

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

Case No.: IPR2021-00453

PATENT OWNER'S SUR-REPLY

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UPDATED LIST OF EXHIBITS

No.	Description
2101-2119	<i>Reserved</i>
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	<i>Reserved</i>
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	<i>Reserved</i>
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
2135	Definitions of DETECT in The Free Dictionary
2136	Declaration of Duncan L. MacFarlane, Ph.D., P.E. in Support of Patent Owner's Response, November 12, 2021
2137	Copy of Lisogurski highlighted to show text cited for the first time in the Reply

I. Introduction

Lisogurski alone, or combined with Carlson, does not teach or suggest a device “configured to” increase SNR by increasing an LED pulse rate from an initial pulse rate. Apple misstates the teachings of Lisogurski and does not dispute it failed to show why an ordinary artisan would be motivated to combine four, five or six references to make the inventions claimed in the ‘484 patent. Apple’s Reply raises new arguments endorsed by mere attorney say-so—not evidence. Apple also improperly conflates the meanings of “to detect an object” and “to identify an object.” The Board should confirm the patentability of the Challenged Claims.

II. **Ground 1: Lisogurski alone does not disclose a device configured to increase SNR by increasing an LED pulse rate**

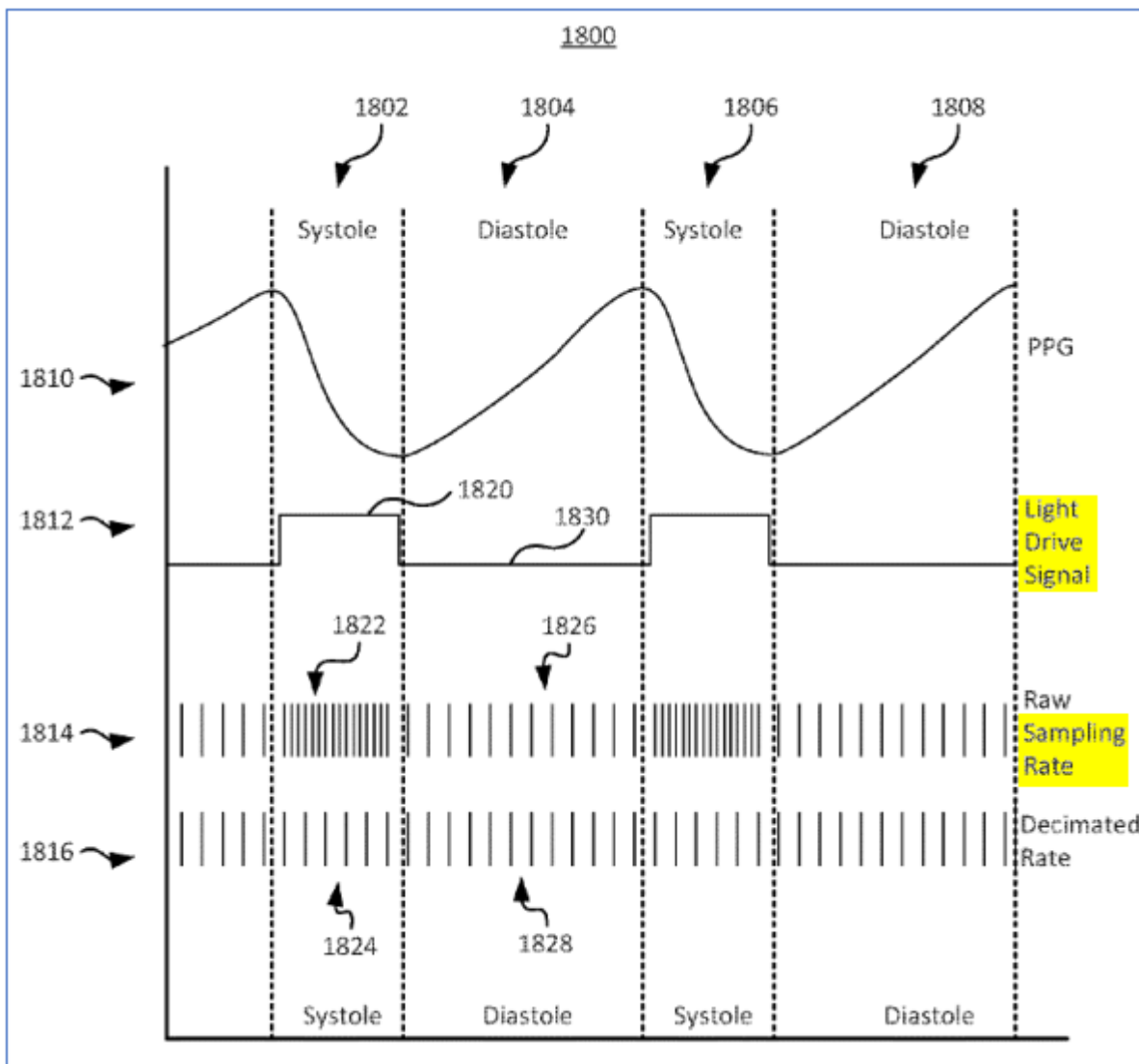
Apple says Lisogurski discloses “two features” that meet the *pulse rate* limitation: “(i) Lisogurski’s description of changing parameters such as sampling rate, and (ii) Lisogurski’s CCM.” Reply, 3.

