UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

OMNI MEDSCI, INC.,
Patent Owner.

U.S. Patent No. 10,517,484

IPR Case No.: IPR2021-00453

PATENT OWNER'S RESPONSE TO PETITION FOR *INTER PARTES* REVIEW UNDER 37 C.F.R. § 42.107

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No.	Description
2101-2119	*Reserved*
2120	PCT Application Serial No. PCT/US2013/075767 (Publication No. WO/2014/143276)
2121	U.S. Patent Application Serial No. 14/109,007 (Publication No. 2014/0236021)
2122	*Reserved*
2123	Curriculum Vitae of Duncan L. MacFarlane, Ph.D., P.E.
2124	Board's Institution Decision, IPR2019-000916, Paper 16, October 18, 2019 ("DI")
2125	Board's Final Written Decision, IPR2019-00916, Paper 39, October 14, 2020
2126-2130	*Reserved*
2136	Declaration of Duncan L. MacFarlane, Ph.D., P.E. in Support of Patent Owner's Response to Petition in IPR2020-00175, September 10, 2020
2132	Excerpt of Record of Oral Hearing held March 25, 2021, IPR2020-00175, Paper 25, April 14, 2021
2133	Board's Institution Decision, IPR2020-00175, Paper 11, June 17, 2020
2134	Definitions of IDENTIFY in The Free Dictionary
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2136	Declaration of Duncan L. MacFarlane, Ph.D., P.E. in Support of Patent Owner's Response, November 12, 2021

Omni MedSci, Inc. ("Omni"), submits this Response to the Petition for *Inter Partes* Review ("Petition," Paper 1) that Apple Inc. ("Apple") filed against Claims 1-23 ("Challenged Claims") of U.S. Patent No. 10,517,484 ("the '484 Patent").

I. Introduction

In **Ground 1**, Apple challenges independent Claims 1, 7, and 15, and dependent Claim 17 as obvious under 35 U.S.C. § 103 using a combination of U.S. Patent No. 9,241,676 ("Lisogurski") (Ex. 1011) and U.S. Patent Pub. 2005/0049468 ("Carlson") (Ex. 1009).

In **Ground 2**, Apple challenges independent Claims 1, 7, and 15, and dependent Claims 2–4, 8–12, and 16–22 as obvious under 35 U.S.C. § 103 using a combination of Lisogurski, Carlson, and U.S. Patent No. 8,108,036 ("Tran") (Ex. 1064).

In **Ground 3**, Apple challenges dependent Claims 5 and 13 as obvious under 35 U.S.C. § 103 using a combination of Lisogurski, Carlson, Tran, and U.S. Patent No. 8,725,226 ("Isaacson") (Ex. 1063).

In **Ground 4**, Apple challenges dependent Claims 6, 14, and 23 as obvious under 35 U.S.C. § 103 using a combination of Lisogurski, Carlson, Tran, and U.S. Patent Publication No. 2012/0197093 ("Valencell-093") (Ex. 1005) "with or without" Isaacson.

The Board should confirm the patentability of all claims.

For **all Grounds**, Apple relies on just two references, Lisogurski and Carlson, to disclose the "*increasing a pulse rate*" limitation recited in the challenged independent claims. Neither reference teaches or suggests the limitation, alone or in combination. Lisogurski fails to teach or suggest that cardiac cycle modulation ("CCM") increases SNR as claimed. Apple does not dispute Dr. MacFarlane's testimony that the trivial changes in firing rate during CCM ***"would have no measurable effect on SNR."*** (Ex. 2136, ¶ 83.)[1] On the contrary, Lisogurski teaches a *different* modulation technique (drive cycle modulation) to address noise by modulating at a frequency far above that of ambient noise and the 0.5–3 Hz frequency of CCM. But the Petition makes no reference to Lisogurski's drive cycle modulation. Lisogurski's use of high frequency modulation, in addition to CCM, confirms that the trivial changes in LED firing rates that occur in the 0.5–3 Hz range do not increase SNR.

Apple also asserts Lisogurski's teaching of CCM can be modified "as taught by Carlson" to render the *pulse rate* limitation obvious. (Pet. 53.) Modifying Lisogurski "as taught by Carlson" is not viable because it impermissibly changes Lisogurski's CCM principle of operation. Increasing CCM's LED pulse rate to 1000 Hz or higher, as Carlson teaches, is far beyond a human heart rate, changing

[1] All emphasis added unless otherwise indicated.

the core principle of the teaching Apple relies on. Apple, therefore, has not established a prima facie obviousness of the Challenged Claims.

In **Ground 2**, Apple challenges dependent Claims 2, 10, and 18 ("*artificial intelligence*"). Apple argues that Lisogurski + Carlson + Tran make these claims obvious. Apple does not name which of its 10 background references provide a motivation to combine Tran with Lisogurski. The Petition does not discuss any reason an ordinary artisan would have been motivated to combine Tran with Carlson, as needed to make the full combination.

Also in **Ground 2**, Apple challenges dependent Claims 3, 8, and 16 ("*object identification/detection*"). Apple quotes Lisogurski's statement, "the system may detect a signal indicative of a system error such as … a probe-off signal." (Pet. 62.) A signal that a sensor is missing does not "*detect an object*" (as Claim 16 requires), nor does it "*identify an object*" as a particular thing (as Claims 3 and 8 require).

In **Ground 3**, Apple challenges dependent Claims 5 and 13 ("*spatially separated detectors*"). Apple asserts these claims require a combination of four references: Lisogurski + Carlson + Tran + Isaacson. But the Petition only discusses reasons to combine Lisogurski + Isaacson, rather than the full combination that supports Ground 3. The Petition merely says that the four references are analogous art, but it never explains a motivation-teaching-suggestion to combine all four references. Apple cannot combine four references to challenge the *spectral*

fingerprinting claims absent a motivation-teaching-suggestion to combine all four references.

In **Ground 4**, Apple challenges dependent Claims 6, 14, and 23: ("*reflective surface*"). Apple asserts these claims require a combination of five references: Lisogurski + Carlson + Tran + Isaacson + Valencell-093. But the Petition only discusses reasons to combine Lisogurski + Valencell-093, rather than the full combination that supports Ground 4. The Petition merely says that four of the five references are analogous art, and it never explains a motivation-teaching-suggestion to combine all five references. Apple cannot combine five references to challenge the *reflective surface* claims absent a motivation-teaching-suggestion to combine all five references.

II. Overview of the '484 Patent

A. The '484 Patent discloses innovative systems for making accurate non-invasive physiological measurements

The Challenged Claims of the '484 Patent are directed to a measurement system for making more accurate non-invasive physiological measurements of a material or substance, including human tissue and blood. The '484 Patent describes application of the measurement system to "non-invasive glucose monitoring," and "non-invasive monitoring of blood constituents or blood analytes" using "near-infrared spectroscopy." (*See, e.g.*, Ex. 1001 at 10:2-7; 2:64-3:30.) Figure 24 of the

'484 Patent, reproduced below (color added), shows a high-level overview of an exemplary physiological measurement system 2400. The system includes a wearable measurement device (blue), a smart phone or tablet (red), and a cloud-based server (yellow). (*Id.* 17:10-13; 15:53-61; 7:65-8:27.)

