motion artifact suppression module. Petitioner incorrectly ignores the clean plethysmograph waveform in its analysis.

Id. at 31–32 (citing Ex. 1007, 47:52–54; Ex. 2001 ¶¶ 53–59, 65–69).

Thus, Patent Owner argues that Petitioner mischaracterizes Diab's teachings as conveying that its motion artifact suppression module is ever suspended and not executed because the module is required to continuously operate for the generation of a "clean plethysmograph waveform." *Id.*; *see id.* at 34–35 (citing Ex. 2001 ¶¶ 57–59). In that regard, we understand Patent Owner's position as being that although Diab contemplates omitting motion artifact suppression in some circumstances to calculate heart rate, the motion artifact suppression module 580 is never suspended but instead operates continuously, because it functions at all times to enable generation of a "clean plethysmograph waveform." Patent Owner provides the following annotated versions of Diab's Figure 20 to illustrate that understanding:

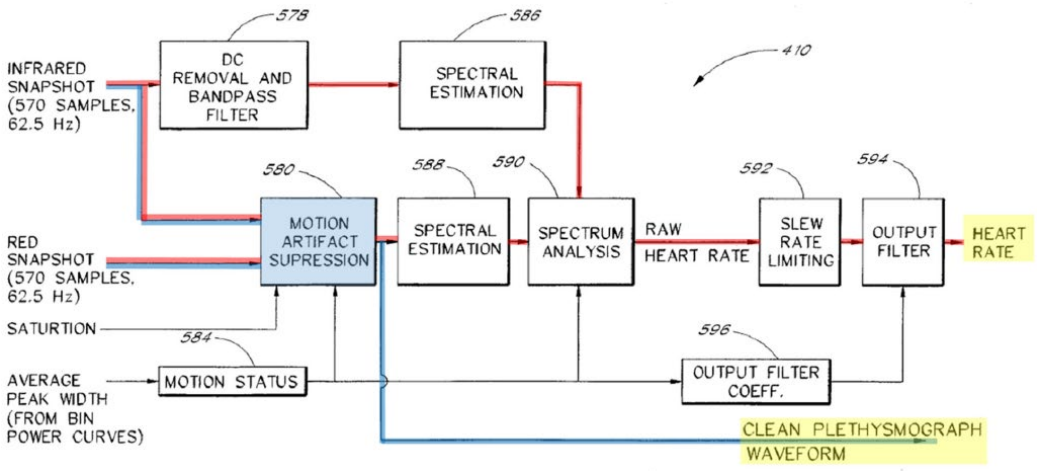

FIG. 20

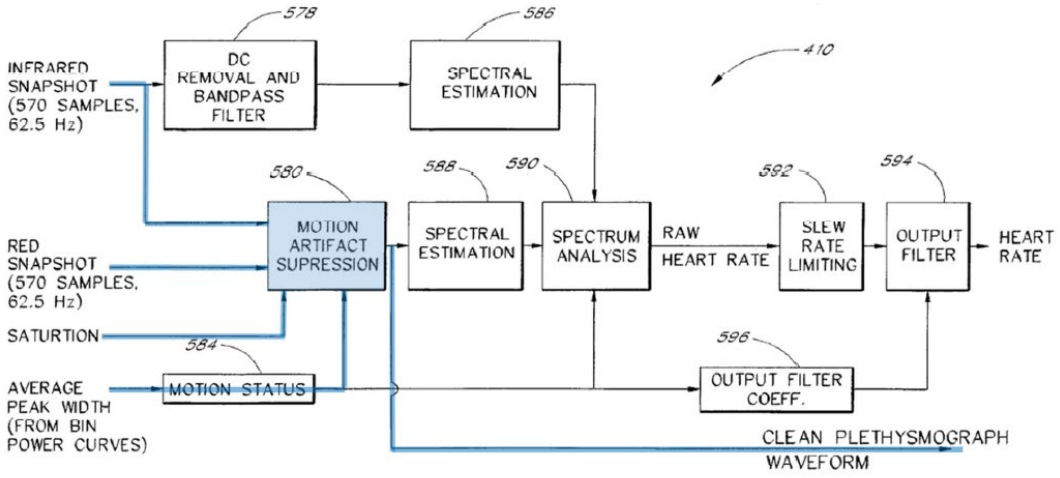

FIG. 20

PO Resp. 34–35. The annotated versions of Figure 20 above illustrate that although Diab contemplates calculating "heart rate" in a situation in which the "infrared" signal (i.e., designated the "infrared snapshot" in Figure 20) is not passed through motion artifact suppression module 580, in all circumstances generation of the clean plethysmograph waveform occurs after each of the "infrared" signal and the "red" signal pass through the motion artifact suppression module. Patent Owner also emphasizes that Diab necessitates that motion artifact suppression module 580 uses each of the infrared and red signals to generate the clean waveform, providing the following annotated version of Diab's Figure 21 in making that point:

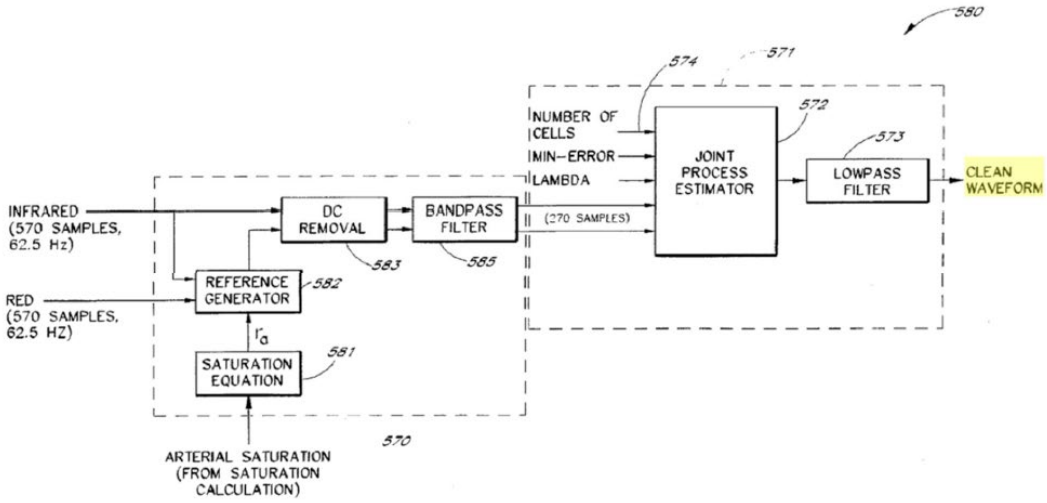