A. **Lisogurski does *not* “use[] the term ‘sampling rate’ to refer to the emitter (LED) firing rate”**

For “feature (i),” Apple bases its argument on the erroneous claim that “Lisogurski uses the term ‘*sampling rate*’ to refer to the emitter (LED) firing rate” using a cropped snippet of text. Reply, 3.¹ But Lisogurski is clear that the “sampling

¹ All emphasis added unless otherwise noted.

rate” is not the LED firing rate. Ex.2136, ¶¶75-76. For example, Figure 18 shows the “light drive signal” (the signal that controls the emitter firing rate²) is not the “sampling rate”:



Ex.1011, Fig. 18 (annotated)

² The “light drive signal” is “provided to light source 130 ... to drive red and IR light emitters, respectively, within light source 130.” Ex.1011(12:3-7).

And Lisogurski confirms that “sampling rate” refers to the rate a *detector* (not the emitter) receives (not emits) light: “the system may *sample the received signal* at a low rate during a period of low light output and at a high rate during a period of high light output.” Ex.1011(10:34-36). Even Apple knows this: it refers (in the Petition) to “the sampling rate of an analog-to-digital converter in the detector.” Pet.49. Correcting Apple’s mis-definition of “sampling rate” defeats Apple’s entire first argument in Reply §II.A. but for the last paragraph.³

In the last paragraph of §II.A., Apple makes two unfounded assertions:

1. “Lisogurski discloses increasing LED firing rate of other types of modulation, including during DCM.” Reply, 5.

As its support for this assertion, Apple cites “Ex.1011, 34:10-13⁴ (‘sampling rate may represent the number of samples taken during ... drive cycle

³ Contrary to Apple’s assertion that Omni’s expert could not identify a scenario where an increasing pulse rate would not increase SNR, Reply, 5, n.1, Dr. MacFarlane gave an example. Ex.1060(83:19-84:4). Apple’s attorney then abandoned his inquiry.

⁴ “34:10-13” is one of many new sections in Lisogurski Apple cites for the first time in Reply. Ex.2137 highlights all newly cited sections.

modulation’).”⁵ *Id.* So, Apple’s assertion rests on the same false premise, *i.e.*, that “Lisogurski uses the term ‘sampling rate’ to refer to the emitter (LED) firing rate.” *Id.*, 3. It is irrelevant (and unsurprising) that Lisogurski takes samples during DCM. The citation and quote do not support Apple’s assertion. Instead, Lisogurski discloses firing the LED at a set rate during DCM, *e.g.*, 1kHz. Ex.2136, ¶86.

Moreover, this is a new argument by Apple. As Omni explained in the Response (pp. 16-19)—undisputed by Apple—the Petition relies *solely* on CCM and does not discuss, or mention, Lisogurski’s DCM embodiment. Making new arguments and relying on new embodiments for the first time in Reply is improper. *Ariosa Diagnostics v. Verinata Health, Inc.*, 805 F.3d 1359, 1367-68 (Fed. Cir. 2015)(“We see no error in the Board's rejection of [Petitioner’s] reliance, in its Reply submissions, on previously unidentified portions of a prior-art reference to make a meaningfully distinct contention.”); *see also* 35 U.S.C. § 312(a)(3)(the petition must identify “with particularity ... the grounds on which the challenge to each claim is based”); 37 C.F.R. §42.104(b)(5)(The petition must identify “the relevance of the evidence to the challenge raised”); Consolidated Trial Practice Guide (Nov. 2019) at 73 (“Petitioner may not submit new evidence or argument in reply that it could

⁵ As a “*see also*,” Apple cites “Ex.1011, 27:44-55, 33:47-49, 1:20-22, 2:1.” These passages do not discuss DCM or increasing SNR.

have presented earlier, *e.g.* to make out a prima facie case of unpatentability.”); *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-00582, Paper No. 34 at 30-31 (PTAB Aug. 5, 2019) (Informative).

2. “Lisogurski discloses that CCM can be combined with DCM, which operates at around 1 kHz. ... Notably, this explicit disclosure fundamentally contradicts Omni’s assertions that LED pulse rates at 1 kHz or higher are incompatible with CCM.” Reply, 6 (citations omitted).

Apple misrepresents “Omni’s assertions.” Omni never asserted the “LED pulse rates at 1 kHz or higher are incompatible with CCM.” On the contrary, Omni said: “[Lisogurski] explains that DCM and CCM can occur simultaneously.” Resp., 19. And CCM’s pulse rate is 1 Hz, not 1 kHz, when the two are combined. Ex.1011(6:26-30). Apple does not dispute that CCM’s firing rate is not 1 kHz.

In summary, Apple’s arguments in Reply §II.A. are based on a false premise and fail to show that Lisogurski teaches a wearable device configured to increase SNR by increasing the LED pulse rate from an initial pulse rate.

B. Apple has no evidence refuting Omni’s expert that CCM firing rate changes do not increase SNR

Omni’s expert testified that CCM’s trivial firing rate changes do not affect SNR. Ex.2136, ¶83. In the Response (pp. 21-23), Omni noted that Apple knew about

this evidence before it filed the Petition. Apple, not Omni, has the burden of proof, but now in Reply, Apple makes a conclusory attorney argument—unsupported by evidence—that the trivial changes in CCM firing rates increase SNR. Attorney argument is not evidence. *Creative Compounds, LLC v. Starmark Labs.*, 651 F.3d 1303, 1312 (Fed. Cir. 2011)(“[The patent challenger’s] evidentiary shortcomings are not overcome by its reliance on attorney argument”); *Biotec Biologische Naturverpackungen GmbH v. Biocorp, Inc.*, 249 F.3d 1341, 1353 (Fed. Cir. 2001)(“It is well established that conclusory statements of counsel or a witness that a patent is invalid do not raise a genuine issue of fact.”).