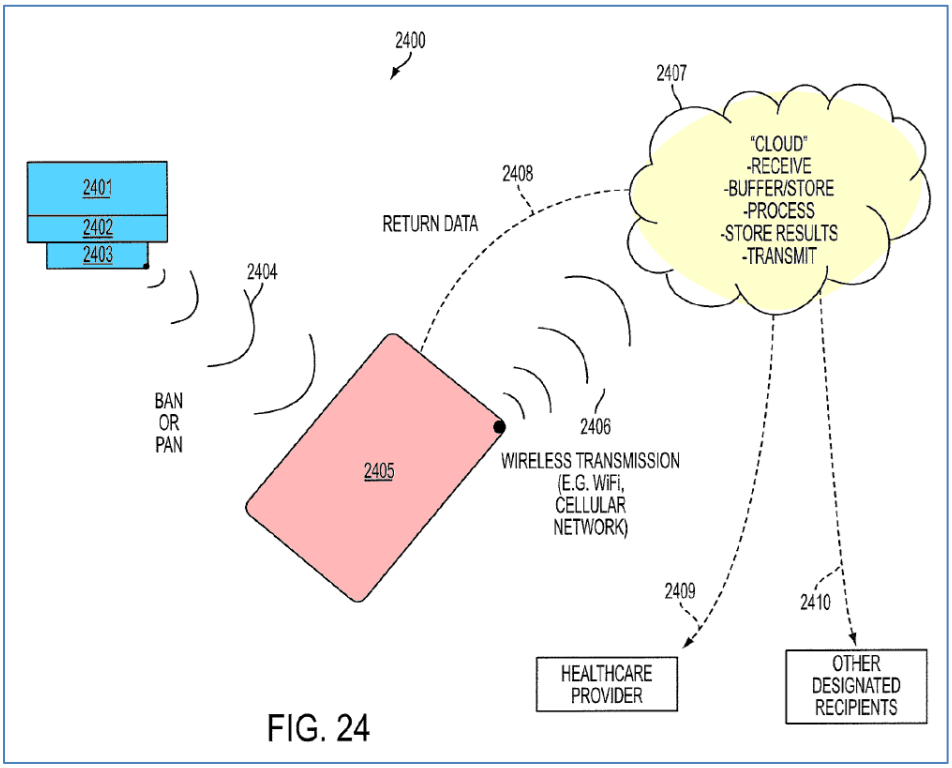


FIG. 24

The '484 Patent discloses inspecting a sample "by comparing different features, such as wavelength (or frequency), spatial location, transmission, absorption, reflectivity, scattering, fluorescence, refractive index, or opacity" of the sample. (Ex. 1001 at 10:2-7.) This may entail measuring various optical characteristics of the sample as a function of the wavelength of the source light, *e.g.*,

by varying the wavelength of the source light or by using a broadband source of light. (Ex. 1001 at 10:8-18.)

The ‘484 Patent describes various techniques for improving the signal-to-noise ratio (“SNR”) of the physiological measurement made using the light source. For example, the SNR may be improved by increasing the light intensity from the light source. Ex. 1001 at 15:53-55 (“a higher light level or intensity may improve the signal-to-noise ratio for the measurement”). As another example, in a “pulsed mode of operation,” the light source can increase the pulse rate to improve SNR. (Ex. 1001 at 26:29-34.)

As to the latter, the specification states, “By use of an active illuminator, a number of advantages may be achieved” including “higher signal-to-noise ratios.” (Ex. 1001 at 16:61-65.) PCT Application Serial No. PCT/US2013/075767 (Publication No. WO/2014/143276) (Ex. 2120) is incorporated by reference into the ‘484 specification and describes the use of an “active illuminator” to achieve “higher signal-to-noise ratios” despite “variations due to sunlight” and the “effects of the weather, such as clouds and rain.” (Ex. 1001 at 2:26-29; Ex. 2120, ¶ [0079].) This follows U.S. Patent Application Serial No. 14/109,007 (Publication No. 2014/0236021) (Ex. 2121), also incorporated by reference into the ‘484 specification, which discloses that the modulation frequency of the light source is

non-zero and can range between "0.1-100kHz." (Ex. 1001 at 2:36-39; Ex. 2121, ¶ [0045].)

The "light source" can comprise several components. For example, Figure 20 shows a light source (2000) that uses "pulse electronics" (yellow) to pulse a diode (blue). (Ex. 1001 at 28:19-21; FIG. 20.)

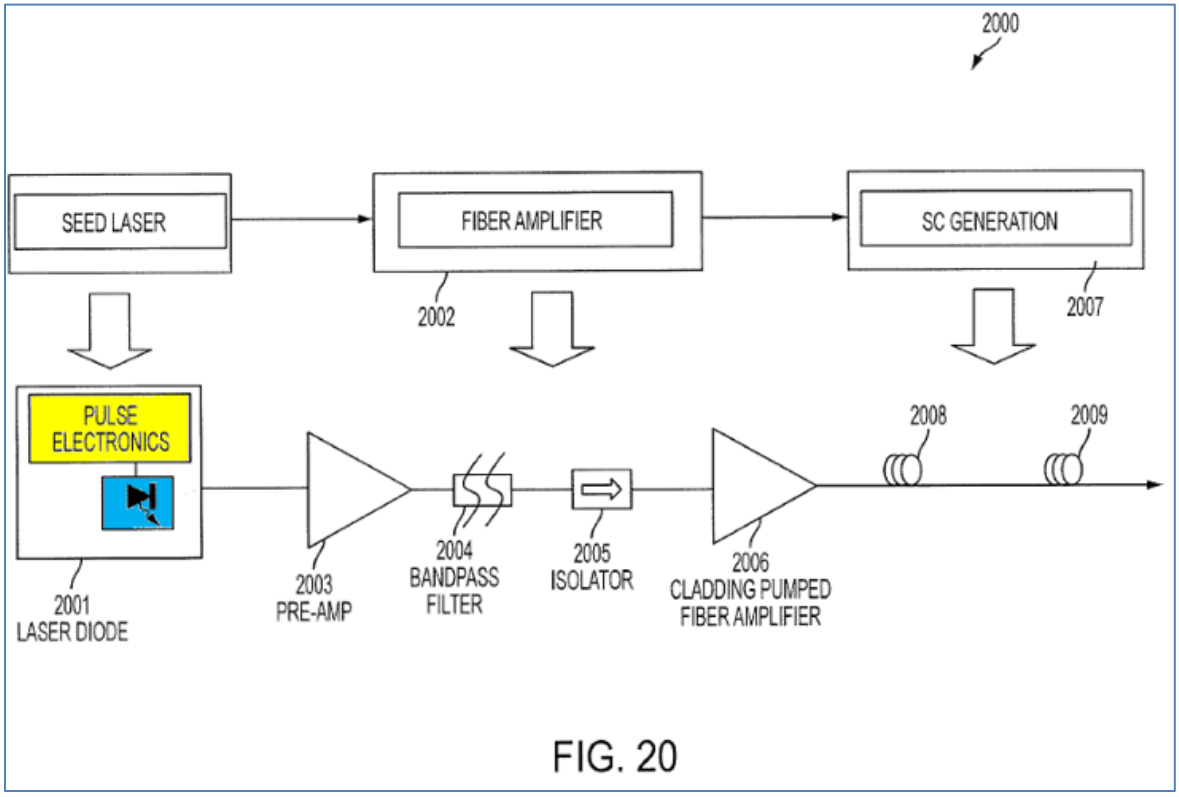


FIG. 20

The pulse electronics in this example can drive the diode with a "0.5-2.0 ns pulsed output, and with a pulse repetition rate between one kilohertz to about 100 MHz or more." (Ex. 1001 at 28:24-26.)

B. AIA status and Priority Date

Omni does not contest that the '484 Patent is an AIA patent. Apple asserts in a footnote that the '484 Patent "violates 37 C.F.R. §1.78(d)(2)" (Pet. 15, n.2) but offers no evidence or analysis to support its conclusory statement. And Apple's assertion is irrelevant for this IPR because Omni does not contest that the references Apple relies on (Lisogurski, Carlson, Tran, and Valencell-093, and Isaacson) are prior art to the '484 Patent.

III. Claim Construction

While Omni does not necessarily agree with Petitioner regarding its proposed constructions, none of the claim terms Apple identifies for construction relate to the disputed issues in this Response except for the *pulse rate* limitation. *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) ("only those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy").