FIG. 21

Id. at 36. Figure 21 above illustrates the internal operating components of motion artifact suppression module 580. Ex. 1007, 8:19–20. We agree with Patent Owner that Diab makes clear that operation of the motion artifact suppression module includes a single processing path that uses each of the infrared and red signals to generate the clean plethysmograph waveform, which is necessary for Diab's approach to patient monitoring. *Id.* at 36–41 (citing Ex. 2001 ¶¶ 53–59, 65–73).

We also note that, as is shown in Diab's Figure 20, Diab's system provides for "spectral estimation" (via modules 586 and 588) for only the processing paths that result in calculation of the heart rate. *See, e.g.*, Ex. 1007, 47:30–39; PO Resp. 38–39. We, therefore, agree with Patent Owner that Petitioner's argument that "[i]f motion is not detected, ***spectral estimation*** on the signals is carried out directly without artifact suppression" means Diab "teaches not executing the motion artifact suppression module 580 if motion is not detected" is questionable. *See* PO Resp. 38–39. As Patent Owner observes, "[s]pectral estimation is not part of the clean plethysmograph waveform processing path." *Id.* at 39 (citing Ex. 2001

¶¶ 53–54, 65–66). That is evident from Diab's Figure 20. Yet, generation of the clean plethysmograph waveform necessarily occurs based on signals that have passed through motion artifact suppression module 580. Thus, whether spectral estimation occurs does not impact the function of motion artifact suppression module 580 in generating a clean plethysmograph waveform. Simply put, Petitioner's assessment of what Diab would have taught a skilled artisan as to the function of motion artifact suppression module 580 does not find adequate support within Diab's own disclosure, and does not address sufficiently the impact of Figures 20–21 on its position.