Apple first argues, wrongly, that in prior IPRs, Omni admitted that CCM increases SNR by increasing the LED firing rate. Reply, 6-7. Omni has **never** made such an admission—Omni has continuously and vigorously denied that CCM does so, including in this IPR. The firing rate “increase[s] or decrease[s] **without reference to SNR[.]**” Ex.2136, ¶81.

Although, when compared to measurements made **without CCM**, CCM may increase SNR by synchronizing with the heart rate, Apple’s transitive (A=B, B=C, A=C) argument does not apply. Apple has identified no evidence that Lisogurski teaches firing rate **changes** in CCM increases SNR. Lisogurski only teaches that CCM increases SNR when compared to measurements **without CCM**.

Ex.1011(42:45-58)(comparing simulated “coefficients of variation” for PPG signals to signals modulated with the systole period).⁶

On the other hand, Omni presented detailed, unrefuted proof that the changes do not affect SNR. Ex.2136, ¶83. Apple’s attorneys claim Omni’s arguments are “confused and internally inconsistent” based on a non sequitur: that “SNR benefits occur because the LED fires synchronously with the heartbeat.” Reply, 7. That statement merely acknowledges Lisogurski’s simulations. The *pulse rate* limitation

⁶ In the Response, Omni noted that Apple made the unsupported claim that an “increase in the firing rate can increase SNR because noise is reduced 1%-4%.” Resp., 21, n.4. Without explanation, Apple repeats that error at Reply, 6. Apple’s claim has no evidentiary support. Apple cites two passages from Lisogurski, “Ex.1011, 42:50-54” and “25:66-26:14,” neither of which supports its claim. At 42:50-54, Lisogurski says, based on “simulated waveforms,” “noise contributes coefficients of variation of 2.6%, 1.9%, and 3.8% to the computed pulse amplitudes of PPG signal 2602, systole period modulated PPG signal 2604, and diastole period modulated PPG signal 2606, respectively.” Lisogurski does **not** say an “noise is reduced 1%-4%.” At 25:66-26:14, Lisogurski says his embodiments are not limited to “cardiac pulses” but he does not say and “noise is reduced 1%-4%.”

is not about synchronization—that is a different claim limitation. Apple has no evidence that SNR *increases* by *maintaining* synchronization with the heartbeat.

Apple’s attorneys also wrongly assert, “[t]he claims do not ... limit why the LED pulse rate can be increased.” Reply, 7. But the claims expressly say why: to increase SNR. Apple falsely asserts, “Omni has admitted ... that increasing the LED pulse rate will increase SNR.” *Id.* Omni has never made such an admission and has repeatedly refuted it. Ex.2136, ¶83.

Apple next argues, “why Lisogurski increases the LED firing rate is irrelevant.” Reply, 8, citing *ParkerVision, Inc. v. Qualcomm Inc.*, 903 F.3d 1354, 1361 (Fed. Cir. 2018). Apple ignores the need to distinguish between claims that recite mere “*capability*” and claims, like those here, that recite “*configuration*”: “our cases distinguish between claims with language that recites capability, and those that recite configuration *The language used in the claims is critical to deciding on which side of this line the claims fall.*” *ParkerVision*, 903 F.3d at 1361. The claims in *ParkerVision* were “capability” claims, *id.* at 1362, so the foundation of Apple’s argument crumbles. Instead, the “configuration” cases control: “That [Lisogurski] was reasonably capable of being put into the claimed configuration is insufficient[.]” *Ball Aerosol & Specialty Container, Inc. v. Ltd. Brands, Inc.*, 555 F.3d 984, 995 (Fed. Cir. 2009); *ParkerVision*, 903 F.3d at 1361.

Apple’s attorneys—but not its expert—then discuss Dr. MacFarlane’s testimony that firing rate increases during CCM do not affect SNR. Relying on mere attorney argument, not evidence, Apple asserts CCM may increase SNR “in the presence of Gaussian noise” (but only when compared to no CCM). Reply, 8. It is irrelevant that Lisogurski ran simulations with “Gaussian noise” to compare waveforms with and without CCM. Ex.1011(41:46-49,42:46-54). The only issue is whether LED **firing rate increases** increase SNR. Omni presented unrefuted evidence that the trivial⁷ increases in CCM’s firing rate (to match heart rate increases) do not increase SNR—and Apple has no contrary evidence despite its burden of proof. Apple did not depose Dr. MacFarlane about this or supply a rebuttal from Apple’s expert because it knows Dr. MacFarlane is correct. Instead, Apple relies solely on attorney argument, which is insufficient. *Creative Compounds*, 651 F.3d at 1312; *Biotec*, 249 F.3d at 1353.

⁷ In footnote 3, Apple’s attorneys claim, without evidence, that the changes in firing rate during CCM are “non-trivial.” They cite nothing to support that claim, which is contrary to (1) unrefuted expert testimony, Ex.2136, ¶83, and (2) the teachings of Lisogurski and Carlson both of whom teach the modulation rate must be 1000 Hz or more to avoid ambient noise (as Omni pointed out in the Response (pp. 23-24) and Apple does not dispute).