A. The "*pulse rate*" limitation (all claims)

Independent claim 1 of the '484 Patent is reproduced below with emphasis added to the "wearable device … increasing a pulse rate" limitation:

> 1. A system for measuring one or more physiological parameters and for use with a smart phone or tablet, the system comprising:

a wearable device adapted to be placed on a wrist or an ear of a user, including a light source comprising a plurality of semiconductor sources that are light emitting diodes, each of the light emitting diodes configured to generate an output optical light having one or more optical wavelengths;

the wearable device comprising one or more lenses configured to receive a portion of at least one of the output optical lights and to direct a lens output light to tissue;

the wearable device further comprising a detection system configured to receive at least a portion of the lens output light reflected from the tissue and to generate an output signal having a signal-to-noise ratio, wherein the detection system is configured to be synchronized to the light source;

wherein the detection system comprises a plurality of spatially separated detectors, and wherein at least one analog to digital converter is coupled to at least one of the spatially separated detectors;

wherein a detector output from the at least one of the plurality of spatially separated detectors is coupled to an amplifier having a gain configured to improve detection sensitivity;

the smart phone or tablet comprising a wireless receiver, a wireless transmitter, a display, a speaker, a voice input module, one or more buttons or knobs, a microprocessor and a touch screen, the smart phone or tablet configured to receive and process at least a portion of the output signal, wherein the smart phone or tablet is

configured to store and display the processed output signal, and wherein at least a portion of the processed output signal is configured to be transmitted over a wireless transmission link;

a cloud configured to receive over the wireless transmission link an output status comprising the at least a portion of the processed output signal, to process the received output status to generate processed data, and to store the processed data;

wherein the output signal is indicative of one or more of the physiological parameters, and the cloud is configured to store a history of at least a portion of the one or more physiological parameters over a specified period of time;

the wearable device configured to increase the signal-to-noise ratio by increasing light intensity of at least one of the plurality of semiconductor sources from an initial light intensity and ***by increasing a pulse rate of at least one of the plurality of semiconductor sources from an initial pulse rate***; and

the detection system further configured to:

generate a first signal responsive to light while the light emitting diodes are off,

generate a second signal responsive to light received while at least one of the light emitting diodes is on, and

increase the signal-to-noise ratio by differencing the first signal and the second signal.

Apple identifies three constructions for the *pulse rate* limitation without committing to any of them. (Pet. 20-21.) In the IPR2020-00175 Final Written Decision ("FWD"), the Board said the nearly identical[2] *pulse rate* limitation needed no construction, distinguishing it from the "pulse rate" limitation in IPR2019-00916. (Ex. 2133 at 18-19.) Likewise, the *pulse rate* limitation in the '484 Patent needs no construction.

B. "*to identify an object*" (Claims 3 and 8)

Claims 3 and 8 recite: "the wearable device is at least in part configured to identify an object[.]" Apple does not propose a construction for "to identify an object." The word "identify" is a common word that means "to recognize or establish as being a particular person or thing." (Ex. 2134 p. 2, quoting Random House Kernerman Webster's College Dictionary (2010).)[3]

[2] The only difference between the two limitations is the initial phrase of the limitations. In the '299 Patent (at issue in IPR2020-00175), the pulse rate limitation begins, "the ***system*** configured to," whereas in the '484 Patent the limitation begins, "the ***wearable device*** configured to." Otherwise, the limitations are identical.

[3] Omni uses this 2010 definition because it was published shortly before the 2012 priority date of the '484 Patent. The other dictionary definitions are nearly identical. (Ex. 2134, pp. 1.)

The claims themselves confirm this ordinary meaning. For example, Claim 16 is nearly identical with Claims 3 and 8—the Petition lumps Claim 16 with Claims 3 and 8 (*see* Pet. 62)—but Claim 16 uses "to ***detect*** an object" instead of "to ***identify*** an object." This difference in claim language creates a presumption that ***identification***, which requires recognizing or establishing an object as a particular thing, differs from ***detection***, which merely requires noticing an object's presence (*see* Ex. 2135). *Wi-LAN USA, Inc. v. Apple Inc.*, 830 F.3d 1374, 1391 (Fed. Cir. 2016) ("A construction that would cause two differently worded claims to cover exactly the same claim scope would render one of the claims superfluous, so we apply a presumption against such constructions.")

The '484 Patent specification (Ex. 1001) also confirms that, to "identify an object" requires an object be identified as a ***particular*** thing:

- 7:21-24: "Hyper-spectral images may provide spectral information ***to identify and distinguish between spectrally similar materials, providing the ability to make proper distinctions among materials*** with only subtle signature differences;"
- 8:18-22: "the active remote sensing or hyper-spectral imaging information could also be combined with two-dimensional or three-dimensional images ***to provide a physical picture as well as a chemical composition identification of the materials***;"

- 12:57-60: "it may be advantageous to use pattern matching algorithms and other software and mathematical methods ***to identify the blood constituents of interest***;"
- 15:45-48: "Various signal processing methods may be used to ***identify and quantify the concentration of cholesterol 876 and/or glucose 877, or some of the other blood constituents***."

So, "to identify an object" in Claims 3 and 8 means "to recognize or establish an object as being a particular thing."

C. "*to detect an object*" (Claim 16)

Claim 16 recites: "the wearable device is at least in part configured to detect an object[.]" Apple does not propose a construction for "to detect an object." The word "detect" is a common word that means "to discover or notice the existence or presence of." (Ex. 2135 p. 1, quoting Random House Kernerman Webster's College Dictionary (2010).)

As noted in the prior section, Claims 3 and 8 use "identify," creating a presumption that "detect" in Claim 16 has a different meaning. *Wi-LAN*, 830 F.3d at 1391. The specification (Ex. 1001), confirms the ordinary meaning of "detect":

- 11:22-37: "[glucose] signatures may fall in valleys of water absorption, permitting non-invasive ***detection*** through the body;"
- 13:23-24: "In one embodiment, these ketone bodies are ***detected***;"

- 14:54-64: "the non-invasive SWIR measurement should be able to ***detect*** HbAle with appropriate pattern matching algorithms;"
- 15:31-33: "A further example of blood compositions that can be ***detected*** or measured using near-infrared light includes cholesterol monitoring;"
- 25:26: "***detect*** any anomalies in the teeth;"
- 35:65-67: "The discussion thus far has included use of near-infrared or SWIR spectroscopy in applications such as … ***detection*** of illicit drugs."

So, "to detect an object" in Claim 16 means "to discover or notice the existence or presence of something."

IV. The Board should deny the Petition because it fails to establish prima facie obviousness of the Challenged Claims

A. Grounds 1 & 2: Apple has failed to show that Lisogurski, alone, or combined with Carlson, renders the "*pulse rate*" limitation obvious

The three independent claims, Claims 1, 7, and 15, from which all other Challenged Claims depend, require: "*the wearable device configured to increase the signal-to-noise ratio ... by increasing a pulse rate of at least one of the plurality of semiconductor sources from an initial pulse rate*." Apple asserts that Lisogurski discloses this limitation, and if not disclosed in Lisogurski alone, it would have been

obvious to modify Lisogurski "as taught by Carlson." (Pet. 48-53.) Apple asserts no other basis for finding the *pulse rate* limitation obvious.

1. <u>Lisogurski alone</u>: The changes in LED firing rate during Lisogurski's CCM, which Apple relies on for obviousness, undisputedly "have no measurable effect on SNR"

Regarding Lisogurski alone, Apple makes two arguments. *First,* Apple relies on Lisogurski's disclosure of "first" and "second" modulation modes, "sampling rate" changes, and Omni's expert's "general statement" that a faster modulation rate may "lower the background noise." (Pet. 48-50.) *Second,* Apple "also" relies on "Lisogurski's cardiac cycle modulation." (Pet. 50-51.) But both arguments rely on the same disclosure regarding Lisogurski's CCM, so the "also" in Apple's second argument is inapt. (Ex. 2136, ¶ 88.)