Accordingly, we agree with Patent Owner that the record does not support Petitioner's view that Diab contemplates "suspend[ing] and not execut[ing]" motion artifact suppression module 580. PO Resp. 32. In that regard, we conclude that Petitioner does not offer adequate evidence or argument that Diab contemplates either not generating a clean plethysmograph waveform or some non-use of that module in so generating a clean waveform. We credit Dr. Madisetti's testimony to that effect, as we conclude that his testimony accurately reflects what an ordinarily skilled artisan would have gleaned from Diab's teachings. *See, e.g.,* Ex. 2001 ¶¶ 53–59. As a result, we find unpersuasive Petitioner's apparent view that Diab, itself, suggests reducing power consumption of its patient monitoring system by suspending or shutting off operation of motion artifact suppression module 580.

ii. Petitioner's Proposed Reasoning to Combine Diab and Amano

Petitioner also theorizes that it would have been obvious to "suspend and not execute the operations of Diab's motion artifact suppression

module 580 if motion is not detected based on Amano's teaching of suspending 'the operations of. . . body movement component elimination section' 'when no body movement is presented.'" Pet. 17 (citing Ex. 1004, 21:65–22:6). According to Petitioner,

> A POSITA would have been motivated and would have found it obvious and straightforward to combine Diab with Amano to "reduc[e] calculation time and power consumption," as suggested by Amano, "[i]f motion is not detected" by performing "spectral estimation on the signals... directly ***without*** motion artifact suppression," as taught by Diab. Accordingly, the combination of Diab and Amano renders obvious continuously operating the oximeter at a lower power consumption level "[i]f motion is not detected" to determine measurement values for one or more physiological parameters of a patient.

Id. at 18 (citing Ex. 1004, 21:50–22:6, 35:54–64; Ex. 1007, 48:34–49:38; Ex. 1003 ¶ 55).

Patent Owner challenges Petitioner's position. *See, e.g.*, PO Resp. 41–45. We find Patent Owner's arguments availing as we do not find Petitioner's position persuasive as to what one of ordinary skill in the art would have taken from the teachings of Diab and Amano. Although Diab and Amano are both directed to systems for the physiological monitoring of patients, we agree with Patent Owner that "Diab and Amano disclose different processing algorithms that result in different outputs that are not directly applicable to each other." PO Resp. 41 (citing Ex. 2001 ¶¶ 70–73). For instance, we agree with Patent Owner that where Diab discloses producing "multiple patient-monitoring outputs, including a heart rate and clean plethysmograph waveform," the portions of Amano on which Petitioner relies seemingly produce a "single output" that is descriptive of a patient's pulse condition. *Id.* at 41 (citing Ex. 1004, 213–57, 23:5–9, 40:23–24). Although Amano does teach that some of the modules of its particular

system may be suspended (*see, e.g.*, Ex. 1004, 21:57–60), Petitioner does not explain adequately why a skilled artisan would have applied such a teaching to Diab's particular motion artifact suppression module 580. As Patent Owner observes, and as discussed above, Diab's system is one that requires operation of motion artifact suppression module 580 to produce a clean plethysmograph waveform. *See* PO Resp. 42–43 (citing Ex. 2001 ¶¶ 61–62, 71); *supra* § II.D.3.i. Petitioner's proposed modification, however, is premised on the conclusion that a skilled artisan would, nevertheless, suspend operation of that module under the guise of reducing power consumption. Yet, that circumstance would seemingly result in no clean plethysmograph waveform being generated. Petitioner simply does not explain adequately why that outcome follows from the teachings of the prior art.