Apple then misinterprets and criticizes Dr. MacFarlane’s illustration. Apple claims, wrongly, that the illustration shows “a flat noise distribution from 0 [*sic* – 0.5] to 10 Hz.” Reply, 9. That is not the purpose of the red box. As Dr. MacFarlane explained, it shows “the noise **range** identified in Carlson and Lisogurski” that envelopes the CCM frequencies. Ex.2136, ¶83.⁸

Apple next cites prior Board decisions in which Apple claims, “[t]he Board recognized that even small increases in LED firing rate during CCM can increase SNR in some noise environments, which is enough to satisfy the claims.” Reply, 9. There are two flaws with this argument. *First*, in the decisions, the Board did not address Dr. MacFarlane’s evidence, unrefuted in this IPR, that a CCM firing rate increase does **not** increase SNR. Ex.2136, ¶83. *Second*, the Board based its “enough to satisfy the claims” conclusion on *Hewlett-Packard Co. v. Mustek Sys., Inc.*, 340 F.3d 1314, 1326 (Fed. Cir. 2003), which the Federal Circuit held in *ParkerVision* does not apply to “configuration” limitations like the *pulse rate* limitation.

⁸ Apple’s attorneys, but not its expert, also claim that Carlson shows ambient light noise “trails off” (citing Carlson Figure 7b). Carlson refutes Apple’s attorney argument: “The [pulsed light] 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.**” (Carlson, ¶[0069].)

ParkerVision, 903 F.3d at 1361-62 (explaining that *Hewlett-Packard's* statements were made in the context of a case involving “an apparatus that is ‘capable of’ performing certain functions” and distinguishing it from cases like *Ball Aerosol* that “recited a configuration”). Here, it is not enough that CCM might (contrary to the evidence) randomly increase SNR because such randomness proves CCM is not **configured** to increase SNR by increasing the pulse rate. *Id.*

Finally, without citing to any record that analyzes or refutes Dr. MacFarlane’s detailed discussion of why firing rate increases during CCM do not increase SNR, Apple indirectly references Dr. MacFarlane’s deposition testimony (from a different IPR) where he made a “general statement” that increasing pulse rates may sometimes increase SNR. Reply, 9. But Apple admits that that testimony was only in response to “an abstract question” and “**not** about Lisogurski.” See Resp., 16-17 (emphasis in original). And, contrary to Apple’s assertion, Dr. MacFarlane’s testimony is neither “conclusory” nor “unsupported”: In ¶83 of his declaration, quoted in full at Resp., 22-23, Dr. MacFarlane details the basis for his opinion, citing specific evidentiary support.

In contrast, Apple’s only alleged support, Reply, 9, is a conclusory sentence in its expert’s declaration, “Ex.1003, ¶182”: “Lisogurki’s [*sic*] device will increase its pulse rate to remain synchronous with a subject’s heart rate resulting in an increased signal-to-noise ratio being detected.” That statement is not just conclusory,

the expert cites no support. He then finishes by saying, “Lisogurki’s [sic] device **is capable of** increasing its SNR by increasing its pulse rate, which satisfies PTAB’s construction.” *Id.* As a matter of law, that opinion is irrelevant because it relies on mere “capability” and does not address recited *pulse rate* “configuration.” *ParkerVision*, 903 F.3d at 1361-62; *Ball Aerosol*, 555 F.3d at 995.

In summary, Omni has unrefuted evidence that CCM is not configured to increase SNR by increasing the pulse rate while Apple, the proof-burdened party, has no contrary evidence.

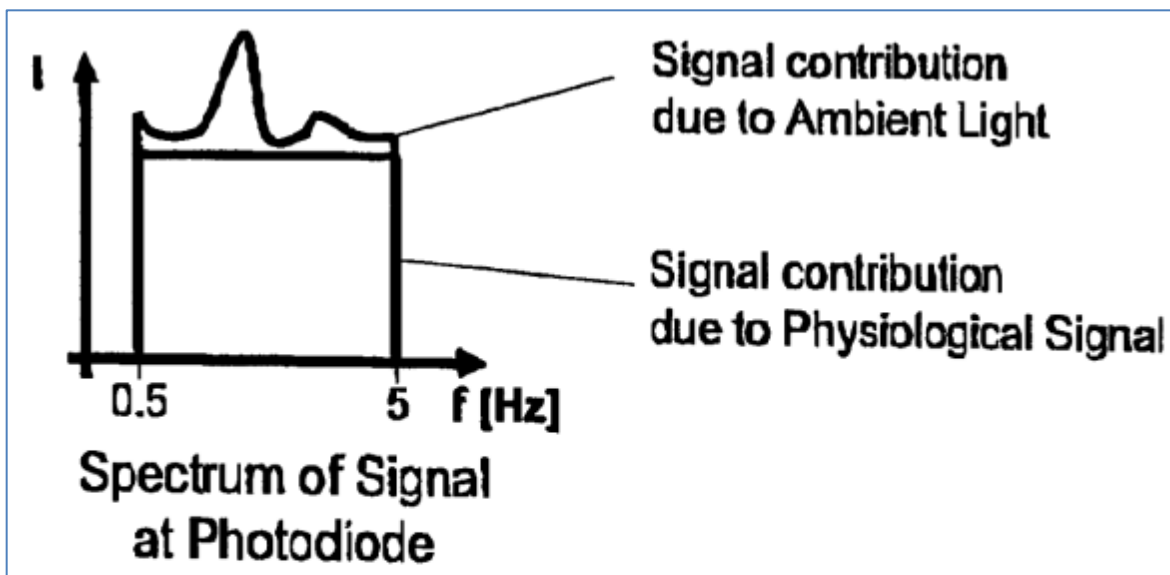
III. Ground 1: Adding Carlson’s teaching of modulating at 1000 Hz to Lisogurski’s CCM changes CCM’s principle of operation