In the Institution Decision ("DI"), the Board contended that Apple did not limit its Lisogurski-alone arguments to CCM, quoting Apple's expert's statement that "'cardiac cycle modulation' *also* teaches [the pulse rate] limitation." (DI 31, emphasis in original). But, as explained below, Apple cites and discusses only Lisogurski's descriptions of CCM and Apple does not cite or discuss "firing rate" changes other than in CCM.

a) Apple's first Lisogurski-alone argument depends on CCM

Apple's first argument asserts that Lisogurski's system can "dynamically adjust the parameters of light emitted by the LEDs." (Pet. 48.) Apple cites "Ex. 1011, 9:46-52; *id*., 37:6-22" for support. At 9:46-52, Lisogurski is expressly discussing CCM: "the system may modify the ***cardiac modulation technique*** … ." At 37:6-22, Lisogurski is discussing CCM's "second mode": The text describes Figure 19, a flow chart "showing steps to adjust a ***cardiac cycle modulation***[.]" (Ex. 1011, 36:48-49.) Apple's first Lisogurski-alone argument thus depends on CCM. (Ex. 2136, ¶ 89.)

The other statements Apple makes in its first Lisogurski-alone argument do not relate to Lisogurski's "firing rate." Apple discusses "sampling rate," which is irrelevant to the "*pulse rate*" limitation. (Ex. 2136, ¶ 90.) Apple asserts, "increased sampling rate results in more samples" so, "signal to noise [ratio] improves because the noise is spread across more samples." (Pet. 49.) But any SNR improvement from ***sampling*** rate changes do not meet the claims' requirement of increasing the LED ***pulse*** rate. (Ex. 2136, ¶ 90.)

Apple next cites Dr. MacFarlane's "general statement" that increasing LED pulse rate can sometimes "lower the background noise." (Pet. 50.) The statements Apple quotes were ***not*** about Lisogurski, as Apple has admitted. (Ex. 2132 at 4:11-13.) Apple's attorney merely asked Dr. MacFarlane an abstract question. Apple

never asked Dr. MacFarlane whether ***Lisogurski's*** CCM firing rate increases affect SNR, presumably because Apple knew the answer would be "no." Dr. MacFarlane's "general statement" does not apply to Lisogurski' CCM because, as Dr. MacFarlane explains in his declaration, the firing rate changes during CCM do not increase SNR. (Ex. 2136, ¶ 91.)

b) Apple's second Lisogurski-alone argument "also" depends on CCM

Apple transitions to its second Lisogurski-alone argument by asserting, "Lisogurski's '***cardiac cycle modulation***' also satisfies [the *pulse rate*] limitation …. Lisogurski's '***cardiac cycle modulation***' varies light drive signal parameters, such as firing rate, to remain 'substantially synchronous[] with' a subject's heart rate." (Pet 50.) Apple then discusses how "the firing rate will increase whenever a subject's heart rate increases" and calls it "***[t]his*** increase in firing rate." (*Id.*) Apple's second argument thus depends expressly on CCM. (Ex. 2136, ¶ 93.)

In the DI, the Board sought to distance Apple's arguments from CCM by asserting, "Petitioner's references to 'firing rate' in its discussion of the pulse rate limitation refers to the pulse rate of the LED, not to the rate of CCM." (DI 32.) But that ignores the Petition: Apple expressly says "the firing rate" is linked to "a subject's heart rate." (Pet. 50.) And Apple's sole support for its second Lisogurski-alone argument is CCM:

- Ex. 1011, 25:46-61: "[T]he system may generate a light drive signal that varies with a period the same as or closely related to the period of the cardiac cycle, thus generating a ***cardiac cycle modulation***. … [T]he system may use a ***cardiac cycle modulation*** that spans several cardiac cycles[.]"
- Ex. 1003, ¶¶ 181-182: "Lisogurski's '***cardiac cycle modulation***' also teaches this limitation. Lisogurski describes its "***cardiac cycle modulation***" : [quoting Ex. 1011, 25:46-52.] A person of ordinary skill in the art would have understood these disclosures to mean …."
- Ex. 1011, 42:50-54: The basis for Lisogurski's statement, "the systole period cardiac ***cycle modulation technique*** may provide improved performance." (42:55-58.)
- Ex. 1011, 25:66-26:14: "[P]hysiological pulses may be ***cardiac pulses***, respiratory pulses, muscular pulses, any other suitable pulses …."
- Ex. 2125, '533 FWD at 29: "Lisogurski teaches correlating LED pulse rate and ***cardiac cycle rate*** …."

Apple cites no evidence that Lisogurski discloses "firing rate" increases other than as part of CCM. (Ex. 2136, ¶¶ 94-95.) In the DI, the Board asserts that the Petition's references to "firing rate" are not limited to CCM, DI 32, contrary to the Petition's explicit statements. The sentence the Board relies on for its assertion, "Pet.

50 (citing Ex. 1011, 25:46–61),” unambiguously ties “firing rate” to CCM: “Lisogurski’s ‘***cardiac cycle modulation***’ varies light drive signal parameters, such as ***firing rate***, to remain ‘substantially synchronous[] with’ a subject’s heart rate.” (Pet. 50; Ex. 2136, ¶ 96.)

The Board also asserts that, in the “same paragraph of Lisogurski,” after the text Apple cited, Lisogurski mentions drive cycle modulation (“DCM”). (DI 32; *see also* DI 33-34.) But there are three problems with the Board’s reliance on DCM: (1) Apple did not cite or rely on that text to support its Petition arguments, (2) the Board may not adopt arguments the Petition does not make, *SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1357 (2018) (“[T]he petitioner's contentions ... define the scope of the litigation all the way from institution through to conclusion.”); *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1381 (Fed. Cir. 2016) (“[W]e find no support for the PTO's position that the Board is free to adopt arguments on behalf of petitioners that could have been, but were not, raised by the petitioner during an IPR.”), and (3) in the text cited by the Board (Ex. 1011, 9:58–60), Lisogurski merely explains that DCM and CCM can occur simultaneously—Lisogurski never suggests a changing DCM firing rate (Ex. 2136, ¶¶ 97-98). The Board’s use of and reliance on DCM is improper and incorrect.

Following the Petition sentence the Board relied on (“Pet. 50 (citing Ex. 1011, 25:46–61)”), Apple argues, “A skilled person would have recognized that this

[CCM's ability to vary the firing rate] means, for example, that firing rate will increase whenever a subject's heart rate increases." (Pet. 50.) But such firing rate increases do not affect SNR—they merely ***maintain*** existing CCM synchronization. Lisogurski's claimed SNR benefits occur because the LED fires synchronously with the heartbeat. (Ex. 2136, ¶ 99.) As Apple recognizes, CCM increases the LED firing rate only if the heart rate increases. (*Id*.) But heart rate increases occur slowly compared to the speed at which the computer controlling CCM can adjust the firing rate. (*Id*.) So, the computer-controller LED firing rate of CCM will increase at the same rate the heart rate increases. (*Id*.) This maintains the existing CCM synchronization and the alleged SNR benefits of CCM remain unchanged—an increase in heart rate/firing rate does not increase SNR. (*Id*.)