We further take note of the disagreement between the parties as to whether, even if Diab's motion artifact suppression module was suspended, such suspension necessarily would result in reduced power consumption of Diab's system. *Compare* Pet. 10, 17–18; Pet. Reply 8–13 *with* PO Resp. 52–54; Sur-reply 15–17. The main thrust of Petitioner's position is that suspending Diab's motion artifact suppression module would eliminate its processing requirements and result in "reduce[d] calculation time and power consumption." *See, e.g.*, Pet. Reply 9 (citing Ex. 1004, 21:50–22:6, 35:54–64; Ex. 1007, 48:34–49:38; Ex. 1003 ¶¶ 54–55). Patent Owner counters that Petitioner's reasoning in that regard is speculative, and submits argument and evidence that one of ordinary skill in the art would have regarded suspending Diab's motion artifact suppression module as requiring *more* overall data processing, not less, thus increasing power consumption of

Diab's system. *See, e.g.*, PO Resp. 52–54; Sur-reply 15–17. Specifically, Patent Owner points to disclosure in Diab conveying that output filter 594 processes samples "much faster" when no motion is detected. PO Resp. 53; Sur-reply 17. And, Patent Owner submits that the filter's capacity to sample much faster means more data is processed potentially causing more power consumption. PO Resp. 53–54 (citing Ex. 1007, 50:23–27; Ex. 2001 ¶ 88); Sur-reply 16 (citing Ex. 2001 ¶ 76). Patent Owner also contends that Diab's spectrum analysis module 590 "operates differently" based on motion status, and that eliminating the function of motion artifact suppression module 580 could also cause increased power consumption. PO Resp. 54 (citing Ex. 1007, 50:8–14; Ex. 2001 ¶ 89); Sur-reply 17 (citing Ex. 2001 ¶ 77; Ex. 1039 68:2–72:2).

We are not persuaded by Petitioner's view that suspending Diab's motion artifact suppression module necessarily will result in reduced power consumption. Although Amano does describe that its particular system enjoys reduced power consumption when its body movement component eliminating section 30 is suspended (Ex. 1004, 21:65–22:6), Patent Owner presents plausible reasoning and evidence that such power reduction may not occur in Diab's differently structured and configured system. As between the conflicting testimony of Dr. Anthony and Dr. Madisetti on this matter, we find more credible the testimony of Dr. Madisetti in explaining why the same power consumption reduction attributed in Amano may not occur in Diab's differently structured system. *See, e.g.*, Ex. 2001 ¶¶ 76–77, 87–90. Yet, the premise of supposed power reduction is the foundational reason that Petitioner advances in combining the teachings of Amano with

Diab. We conclude that Petitioner has not met its burden of persuasion on this issue. *See Dynamic Drinkware,* 800 F.3d at 1378.

iii. Summary

We have considered the respective positions of the parties, including the proffered briefings and underlying evidence. For the foregoing reasons, we conclude that Petitioner has not met its burden to show that claims 9, 10, 12–14, 20, and 22–24 of the '703 patent would have been obvious over the teachings of Diab and Amano.

E. Ground Based on Diab, Amano, and Edgar

Petitioner contends that claims 11 and 21 would have been obvious based on Diab, Amano, and Edgar. Pet. 29–37. Claim 11 ultimately depends from claim 9. Claim 21 depends from claim 20. Petitioner relies on Edgar to account for features added by claims 11 and 21. Patent Owner argues that Petitioner's ground has the same deficiencies noted above with respect to the ground based on Diab and Amano, and that Petitioner does not rely on Edgar to account for the deficiencies. PO Resp. 55. We agree with Patent Owner. For the same reasons discussed above (*see supra* § II.D.3), we conclude that Petitioner has not shown by a preponderance of the evidence that claims 11 and 21 are unpatentable based on Diab, Amano, and Edgar.