A. Apple’s attorneys try to rewrite Carlson’s express teaching of “temporarily” using “pulsed light”

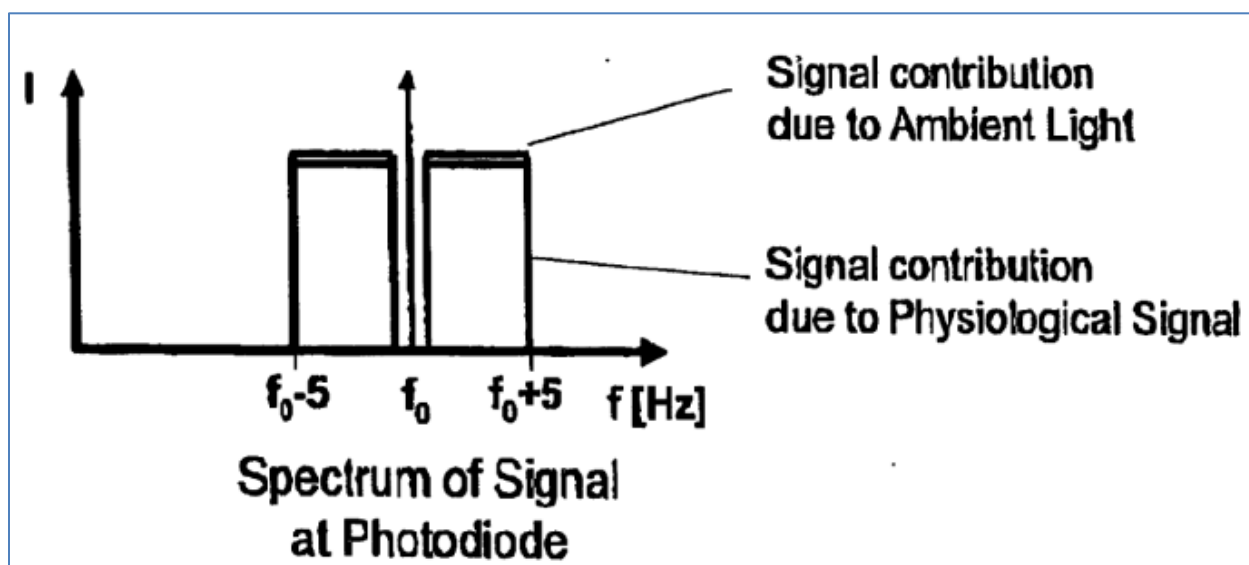
Apple asserts Omni “mischaracteriz[es] Carlson.” Reply, 10. In the first paragraph under heading III.A., Apple paraphrases Omni as saying Carlson’s pulsoximeter “cannot actively increase the LED’s pulse rate during operation.” *Id.* Apple then asserts that statement “is factually incorrect.” *Id.* But the three sentences that follow do not refute Omni. For example, Apple asserts, “Carlson’s device is designed to address **changing** environmental ... conditions.” *Id.* (emphasis in original). But Apple does not say **how** Carlson addresses changing conditions. Carlson expressly says his device does so by “temporarily” switching from

“continuous” to “pulsed light,” Ex.1009[0064], [0069], not by increasing the LED pulse rate during operation.

In the next paragraph, Apple confuses “power spectrum” with modulation frequency. Reply, 10-11. Omni explained the difference in its Response (pp. 25-28): Carlson shifts the “power spectrum” by changing from continuous to pulsed light, not by increasing the pulse rate of a pulsing LED. Ex.2136, ¶¶102-107. Carlson explains this by using Figures 7c and 8 to illustrate the shift:



Ex.1009, Figure 7c



Ex.1009, Figure 8

Carlson says, “FIG. 7c [is] a diagram showing power spectrum of physiological signals and ambient light *without phase shifting or modulation of the light source* of a sensor.” Ex.1009[0044]. “In other words, Figure 7c discloses the power spectrum for *continuous* light, not pulsed light.” Ex.2136, ¶103 (emphasis in original). In contrast, “FIG. 8 a diagram showing power spectrum of physiological signals and ambient light *with phase shifting or modulation of the light source* of a sensor.” Ex.1009[0045].

Carlson first discusses “shift[ing] the power spectrum” in ¶[0065], where he explains “[t]he basic idea” of “*temporarily* modulat[ing] the optical radiation of the LED at the carrier frequency f_c in order to shift the power spectrum of the pulsoximeter signals into a higher frequency range where environmental optical radiation is unlikely[.]”

After describing concerns with “ambient light” in ¶[0068], Carlson details how his power spectrum shift works in ¶[0069]:

[I]t is therefore proposed to emit light by the LEDs not as current or continuous light but as pulsed light. 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. ... FIG. 8 shows the shift spectrum of signal to a region where there is little influence, e.g. of ambient light.

Ex.1009[0069].

Apple is wrong when it argues that the shift in power spectrum (shown in Figures 7c and 8) “indicates the LED previously pulsed at a lower frequency.” Reply, 11.⁹ Figure 7c shows the power spectrum without modulation of the light source, a fact Apple does not dispute.

Apple also briefly mentions Carlson’s claims 10-13, which it admits are “means” claims. Reply, 11. Omni’s Response (pp.27-28) details why claims 10-13 do not disclose increasing a pulse rate: Because the claims are in means plus function format, one must look to the specification and, there, the only “means for shifting”

⁹ Apple’s assertion is mere attorney argument—Apple does not cite its expert for support. Omni’s expert refutes Apple’s attorney argument. Ex.2136, ¶¶102-107.

shifts just the power spectrum (only) by temporarily switching continuous light to pulsed light. Apple's Reply does not address or dispute these facts.