Apple also claims, "Omni has admitted that Lisogurki's [*sic*] 'cardiac cycle modulation' is a technique for 'improving SNR.'" (Pet. 50.) That is beside the point. Omni did not say that the Lisogurski device is configured to increase SNR ***by increasing the LED pulse rate*** as the Challenged Claims require. Lisogurski merely asserts that some points on the cardiac cycle may be less noisy than others, so taking measurements at those points may be better. (Ex. 2136, ¶ 100.) Specifically, Lisogurski used "simulated waveforms" to "calculate pulse amplitudes." (Ex. 1011 at 42:46-48.) "Based on [that] analysis," Lisogurski concluded, "noise contributes coefficients of variation" of 2.6% for the PPG signal without modulation, 1.9% for

the "systole period modulated PPG signal," and 3.8% for the "diastole period modulated PPG signal." (*Id*. 42:50-54.)[4] In other words, Lisogurski concluded that, in his simulations, a systole period modulated PPG signal could reduce noise coefficients while a diastole period modulated PPG signal could increase noise coefficients. (Ex. 2136, ¶ 100.) But Lisogurski's statements do not teach or suggest that the tiny LED firing rate ***changes***, which occur while maintaining CCM, increase SNR. (*Id.*) Nor do his statements teach or suggest that Lisogurski "configured" his system to increase SNR by increasing the LED firing rate. (*Id.*) Instead, as the Board has said twice, Lisogurski's "LED firing rate is varied to become or remain synchronous with a cardiac cycle, ***not*** to increase signal-to-noise." (Ex. 2124 at 30; Ex. 2133 at 47.)

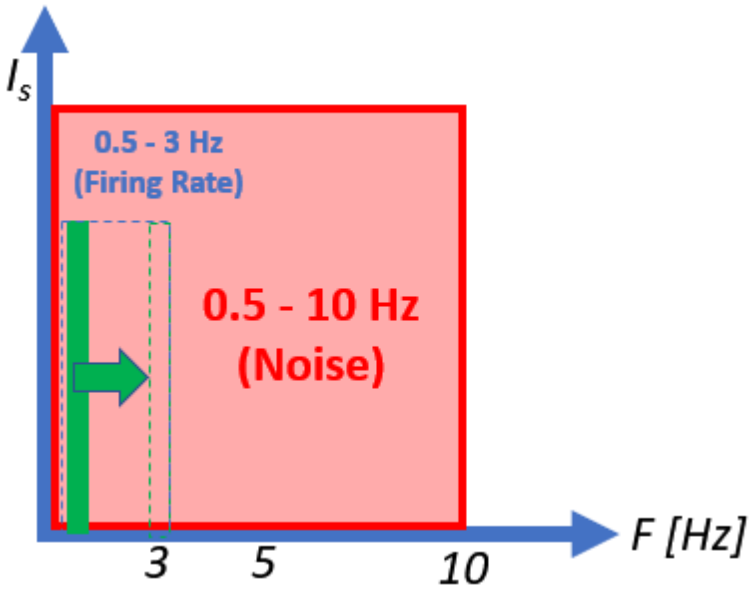
c) Apple ignores the undisputed evidence that CCM "firing rate" increases do not increase SNR

Critically, Apple does not dispute Omni's evidence that CCM "firing rate" increases do not increase SNR. When Apple filed its Petition on January 22, 2021, Apple had studied Dr. MacFarlane's declaration, which Omni filed in IPR2020-00175 three months earlier (Ex. 2131). Apple has never disputed Dr. MacFarlane's

[4] Apple miscites these lines of Lisogurski for its unsupported claim that an "increase in the firing rate can increase SNR because noise is reduced 1%-4%." (Pet. 50-51.)

testimony that the slight changes in firing rate during CCM ***"would have no measurable effect on SNR."*** (Ex. 2136, ¶ 81.) In full, Dr. MacFarlane testified, without contradiction from Apple or Apple's expert:

> [W]hile tracking the cardiac cycle, the LED firing rate is varied just a few hertz, within the range of about 0.5 Hz to 3 Hz, the frequency range of the human cardiac cycle. (*See, e.g.*, Ex. 1009, Carlson, [0066].) ***Such a slight change in firing rate would have no measurable effect on SNR*** because, according to Carlson and Lisogurski, this frequency range is the same as the frequency range of the noise. Carlson explains, "optical contributions, e.g. temporally structured day-light, and electronic noise . . . are stronger in the low frequency range 0.5 Hz to 10 Hz than in higher frequency ranges." (Ex. 1009, Carlson, [0009].) Lisogurski is concerned with overcoming "Gaussian noise from approximately 0-5 Hz." (Ex. 1011 at 41:48; 43:15-16; 44:42-43.) Thus, Lisogurski's firing rate variations in the 0.5 to 3 Hz range will not avoid the noise in the 0.5 to 10Hz range. The following graphic shows how the small adjustment in Lisogurski's firing rate will not avoid the ambient noise. This illustration shows the noise range identified in Carlson and Lisogurski (in red) overlaid with the cardiac cycle firing rate adjustment taught in Lisogurski (in green).



(Ex. 2136, ¶ 81.)

The teachings of both Lisogurski and Carlson confirm that modulating LEDs at physiological frequencies does not increase SNR and overcome ambient noise. When they modulate LEDs to avoid noise, both Lisogurski and Carlson teach that the modulation frequency must be 1000 Hz (or higher)—far above ambient noise and the 0.5–3 Hz heart rate where CCM operates. (Ex. 2136, ¶ 102.) Lisogurski adds a separate 1000 Hz modulation, called "drive cycle modulation" (Ex. 2136, ¶ 83), which "cycle[s] light output at a rate significantly greater than the cardiac cycle." (Ex. 1011 at 6:9-19.) "For example, time interval 260 (i.e., the period of the cardiac cycle modulation) may be on the order of 1 second [1 Hz], while time interval 272 (i.e., the period of the drive cycle modulation) may be on the order of 1 ms [1000 Hz]." (Ex. 1011 at 16:42-46.) Likewise, as Apple admits, "Carlson teaches that ***the***

pulse frequency ("pulse rate") is 'chosen in such a way that it is outside the frequency spectrum of sunlight and of ambient light' and it could be '***1000 Hz***' or 'can be chosen at any other frequency, as e.g. ***2000 Hz or even higher***.' Ex. 1009, [0069]; Ex. 1003, ¶ 186." (Pet. 52.) These teachings of Lisogurski and Carlson confirm that increasing the LED "firing rate" within the range of the cardiac cycle (and the ambient noise) does ***not*** increase SNR.

Apple's Lisogurski-alone arguments depend solely on CCM. Omni presented evidence that the trivial changes in LED firing rate during Lisogurski's CCM do not increase SNR. The evidence is undisputed—Apple does not address it, let alone refute it. The Petition does not make a prima facie case that Lisogurski alone renders the *pulse rate* limitation obvious.

2. Carlson does not disclose "increasing a pulse rate … from an initial pulse rate" as the Challenged Claims require

In the Institution Decision, the Board noted the Petition's claim that "Carlson expressly discloses shifting the frequency of emitted light during operation." (DI 33.) This is an incorrect description of Carlson. For support, the Board quotes Carlson ¶ 27, which teaches only to "***temporarily modulate*** the optical radiation of, e.g., the LED at a carrier frequency f_c in order to shift the ***power*** spectrum[.]" (Ex. 1009, ¶[0027].) This quote highlights two flaws in the Petition's and the Board's analysis. *First,* Carlson discloses either a continuous light (without "temporary

modulat[ion]") or "temporarily modulate[d]" light at f_c. Carlson never teaches "increasing a pulse rate . . . from an initial pulse rate" as claimed.

Second, Carlson teaches that temporarily modulating the LED will "shift the ***power spectrum*** of the pulsoximeter signals into a higher frequency range." (Ex. 1009, ¶27.) Shifting the "power spectrum" from the baseband (i.e., unmodulated light with ***no pulse rate***, shown in Fig. 7c) to a power spectrum centered on the carrier frequency f_c (as in Fig. 8) does not "increas[e] a pulse rate … from an initial pulse rate" as the Challenged Claims require. (Ex. 1009, ¶¶ [0020], [0027], [0064], [0065], [0069]; Ex. 2136, ¶¶ 103-108, 111-114, 121.) Thus, the Petition's claim (noted by the Board) that "Carlson expressly discloses shifting the frequency of emitted light during operation" is factually incorrect. (DI 33.)