F. Ground Based on Diab, Amano, and Turcott

Petitioner contends that claims 1–7 and 15–18 of the '703 patent would have been obvious over the combined teachings of Diab, Amano, and Turcott. Pet. 37–47. Claim 1, like claim 9, is directed to a "method of

managing power consumption during continuous patient monitoring by adjusting behavior of a patient monitor." Ex. 1001, 11:32–34. Claim 1 requires the same limitations of claim 9 that are designated [a]–[e] in this Decision. Claims 2–7 ultimately depend from claim 1. Independent claim 15 is drawn to a "patient monitor" that corresponds to the method of claim 1, including corresponding steps for noted limitations [a]–[e]. Claims 16–18 ultimately depend from claim 15. Petitioner relies on the combined teachings of Diab and Amano in the same manner as it did for the limitations in claim 9. *See* Pet. 40–41.

Patent Owner contends that the proposed ground of unpatentability based on Diab, Amano, and Turcott and applied to claims 1–7 and 15–18 suffers from the same flaws that Patent Owner submits for the ground based on Diab and Amano and applied to claims 9, 10, 12–14, 20, and 22–24. PO Resp. 56. In particular, Patent Owner contends the following:

> Independent claims 1 and 15 include similar limitations as the claims discussed in [the ground based on Diab and Amano], except for their final limitation (Limitations 1[f] and 15[e]). Limitations 1[f] and 15[e] require "reducing/reduce activation of an attached sensor." Petitioner argues that Turcott discloses this limitation. (Pet. 41-42, 46.) Petitioner does not allege that Turcott satisfies any other limitations in independent claims 1 and 15. (*Id.*) Consequently, [the ground based on Diab, Amano, and Turcott] fails to show obviousness for many of the same reasons as [the ground based on Diab and Amano].

Id.

Patent Owner further expresses the following:

> [I]ndependent claims 1 and 15 require (1) operating a patient monitor "at a lower power consumption level to determine measurement values for one or more physiological parameters of (a/said) patient," and (2) "transitioning to continuously operating … at a higher power consumption level." Petitioner does not

> make any new arguments regarding these limitations in [the ground based on Diab, Amano, and Turcott]. (Pet. 41, 46.) Rather, Petitioner simply refers back to its arguments in [the ground based on Diab and Amano]. Therefore, [the ground based on Diab, Amano, and Turcott] fails to render these limitations obvious for the same reasons as [the ground based on Diab and Amano].

Id. at 57.

We agree with all of Patent Owner's above-noted assertions. We conclude that the deficiencies discussed above (*see supra* § II.D.3) also extend to the proposed ground for claims 1–7 and 15–18 based on Diab, Amano, and Turcott. Therefore, for the same reasons discussed above, we conclude that Petitioner has not shown by a preponderance of the evidence that claims 1–7 and 15–18 are unpatentable based on Diab, Amano, and Turcott.

G. Grounds Based on: (1) Diab and GK-POSITA; (2) Diab, GK-POSITA, and Edgar; and (3) Diab, GK-POSITA, and Turcott

Petitioner contends that: (1) claims 9, 10, 12–14, 20, and 22–24 are unpatentable over Diab and GK-POSITA; (2) claims 11, and 21 are unpatentable over Diab, GK-POSITA, and Edgar; and (3) claims 1–7 and 15–18 are unpatentable over Diab, GK-POSITA, and Turcott. These three grounds largely mirror those discussed above that employ Amano for its asserted teachings of reducing power consumption by not performing motion artifact suppression when no motion is detected. For these grounds, however, in lieu of Amano's teachings, Petitioner seeks recourse to the "general knowledge and ordinary level of skill" in proposing that "changes in power consumption were obvious from changes in the amount of processing that are contemplated by Diab." Pet. 47. This theory of the

"general knowledge" is said to be collectively "corroborated by" seven additional prior art references. *Id.* at 48.

Patent Owner urges that the same arguments that it advanced for the grounds using Amano also apply for the grounds that reference GK-POSITA, and specifically that "Diab never suspends the motion artifact suppression module and a POSITA would not have been motivated to do so." PO Resp. 68 (referencing §§ VII.A and VII.C of the Patent Owner Response). Patent Owner additionally contends that "Diab does not operate at a lower power level or process less data when motion is not detected." *Id.* (also referencing §§ VII.A and VII.C of the Patent Owner Response).