Apple next asserts the Board should ignore Carlson's express, unequivocal statements that his device switches temporarily from continuous to pulsed light because, according to Apple's attorneys (with no evidentiary support), "Carlson's device would consume excessive battery power." Reply, 11. That argument is contrary to Carlson, lacks support, and ignores that Carlson can use other measures to reduce battery consumption. For example, Lisogurski teaches varying the sampling rate to conserve power. Ex.1011(36:38-40)("the system may alter sampling rate ... to optimize power consumption.") Carlson never suggests that battery power is a factor in using continuous light or in the need to temporarily modulate the light. Apple's attorney arguments are not evidence. *Creative Compounds*, 651 F.3d at 1312; *Biotec*, 249 F.3d at 1353.

Apple also claims that "continuous light" has "a pulse rate." Reply, 11. Ridiculous: pulses that do not exist have no "rate." See Ex.2136, ¶¶108-113. And, as detailed in Dr. MacFarlane's declaration, "the '484 specification draws a clear distinction between continuous light and pulsed modulated light"; "the specification provides examples of pulse rates, which are consistently **non-zero**." Ex.2136, ¶109(quoting examples)(emphasis in original).

Apple concludes §III.A. with more attorney argument. Reply, 11-12. It is irrelevant that Apple’s attorneys believe their arguments “align with Carlson’s broader context” and that ignoring Carlson’s express teachings “would be natural.” The absence of evidentiary support for these opinions speaks volumes.

B. Apple mischaracterizes Omni’s arguments and Lisogurski and Carlson’s teachings

Omni does not, as Apple asserts, “attack[] the teachings of Lisogurski nor [sic] Carlson in isolation.” Reply, 12. The combined references cannot teach *increasing* a pulse rate to 1000 Hz because neither reference contains that teaching. In Lisogurski, CCM’s pulse rate never increases to 1000 Hz and DCM’s pulse rate (which the Petition does not rely on) is either active or inactive without increasing. In Carlson, the light source is either unmodulated or (temporarily) modulated, but when modulated the pulse rate does not increase.

Apple says Omni’s arguments “boil down to two assertions”: (1) “Lisogurski does not teach increasing the LED firing rate for the purpose of increasing SNR” and (2) “Carlson alone allegedly does not disclose increasing an LED’s pulse rate during its operation.” *Id.* at 12-13 (emphasis and footnote omitted).

On the first point, Omni disputes that Apple’s summary of Lisogurski’s teaching “is undisputed.” Reply, 13. Apple claims Lisogurski’s device can “vary LED modulation ... in response to noise level changes.” *Id.* Not true. The light drive

“varies substantially synchronously with physiological pulses of the subject.” Ex.1011(25:46-55). This means the firing rate increases or decreases “without reference to SNR.” Ex.2136, ¶81. None of the passages Apple cites from Lisogurski supports Apple’s claim:

- “1:67-2:3” only mentions responses to “external trigger[s].”
- “5:55-61” only discusses adjusting brightness, not modulation, using “servo algorithms.”
- “9:46-60” again refers to “brightness” and to changing “from a modulated light output to a constant output,” the ***opposite*** of increasing to a higher pulse rate as claimed.
- “27:44-49” does not address “noise level changes.”
- “33:53-57” is about “sampling rate,” not firing rate.
- “37:6-18” mentions CCM’s “second mode,” where the only “modulation change” Lisogurski discloses is “***stop[ping]*** cardiac cycle modulation and emit[ting] light at a constant brightness,” Ex.1011(37:6-17), *i.e.*, changing to no pulses.

See Ex.2136, ¶¶71, 74, 79.

Apple also claims it is “undisputed” that Lisogurski “var[ies] LED modulation for the purpose of increasing SNR.” Reply, 13. It is unfathomable that Apple can make that claim—this is a core dispute in this IPR. See §II, above.

Regarding Carlson, Apple rehashes its unsupported claim from §III that “Carlson *does* disclose a device that changes an LED’s pulse rate in operation.” Reply, 13 (*italics in original*). That claim is wrong as explained in the preceding section. Apple also misstates that Carlson can overcome ambient light by “switching” the LED pulse rate to a higher frequency. *Id.* Apple misuses the comparative “higher” because, as explained in the preceding section, Carlson’s continuously-on LED has no pulse rate.

Finally, Apple identifies its proposed Lisogurski/Carlson combination: switching Lisogurski into CCM’s “second mode” and increasing CCM’s firing rate to 1000 Hz (Carlson’s modulation rate). Reply, 14. As discussed in the next section, that proposed combination is improper because it changes CCM’s principle of operation.

C. Modulating CCM at 1000 Hz is not “consistent with Lisogurski’s teaching”—it improperly changes CCM’s principle of operation

Apple summarizes Omni’s “principle of operation” argument incorrectly. Reply, 14. In the Response, Omni noted that the Petition discussed only Lisogurski’s disclosure of CCM and contained no discussion of other modulation techniques

(including DCM). Resp. §§IV.A.1.a., b.; *see also* Ex.2136, ¶¶89, 93. Nor does the Petition discuss Lisogurski making modulation frequency changes other than during CCM. *Id.*; Resp., 31; Ex.2136, ¶¶95-96.

For the first time in Reply, Apple adds arguments regarding DCM and “servo algorithms.” Reply, 15. Nowhere in Apple’s Petition do the terms DCM, “drive cycle modulation,” or “servo” appear. Apple’s Reply improperly raises new arguments about different Lisogurski features. *Ariosa*, 805 F.3d at 1367-68; 35 U.S.C. § 312(a)(3); 37 C.F.R. § 42.104(b)(5); Consolidated Trial Practice Guide at 73; *Hulu*, IPR2018-00582, Paper No. 34 at 30-31.