Carlson also does not teach or suggest changing the chosen modulation frequency f_0 because there is no need to do so—Carlson says that his chosen f_0 modulation frequency (e.g., 1000 Hz) is "far outside" the noise spectrum such that "[a]ny noise or sunlight … will not influence the measurement of the pulsoximetric sensor." (Ex. 1009, ¶ [0069]); Ex. 2136, ¶ 121.)

Carlson thus does not disclose the claimed configuration in which the device increases an ***initial pulse rate*** to increase SNR. (Ex. 2136, ¶ 115.) Apple knows this—if Apple believed Carlson, alone, taught increasing LED modulation to

increase SNR, it would have simply used Carlson (alone) instead of arguing that Lisogurski's "increasing LED firing rate" must be added to Carlson's teaching.

3. Lisogurski and Carlson: Modifying Lisogurski's CCM "as taught by Carlson" changes CCM's principle of operation

For its Lisogurski + Carlson combination, Apple asserts "a skilled person would have found it obvious ***to configure Lisogurski to increase the LED firing rate*** (frequency) in the presence of noise to increase signal-to-noise ratio ***as taught by Carlson***." (Pet. 53.) As discussed above, "to configure Lisogurski to increase the LED firing rate" means CCM because the only time Lisogurski increases (or decreases) the LED firing rate is during CCM. (*See* §IV.A.1.) "[A]s taught by Carlson" refers to Carlson's teaching that "pulse frequency" is "chosen … outside the frequency spectrum of sunlight and of ambient light," at 1000 Hz or higher. (Pet. 52.) To combine these teachings, an ordinary artisan would need to increase CCM's LED firing rate to 1000 Hz or more, which is not possible because CCM works by matching the LED firing rate to the heart rate, and the heart rate can never be 1000 Hz. (Ex. 2136, ¶¶ 122-127.)

As Apple states, Carlson teaches that, to avoid noise from sunlight and other ambient light, the modulation frequency should be "***substantially*** outside of frequency of noise and/or environmental signals." (Ex. 1009, Claims 11-12.) Carlson gives examples for such frequencies: "above approximately 1000 Hz" and "2000 Hz

or even higher." (*Id*., ¶ [0069].) Carlson does not teach or suggest using modulation frequencies in the 0.5–3 Hz range, *i.e.*, where the noise is most prevalent. (Ex. 2136, ¶¶ 121, 128-29.)

Apple misrepresents Carlson when Apple claims Carlson discloses "shifting [LED modulation] from a first frequency to a second frequency." (Pet. 52, citing Ex. 1009, Claims 10-11 and [0067]-[0069].) Claims 10-13 are means plus function claims, as Apple has admitted. (IPR2020-00175, Paper 15, Reply, p. 17.) Apple does not identify the claimed "means for shifting" in Carlson's disclosure because doing so would defeat its argument. Carlson's only disclosed "means for shifting" is "synchronous detection," which he uses to "shift the power spectrum," not to vary LED modulation frequency. (Ex. 1009, ¶¶ [0020], [0027], [0065], [0069]).) Each paragraph teaches "temporarily modulat[ing]" the LED at a fixed, predetermined "carrier frequency," either "f_c" or "f_0." (*Id*.; *see also* Ex. 2136, ¶¶ 104, 121.)[5]

As explained above (§IV.A.2.), this shifts the ***power spectrum*** of the LEDs from baseband to a power spectrum centered on the carrier frequency. (Ex. 2136, ¶¶ 108, 121.) But it does not "shift" ***modulation*** "from a first frequency to a second

[5] "The frequency is ***chosen*** in such a way that it is outside the frequency spectrum of sunlight and of ambient light which, according to FIG. 7b, is in the range of above approximately 1000 Hz." (Ex. 1009, ¶ [0069]).)

frequency" because Carlson ***adds*** "temporar[y] modulat[ion]," to an unmodulated light source; he does not increase a (non-existent) pulse rate from an initial pulse rate, as the Challenged Claims require. (Ex. 1009, ¶¶ [0020], [0027], [0064], [0065], [0069]; Ex. 2136, ¶¶ 103-107, 111-114.) Carlson never teaches or suggests changing the chosen modulation frequency f_0 because there is no need to do so—Carlson says that his chosen f_0 modulation frequency (e.g., 1000 Hz) is "far outside" the noise spectrum such that "[a]ny noise or sunlight … will not influence the measurement of the pulsoximetric sensor." (Ex. 1009, ¶ [0069]); Ex. 2136, ¶ 121.) Carlson does not disclose the claimed configuration in which ***the device increases*** an ***existing*** pulse rate to increase SNR. (Ex. 2136, ¶ 115.)

Apple's proposal to "increase the LED firing rate" of Lisogurski "as taught by Carlson," requires increasing the CCM firing rate to 1000 Hz or more. (Ex. 2136, ¶¶ 116-18, 129.) This is not a viable obviousness combination because it changes CCM's principle of operation. (Ex. 2136, ¶¶ 122-23, 129-33.) If a "proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious." MPEP 2143.01, citing *In re Ratti*, 270 F.2d 810, 813 (C.C.P.A. 1959).

Lisogurski consistently teaches that CCM should ***remain synchronous*** with a chosen point in the physiological signal, *i.e.*, the cardiac cycle or the respiratory cycle (Ex. 2136, ¶ 122):

- "[T]he system may vary parameters in a way ***substantially synchronous*** with physiological pulses" (Ex. 1011 at Abstract.)
- "the system may vary a light drive signal in a way ***substantially synchronous*** with physiological pulses, for example, cardiac pulses." (*Id.* at 1:41-43.)
- "The system may generate a light drive signal for activating a light source to emit a photonic signal, wherein at least one parameter of the light drive signal is configured to vary ***substantially synchronously*** with physiological pulses of the subject." (*Id.* at 1:44-47.)
- "the external signal may be received from an external ECG sensor configured to provide a trigger signal ***synchronous*** with an element of the cardiac cycle such as an R wave." (*Id.* at 10:9-12.)
- "the cardiac cycle modulation applied to red light drive signal 556 may be ***substantially synchronous with the systole periods of the cardiac cycle***." (*Id.* at 21:51-53.)

- "the cardiac cycle modulation applied to red light drive signal 614 may be ***substantially synchronous with the diastole periods of the cardiac cycle***." (*Id.* at 22:45-47.)
- "the cardiac cycle modulation applied to red light drive signal 716 is ***substantially synchronous with the dicrotic notch of the cardiac cycle***." (*Id.* at 23:24-27.)
- "the cardiac cycle modulation applied to red light drive signal 804 is ***substantially synchronous with the peak of the PPG signal***." (*Id.* at 24:10-13.)

The frequency range of the human cardiac cycle is about 0.5–3 Hz. (Ex. 2136, ¶ 81.) Increasing Lisogurski's CCM LED firing rate to be "substantially outside the of frequency of noise and/or environmental signals," *e.g.*, "above 1000 Hz" as Carlson teaches (Pet. 52), would require modulating the LEDs at frequencies far above the 0.5–3 Hz of the cardiac cycle and the CCM firing rate would no longer be synchronous with the heart rate. (Ex. 2136, ¶¶ 122-23.) Because such a modification would change the core principle of operation of Lisogurski's CCM, configuring Lisogurski to increase the CCM firing rate "as taught by Carlson" (Pet. 53) is "not sufficient to render the claims prima facie obvious." MPEP 2143.01; *Ratti*, 270 F.2d at 813; *see also* Ex. 2136, ¶¶ 123, 129-33.

In the DI, the Board asserts that Apple's proposed combination—namely, "to configure Lisogurski to increase the LED firing rate … as taught by Carlson" (Pet. 53)—would not "abolish Lisogurski's principle of operation." (DI 31.) The Board asserts, "a person of ordinary skill would have been motivated to combine [Lisogurski and Carlson's] teachings" to "puls[e] the LEDs at a frequency, e.g., 1000 Hz, that avoids noise introduced by ambient and environmental conditions." (DI 33.)