We are not persuaded by Petitioner that the "general knowledge" of an ordinarily skilled artisan in lieu of Amano's teachings bootstraps these grounds to overcome the deficiencies discussed above in connection with the reasoning for, and potential implications of, suspending or eliminating Diab's motion artifact suppression module. *See supra* §§ II.D.3, II.E, II.F. For the same reasons as those discussed above, we are not persuaded that any of the grounds employing GK-POSITA establish the unpatentability of any of the challenged claims.

H. Grounds Based on: (1) Amano; and (2) Amano and Turcott

Petitioner contends that claims 9, 10, 12–14, 20, and 22–24 are unpatentable based on Amano. Pet. 49–63. Petitioner also contends that claims 1–5 and 15–17 are unpatentable over Amano and Turcott. *Id.* at 64–70. Patent Owner disputes that any of the noted claims have been shown to be unpatentable based on the noted grounds. PO Resp. 69–79. We find Patent Owner's dispute availing.

A central issue with the grounds that are based primarily on Amano lies in the meaning of "processing characteristics." As discussed above (*supra* § II.A.1), we conclude that, in the context of the '703 patent, "processing characteristics" must necessarily be determined from a signal received from one or more detectors configured to detect light. Petitioner's grounds based on Amano, however, rely on an "acceleration sensor" that outputs a signal. *See, e.g.*, Pet. 50. Patent Owner contends that "[t]he Parties agree that Amano receives the alleged processing characteristics from an acceleration sensor, not one or more detectors configured to detect light." Sur-reply 29 (citing Petitioner's Reply 24). Petitioner also notes that the parties "agree that Amano receives processing characteristics from an acceleration sensor[.]" Pet. Reply 24. We do not discern any dispute that Amano's "acceleration sensor" is not configured to detect light.

All of the challenged claims require "comparing processing characteristics to a predetermined threshold." Because in the context of the '703 patent, processing characteristics must be derived from detectors configured to detect light, and because there is no dispute that Amano's acceleration sensor is not such a detector, we find Petitioner's proposed grounds based on Amano to be ineffective to establish the unpatentability of any of the challenged claims. Accordingly, we conclude that Petitioner has not shown by a preponderance of the evidence that claims 9, 10, 12–14, 20, and 22–24 are unpatentable based on Amano or that claims 1–5 and 15–17 are unpatentable based on Amano and Turcott.

I. Patent Owner's Motion to Exclude

Patent Owner moves to exclude Exhibit 1038 as being inadmissible evidence because it is not authenticated and contains hearsay. Paper 25, 1–

4. Because we do not rely on Exhibit 1038 in this Decision, we *dismiss* Patent Owner's Motion as moot.

III. CONCLUSION

In summary:

Claims	35 U.S.C. §	Reference(s)/ Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
9, 10, 12–14, 20, 22–24	103	Diab, Amano		9, 10, 12–14, 20, 22–24
11, 21	103	Diab, Amano, Edgar		11, 21
1–7, 15–18	103	Diab, Amano, Turcott		1–7, 15–18
9, 10, 12–14, 20, 22–24	103	Diab, GK-POSITA		9, 10, 12–14, 20, 22–24
11, 21	103	Diab, GK-POSITA, Edgar		11, 21
1–7, 15–18	103	Diab, GK-POSITA, Turcott		1–7, 15–18
9, 10, 12–14, 20, 22–24	103	Amano		9, 10, 12–14, 20, 22–24
1–3, 15–17	103	Amano, Turcott		1–3, 15–17
Overall Outcome				1–7, 9–18, 20–24

IV. ORDER

Upon consideration of the record before us, it is:

ORDERED that Petitioner has not shown that claims 1–7, 9–18, and 20–24 of the '703 patent are unpatentable by a preponderance of the evidence;

FURTHER ORDERED that Patent Owner's Motion to Exclude is *dismissed as moot*; and

FURTHER ORDERED that, because this is a final written decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.