Regardless, neither DCM nor “servo algorithms” is relevant. “Lisogurski does not teach or suggest varying the ‘drive cycle modulation’ pulse rate.” Ex.2136, ¶86. Apple argues, “the sampling rate during DCM may be increased,” but this argument is infected with the same error Apple made earlier: confusing sampling rate with firing rate. As for “servo algorithms,” Apple does not explain how they relate to LED modulation: other than mentioning the term twice (only on Reply, 15), Apple says nothing about how they work or how/why to combine “servo algorithms” with Carlson.

Apple next asserts, with a string cite, that the Petition included a “discussion of varying sampling rate and LED firing rate during DCM.” Reply, 15. None of the cites supports that claim:

- “Pet., 45” discusses “cardiac cycle modulation,” not DCM.
- “Ex.1011, 1:19-21” does not mention DCM.
- Petition “53 (citing Ex.1011, 1:67-2:1, 5:55-61)”: not one cite mentions DCM.
- “Ex.1011, 35:10-12”: The Petition never cited this text, perhaps because it addresses only “sampling rate,” which Apple’s Reply confuses with firing rate.
- “Pet., 22” does not mention DCM.

See Ex.2136, ¶79.

Apple next cites its expert’s declaration. Reply, 15, citing Ex.1003, ¶166. *First*, the Petition cited that paragraph only in the “increasing intensity” section (§VI.A.5(l)(1)), not to support any “pulse rate” argument (§VI.A.5(l)(2)) and the expert included ¶166 only for his “increasing intensity” analysis, not for the “pulse rate” analysis (see headings in declaration). *Second*, the Lisogurski excerpts the expert cites in ¶166 merely say DCM can be used “in addition to” CCM, but nothing about changing DCM’s modulation rate. Ex.1003, ¶166. Apple’s Petition does not rely on DCM and the Reply’s new, untimely discussion of DCM lacks evidence that DCM’s modulation rate changes.

On Reply 16, Apple strings three sentences together, ending with a non sequitur: “Thus, firing the LED at 1,000 Hz or higher during CCM does not change its principle of operation.” *Id.* The prior two sentences explain that CCM and DCM can work simultaneously, with CCM at “1 Hz” and DMC at “1 kHz.” *Id.* This teaching does not support Apple’s claim that increasing **CCM’s** firing rate to 1,000 Hz “does not change its principle of operation.” On the contrary, Apple’s description makes clear (1) CCM’s firing rate continues at around 1 Hz to track a person’s cardiac cycle, even when using a 1 kHz “envelope” and (2) to increase CCM’s firing rate to 1,000 Hz would necessarily change CCM’s operation as that modulation is 1000 times a person’s cardiac rate contrary to the “CC” in “CCM.”

Apple accuses Omni of “bodily incorporat[ing]” Carlson’s teaching into Lisogurski. Reply, 16. Omni has not done so. It is Apple who proposes to increase CCM’s firing rate to Carlson’s 1000 Hz, saying, “A skilled person would have found it obvious to configure Lisogurski to respond to increased noise ... by increasing the LED firing rate to 1,000 Hz or even higher based on Carlson.” Reply, 17. The “LED firing rate” is Lisogurski’s CCM—the only firing rate Apple describes in its Petition. Apple cannot—and does not—deny that increasing CCM’s firing rate to 1000 Hz makes CCM inoperable for its intended purpose (modulating at the heart rate), which changes CCM’s principle of operation.

Apple tries to gloss over this problem by arguing that Lisogurski says CCM can be turned off in a second mode.¹⁰ Reply, 16. But then, the LED stops pulsing—it does not **increase** to 1000 Hz. The Challenged Claims require the pulse rate to increase. Stopping CCM does not meet that requirement.

Apple’s last argument in this section is that CCM need not “be precisely correlated to the cardiac cycle.” Reply, 17. But 1000 Hz is not “correlated”—precisely or otherwise—to the 1 Hz nominal cardiac cycle.

Next, relying on never-before cited text (“Ex.1011, 5:41-47”), Apple cites Lisogurski’s “external triggers.” Reply, 17. The purpose of an “external trigger” is “to provide a trigger signal synchronous with an element of the cardiac cycle” to fire the emitter “substantially synchronously with physiological pulses of the subject.” Ex.1011(10:9-12, 25:46-55); Ex.2136, ¶81. In other words, the external trigger functions to **maintain** CCM’s synchronization, not increase the firing rate to 1000 Hz. That confirms that the principle of CCM’s operation is to maintain synchronization with the heart rate, so Apple’s proposal to increase CCM’s firing rate to 1000 Hz destroys CCM’s operating principle.

¹⁰ Apple does not dispute that the “second mode” is a mode of CCM. See Resp., 16.

IV. Grounds 2–4: Apple does not show a motivation to combine three, four, and five references

Apple does not dispute that, “[w]hether references are analogous and whether a motivation to combine exists are separate inquiries.” Resp., 34. And Apple does not dispute that merely showing a reference is analogous art “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 also does not dispute that, for its proposed combinations of three, four, and five references in Grounds 2–4, it asserted only that the references are “analogous,” but gave no motivation to combine each reference with the others. Resp., 34, 38, 41. On these undisputed facts, Apple has not met its burden of showing a motivation to combine three/four/five references together.