The Board does not explain how configuring Lisogurski's CCM firing rate (the only increasable firing rate in Lisogurski and the only one Apple discusses) to 1000 Hz would allow CCM to operate. As the Board has noted, and Apple does not dispute, the purpose of Lisogurski's CCM is to "modulate the light drive signal to have a 'period the same as or closely related to the period of [a] cardiac cycle.'" (Ex. 2133 at 24.) Remaining synchronous with various physiological pulses of interest is the "core principle of operation of cardiac cycle modulation." (Ex. 2136, ¶¶ 56, 130.)

Apple does not address this change-in-principle-of-operation problem in the Petition. The Board, on its own and without support from the Petition, suggests DCM as the solution to the change-in-principle-of-operation problem, saying, "Lisogurski states 'the system may apply this cardiac cycle modulation to the light drive signal *in addition* to a drive cycle modulation, as illustrated in FIG. 2C.' Ex. 1011, 25:61–64 (emphasis added)." (DI 32.) In other words, the Board posits a combination where

Carlson's 1000 Hz modulation is, like DCM, "in addition" to CCM. That makes no sense.

First, the Board's argument strips away the "configure Lisogurski to increase the LED firing rate" (Pet. 53) that Apple relies on because using 1000 Hz "*in addition* to" CCM does not "increase the LED firing rate." *Second*, it is superfluous to add Carlson's teaching of 1000 Hz modulation to Lisogurski, which already uses 1000 Hz modulation in DCM. (Ex. 2136, ¶ 132.) A reference that "adds" a feature already present in another reference cannot make a claim obvious. *In re NTP, Inc.*, 654 F.3d 1279, 1299 (Fed. Cir. 2011) ("The Board's position is further weakened by the fact that the AAPA already discloses an RF network that connects portable computers to the system. … Thus, adding an RF network to element # 2 in the figure would render the RF network connecting the portable PCs in figure 1 superfluous.") And there is a more fundamental problem: The Board may not adopt an argument Apple did not make in the Petition, *SAS*, 138 S. Ct. at 1357; *Magnum Oil*, 829 F.3d at 1381.

The Petition fails to make a prima facie case that a skilled person would have found it obvious to configure Lisogurski to increase CCM's firing rate to 1000 Hz. (Ex. 2136, ¶¶ 133-134.)

B. Ground 2 (Claims 1-4, 7-12, and 15-22): Apple (a) does not identify which of its 10 background references provide a motivation to combine Tran with Lisogurski and (b) fails to provide a motivation to combine all three references

In Ground 2, Apple asserts there is a motivation to combine Tran with Lisogurski based on §III.B of the Petition, which describes 10 different references[6] (Pet. 10-14). Apple says generically, "As described in §III.B, market trends would have motivated a skilled person reading Lisogurski to find additional ways to use the tracked data in a mobile or remote scenario," and "[a] skilled person would have been motivated to incorporate Tran's data analysis technique into Lisogurski to achieve the same benefits." (Pet. 59-60.) Apple does not identify which of the 10 references it is relying on.

A Petition must identify "***with particularity*** … the evidence that supports the grounds for the challenge to each claim." 35 U.S.C. § 312(a)(3). Apple's vague allegations and lack of specificity regarding the alleged motivation-to-combine compels the conclusion that Apple has not carried its burden of proof on Ground 2 because there is no "articulated reasoning with some rational underpinning to

[6] Ex. 1003, Ex. 1005, Ex. 1009, Ex. 1020, Ex. 1021, Ex. 1022, Ex. 1023, Ex. 1024, Ex. 1027, and Ex. 1029.

support the legal conclusion of obviousness." *KSR Int'l Co. v. Teleflex Inc*., 550 U.S. 398, 418 (2007), quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006).

In addition, Apple bases Ground 2 on ***three*** references combined, not just two: Lisogurski + Carlson + Tran. While the Petition addresses Tran + Lisogurski (Pet. 59-60), it offers no motivation to combine Tran + Carlson, let alone Tran + Lisogurski + Carlson. Instead, Apple merely asserts, "Lisogurski, Carlson, and Tran are analogous references[.]" (Pet. 60.) But merely being analogous is not sufficient. Whether references are analogous and whether a motivation to combine exists are separate inquiries. *Kahn*, at 986-87. "By requiring [Apple] to explain the motivation, suggestion, or teaching as part of its *prima facie* case, the law guards against hindsight in all cases[.]" *Id*. at 986.

In *Kahn*, the Federal Circuit explained that the "analogous art" test is just the first step, which must be followed by proof of motivation to combine the references:

> The analogous-art test requires that the Board show that a reference is either in the field of the applicant's endeavor or is reasonably pertinent to the problem with which the inventor was concerned in order to rely on that reference as a basis for rejection. … [T]his test ***begins*** the inquiry into whether a skilled artisan would have been motivated to combine references by defining the prior art relevant for the obviousness determination, and that it is meant to defend against hindsight. … The motivation-suggestion-teaching test picks up where the analogous art test leaves off and informs the *Graham* analysis.

441 F.3d at 986-87.

Apple's failure to present evidence of any motivation to combine all three references means Apple has not made a prima facie case under the *Graham* factors. *Kahn*, 441 F.3d at 987 (requiring explanation in the context of "multiple references" and noting, "[t]he requirement of such an explanation is consistent with governing obviousness law, *see* § 103(a); *Graham*, 383 U.S. at 35[.]"). "Where, as here, the necessary reasoning is absent, we cannot simply assume that 'an ordinary artisan would be awakened to modify prior art in such a way as to lead to an obviousness rejection.'" *Plantronics, Inc. v. Aliph, Inc*., 724 F.3d 1343, 1354 (Fed. Cir. 2013).

The Board's own decisions confirm that a Petitioner may not merely rely on an argument that references are "analogous." "Demonstrating that a reference is analogous art or relevant to the field of endeavor of the challenged patent ***is not sufficient*** to establish that one of ordinary skill would have had reason to combine its teachings with other prior art in the manner set forth in the claim." *Johns Manville Corp. v. Knauf Insulation, Inc*., IPR2018-00827 Paper 9 at 10 (PTAB Oct. 16, 2018) (informative).

Apple has only asserted that Lisogurski, Carlson, and Tran are analogous. It has no evidence that an ordinary artisan would have been motivated to combine all three references and it makes only vague references to "§III.B." Apple has failed to make a prima facie case for Ground 2.

C. Ground 2 (Claims 3, 8, and 16): Knowing a sensor is disconnected is not *detecting*, or *identifying*, *an object*

Claims 3 and 8 require the wearable device be "configured to ***identify*** an object" ("*identification*"). Claim 16 requires the wearable device be "configured to ***detect*** an object" ("*detection*"). Ignoring the difference in claim language, Apple argues Lisogurski discloses *identification* because "the system may detect a signal indicative of a system error such as … a probe-off signal." (Pet. 62, quoting Ex. 1011, 36:66-37:2.) Lisogurski's ability to detect the ***absence*** of a probe does not satisfy either Claim 16's *detection* requirement nor Claims 3 and 8's *identification* requirement.

Detection in Claim 16 requires the wearable device "to discover or notice the existence or presence of something." (*See* §III.C., above.) Lisogurski does not teach this. It teaches only a "probe-off" error signal. (Ex. 1011, 36:66-37:2.) The lone sentence fragment Apple cites is Lisogurski's entire disclosure. Lisogurski discloses no ability to "discover or notice" the presence of an object, as Claim 16 requires. (Ex. 2136, ¶ 137.) Apple, who ignores the *detection* requirement of Claim 16, gives no reason why an ordinary artisan would reconfigure Lisogurski's "system error" signal to discover or notice the ***presence*** of the probe. (*Id.*) That would be unnecessary because, when the probe is functioning, the system simply works—Lisogurski has no need to discover the probe. (*Id.*) The Petition's failure to address

the *detection* limitation of Claim 16 means Apple has failed to make a prima facie case for Claim 16. (*Id.*)

Claim 3 and 8 go beyond mere "detection" of an object—they require the wearable device to ***identify*** the object. This means "to recognize or establish an object as being a particular thing." (*See* §III.B., above.) The '484 Patent describes various forms of object identification, all of which require that an unknown object be identified as a particular object:

- 7:21-24: "Hyper-spectral images may provide spectral information ***to identify and distinguish between spectrally similar materials, providing the ability to make proper distinctions among materials*** with only subtle signature differences;"
- 8:18-22: "the active remote sensing or hyper-spectral imaging information could also be combined with two-dimensional or three-dimensional images ***to provide a physical picture as well as a chemical composition identification of the materials***;"
- 12:57-60: "it may be advantageous to use pattern matching algorithms and other software and mathematical methods ***to identify the blood constituents of interest***;"

- 15:45-48: "Various signal processing methods may be used to ***identify and quantify the concentration of cholesterol 876 and/or glucose 877, or some of the other blood constituents***."

The Patent's description of recognizing or establishing an object as a particular thing is fundamentally different from Lisogurski's "system error." (Ex. 2136, ¶¶ 138-139.) Lisogurski's passing reference to a "probe-off signal" does not disclose identifying an unknown object as a particular thing, as the '484 Patent and Claims 3 and 8 require. (Ex. 2136, ¶ 139.) Because Apple relies solely on Lisogurski for these Claims and because the Petition does not establish that Lisogurski discloses *detection* of an object, let alone *identification* of an object, Apple has not met its burden to show that Claims 3, 8, and 16 are unpatentable. (Ex. 2136, ¶ 140.)

D. Ground 3 (Claims 5 and 13): Apple's combination of four references lacks a motivation to combine all four references

In Ground 3, Apple asserts, "A Skilled Person Would Have Modified the Combined System of Lisogurski, Carlson, and Tran." (Pet. 68.) But Apple does not describe a motivation to combine all four references. It only describes a purported motivation to combine Isaacson and Lisogurski. (Pet. 68-70.)

As for all four references, Apple merely asserts, "Lisogurski, Carlson, Tran, and Isaacson are analogous references[.]" (Pet. 70.) But merely being analogous

references is not sufficient: Motivation to combine is a separate inquiry. *Kahn*, 441 F.3d at 986-87.

Apple's failure to present evidence of any motivation to combine all four references means Apple has not made a prima facie case under the *Graham* factors. *Kahn*, 441 F.3d at 987; *see also Johns Manville*, IPR2018-00827 Paper 9 at 10 ("Demonstrating that a reference is analogous art or relevant to the field of endeavor of the challenged patent ***is not sufficient*** to establish that one of ordinary skill would have had reason to combine its teachings with other prior art in the manner set forth in the claim."). "Where, as here, the necessary reasoning is absent, we cannot simply assume that "an ordinary artisan would be awakened to modify prior art in such a way as to lead to an obviousness rejection.'" *Plantronics*, 724 F.3d at 1354.

"Care must be taken to avoid hindsight reconstruction by using 'the patent in suit as a guide through the maze of prior art references, combining the right references in the right way so as to achieve the result of the claims in suit.'" *NTP*, 654 F.3d at 1299 (citations omitted). Using four references to assert obviousness, choosing them with hindsight knowledge of the claim limitations, is improper. "It is impermissible to use the claimed invention as an instruction manual or 'template' to piece together the teachings of the prior art so that the claimed invention is rendered obvious. This court has previously stated that '[o]ne cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to

deprecate the claimed invention.'" *In re Fritch*, 972 F.2d 1260, 1266 (Fed. Cir. 1992) (footnoted citations omitted).

Apple "pick[ed] and [chose] among isolated disclosures in the prior art" with no reason to combine all four references. "By requiring [Apple] to explain the motivation, suggestion, or teaching as part of its prima facie case, the law guards against hindsight in all cases[.]" *Kahn*, 441 F.3d at 986; *accord*., *InTouch Techs., Inc. v. VGO Commc'ns, Inc*., 751 F.3d 1327, 1348 (Fed. Cir. 2014) ("Dr. Yanco's testimony was nothing more than impermissible hindsight; she opined that all of the elements of the claims disparately existed in the prior art, but failed to provide the glue to combine these references.").

Because Apple has no evidence of a motivation to combine all four references, Apple has failed to make a prima facie case for Ground 3 because there is no "articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *KSR*, 550 U.S. at 418.

E. Ground 4 (Claims 6, 14, and 23): Apple's combination of five references lacks a motivation to combine all five references

In Ground 4, Apple asserts, "A Skilled Person would combine Lisogurski, Carlson, Tran, Isaacson, and Valencell-093." (Pet. 73.) But Apple does not describe a motivation to combine all five references. It only describes a purported motivation to combine Valencell-093 and Lisogurski. (Pet. 68-70.)

As for all five references, Apple merely asserts, "Lisogurski, Carlson, Tran, and Valencell-093," ignoring Isaacson. (Pet. 70.) But merely being analogous references is not sufficient: Motivation to combine is a separate inquiry. *Kahn*, 441 F.3d at 986-87.

Apple's failure to present evidence of any motivation to combine the five references means Apple has not made a prima facie case under the *Graham* factors. *Kahn*, 441 F.3d at 987; *see also Johns Manville*, IPR2018-00827 Paper 9 at 10 ("Demonstrating that a reference is analogous art or relevant to the field of endeavor of the challenged patent ***is not sufficient*** to establish that one of ordinary skill would have had reason to combine its teachings with other prior art in the manner set forth in the claim."). "Where, as here, the necessary reasoning is absent, we cannot simply assume that "an ordinary artisan would be awakened to modify prior art in such a way as to lead to an obviousness rejection.'" *Plantronics*, 724 F.3d at 1354.

"Care must be taken to avoid hindsight reconstruction by using 'the patent in suit as a guide through the maze of prior art references, combining the right references in the right way so as to achieve the result of the claims in suit.'" *NTP*, 654 F.3d at 1299 (citations omitted). Using five references to assert obviousness, choosing them with hindsight knowledge of the claim limitations, is improper. "It is impermissible to use the claimed invention as an instruction manual or 'template' to piece together the teachings of the prior art so that the claimed invention is rendered

obvious. This court has previously stated that '[o]ne cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.'" *Fritch*, 972 F.2d at 1266.

Apple "pick[ed] and [chose] among isolated disclosures in the prior art" with no reason to combine all five references. "By requiring [Apple] to explain the motivation, suggestion, or teaching as part of its prima facie case, the law guards against hindsight in all cases[.]" *Kahn*, 441 F.3d at 986; *accord*., *InTouch*, 751 F.3d at 1348 ("Dr. Yanco's testimony was nothing more than impermissible hindsight; she opined that all of the elements of the claims disparately existed in the prior art, but failed to provide the glue to combine these references.").

Because Apple has no evidence of a motivation to combine all five references, Apple has failed to make a prima facie case for Ground 4 because there is no "articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *KSR*, 550 U.S. at 418.

V. Conclusion

Omni asks the Board to find all claims of the ‘484 Patent patentable.

Respectfully submitted,

Dated: November 12, 2021

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Certificate of Service

The undersigned hereby certifies that on November 12, 2021, a complete and entire copy of **PATENT OWNER'S RESPONSE TO PETITION FOR *INTER PARTES* REVIEW UNDER 37 C.F.R. § 42.107 and all new Exhibits**, was served via electronic mail by serving the correspondence email address of IPRnotices@sidley.com, which delivers to the following lead and back-up counsel:

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