Apple’s only response is that it showed a motivation to combine each reference with Lisogurski (only). Reply, 18-19, 25-26. But Apple asserted, “A Skilled Person Would Have Modified Lisogurski **and Carlson** Based on Tran,” Pet., 59, “A Skilled Person Would Have Modified **the Combined System of** Lisogurski, **Carlson, and Tran** to Incorporate Elements Shown in Isaacson,” Pet. 68, and “A Skilled Person would **combine** Lisogurski, **Carlson, Tran, Isaacson, and Valencell-093**,” Pet. 73. Despite making these claims, Apple offered no evidence to support

them. Yet, each Ground relies on the combination of three/four/five references, not just Lisogurski and one other reference.

Apple cites ***no authority*** for its assertion it was “not required” to show a motivation for the complete combination needed for each Ground. Reply, 25-26. As a matter of law, Apple’s has not met its burden of proof for Grounds 2–4. *Plantronics, Inc. v. Aliph, Inc.*, 724 F.3d 1343, 1354 (Fed. Cir. 2013)(“Where, as here, the necessary [motivation-to-combine] 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.’”).

V. Apple improperly conflates “to *detect* an object” and “to *identify* an object”

Apple does not dispute that its Petition ignored the difference between Claims 3 and 8 (“configured to ***identify*** an object”) and Claim 16 (“configured to ***detect*** an object”). The Petition’s ***entire*** argument was two conclusory sentences: “Lisogurski teaches that its sensor can detect when it has fallen off. ... Thus, Lisogurski’s sensor can identify when an object (*e.g.*, a wrist or an ear) is in range of the sensor[.]” Pet., 62.

In its Reply, Apple’s two-sentence argument swells to five pages, including new proposed claim constructions. Apple’s expert does not support the new constructions or the Reply arguments—Apple relies on mere attorney argument. The

Petition should have made the (new) Reply constructions and arguments. 37 C.F.R. § 42.104(b)(3)(The petition must identify “[h]ow the challenged claim is to be construed” and “specify where each element of the claim is found in the prior art patents or printed publications relied upon”). The Board should reject Apple’s new constructions and arguments for this reason alone.

Apple’s attorneys try to patch over their error by changing the plain and ordinary meaning of “identify” to “mean the same thing ‘detect an object’ does.” Reply, 20. The attorneys assert the claims “do not require the device to take any actions based on what an object is.” Reply, 21. They cite no support for that attorney argument, which is contrary to law. The specification, not the claims, describes what actions a device takes. *Nature Simulation Sys. v. Autodesk, Inc.*, 23 F.4th 1334 (Fed. Cir. 2022)(“Specifications teach. Claims claim.”), quoting *SRI International v. Matsushita Electric Corp. of Am.*, 775 F.2d 1107, 1121 n.14 (Fed. Cir. 1985).

Apple’s attorneys inconsistently say “identify” “need[s] no construction,” Reply, 19, but then change its meaning, Reply, 20. They assert, again without support, that “most” of the specification passages cited by Omni’s expert, Ex.2136, ¶138, “are irrelevant to the claims.” Reply, 21. They criticize the use of a quote about “hyper-spectral images” because it is not the claimed invention. But the text shows how the inventor used the word “identify” throughout in the specification and claims. *Phil-Insul Corp. v. Airlite Plastics Co.*, 854 F.3d 1344, 1359 (Fed. Cir.

2017)(“It is well-established, however, that claim terms are to be construed consistently throughout a patent.”); *Rexnord Corp. v. Laitram Corp.*, 274 F.3d 1336, 1342 (Fed. Cir. 2001)(“a claim term should be construed consistently with its appearance in other places in the same claim or in other claims of the same patent.”)

In each example, “identify” means more than just “detect.” At Ex.1001(7:21-24), the device uses information “to identify ... spectrally similar materials.” At 8:18-22, the device performs “chemical composition identification.” At 12:57-60 the device “identif[ies] the blood constituents of interest.” At 15:45-48, the device “identif[ies] ... blood constituents.” In each example, the device “identifies” by “ascertain[ing] as a **certain** person or thing.” Ex.2134.

Conflating “identify” with “detect,” Apple’s attorneys then assert Lisogurski detects an object’s “presence” because the system “does **not** generate the probe-off signal when the sensor is affixed to the subject.” Reply, 22 (citing no support). The phrase “to detect an object” requires an affirmative act, but Apple cites no evidence that Lisogurski’s system takes any action to detect the presence of an object when the signal is **absent**.

Apple next addresses “identifying” using the word’s the plain meaning. Reply, 24. Apple’s Petition relied only on Lisogurski, but now Apple adds Tran as a basis for its argument. That is plainly improper—the Petitioner may not rely on a new reference to support a Ground for the first time in Reply. *Ariososa*, 805 F.3d

at 1367-68; 35 U.S.C. § 312(a)(3); 37 C.F.R. § 42.104(b)(5); Consolidated Trial Practice Guide at 73; *Hulu*, IPR2018-00582, Paper No. 34 at 30-31.

Apple’s attorneys assert, without expert support, that Lisogurski and Tran “identify an object” because they “measure” blood constituents. Reply, 24. Once again, this is an improper new argument not raised in the Petition. “Measuring” is not “identifying.” One can measure an object without identifying it. For example, if a scale is placed so the operator can only see the readout, the operator can measure the weight of an object but cannot identify it. Apple’s arguments focus on “measuring,” not “identifying,” and are irrelevant to Claims 3 and 8.

VI. Conclusion

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

Dated: March 4, 2022

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Certificate of Service

The undersigned hereby certifies that on March 4, 2022, a complete and entire copy of **PATENT OWNER'S SUR-REPLY**, 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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