

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MASIMO CORPORATION,
Petitioner,

v.

APPLE INC.,
Patent Owner

Case IPR2023-00734
U.S. Patent No. 10,942,491

PATENT OWNER RESPONSE

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PATENT OWNER'S LISTING OF EXHIBITS

Ex. 2001	U.S. Patent Pub. No. 2014/0107493 to Yuen et al. (“Yuen”)
Ex. 2002	RESERVED
Ex. 2003	U.S. Patent Pub. No. 2017/0011210 to Cheong et al. (“Cheong”)
Ex. 2004	U.S. Patent No. 7,946,758 to Mooring (“Mooring”)
Ex. 2005	U.S. Patent Pub. No. 2014/0139486 to Mistry et al. (“Mistry”)
Ex. 2006	U.S. Patent No. 8,229,535 to Mensinger et al. (“Mensingher”)
Ex. 2007	U.S. Patent No. 7,682,070 to Burton (“Burton”)
Ex. 2008-2009	RESERVED
Ex. 2010	U.S. Prov. App. No. 61/943,004 (“Cheong Provisional”)
Ex. 2011	File History of U.S. Patent App. No. 17/188,995
Ex. 2012	File History of U.S. Patent App. No. 17/951,973
Ex. 2013	File History of U.S. Patent App. No. 18/075,253
Ex. 2014	File History of U.S. Patent App. No. 18/119,175
Ex. 2015-2018	RESERVED
Ex. 2019	Prosecution History of US Patent No. 10,627,783
Ex. 2020	U.S. Patent Pub. No. 2014/0275852 to Hong et al. (“Hong”)
Ex. 2021	U.S. Patent No. 4,448,199 to Schmid (“Schmid”)

EX-2022	RESERVED
EX-2023	S. Annam, “Scholar Works at UT Tyler Four-Coil Wireless Power Transfer Using Resonant Inductive Coupling,” Electric Engineering Theses, Paper 19 (2012).
EX-2024	Z. Atrqchi et al., “Efficiency Examination of The Circular Coils with Two Types of Cross-Sections for WPT System,” UMD-SDSP (2020).
EX-2025	Y. Li et al., “Maximizing Transfer Distance for WPT via Coupled Magnetic Resonances by Coupling Coils Design and Optimization,” IEEE Access, vol. 8, pp. 74157–74166 (2020).
EX-2026	Y. Li et al., “Influences of Coil Radius on Effective Transfer Distance in WPT System,” IEEE Access, vol. 7, pp. 125960–125968 (2019).
EX-2027	Y. Li et al., “Directional characteristics of wireless power transfer via coupled magnetic resonance,” Electron., Vol. 9, No. 11, pp. 1–14 (2020).
EX-2028	K. A. Mohamad et al., “Effect of Circular Coil Dimension on Resonant Coupling Wireless Power Transfer System,” J. Telecommun. Electron. Comput. Eng., Vol. 10, No. 2–6, pp. 19–23 (2018).
EX-2029	A. P. Sample et al. “Analysis, experimental results, and range adaptation of magnetically coupled resonators for wireless power transfer,” IEEE Trans. Ind. Electron., Vol. 58, No. 2, pp. 544–554 (2011).
EX-2030	G. Vigneau et al., “Design and modeling of PCB coils for inductive power charging,” Wirel. Power Transf., Vol. 2, No. 2, pp. 143–152 (2015).

- EX-2031 R. Vinge, “Wireless Energy Transfer by Resonant Inductive Coupling,” p. 83 (2015).
- EX-2032 F. Wen et al., “Research on optimal receiver radius of wireless power transfer system based on BP neural network,” Energy Reports, Vol. 6, pp. 1450–1455 (2020).
- EX-2033 U.S. Patent Pub. No. 2007/0228404 to Tran et al. (“Tran”)
- EX-2034 U.S. Patent Pub. No. 2005/0274971 to Wang et al. (“Wang”)
- EX-2035 U.S. Patent Pub. No. 2010/0193804 to Brown et al. (“Brown”)
- EX-2036 U.S. Patent Pub. No. 2005/0030518 to Nishi et al. (“Nishi”)
- EX-2037 U.S. Patent No. 7,455,423 to Takenaka (“Takenaka”)
- EX-2038 Declaration of Dr. Brian Anthony, Ph.D.
- EX-2039 Deposition Transcript of R. James Duckworth, Ph. D.
- EX-2040 G. Patancheru, “Wearable Hear Rate Monitoring Unit”
- EX-2041 Pulse Sensor Easy to Use Heart Rate Sensor and Kit (World Famous Electronics)
- EX-2042 “Bringing Vital Signs Monitoring into the Wearable Domain” (April 2023)

I. INTRODUCTION

Claims 1-19 (“Challenged Claims”) of U.S. Patent No. 10,942,491 (“’491 Patent”) should be found patentable because none of Petitioner’s presented grounds render these claims obvious. As explained below, and in more detail throughout this Patent Owner Response (“Response”) and in the accompanying declaration of Dr. Anthony (*see* EX-2038, ¶¶1-250), Petitioner’s presented grounds fail for multiple reasons: (1) they fail to demonstrate how or why a person of ordinary skill in the art (POSITA) would have implemented the Kotanagi and Honda combination (and/or the Kotanagi, Honda, and Choi combination) in the manner proposed by Petitioner for purposes of the independent claims and (2) they hinge on conclusory, hindsight-driven allegations that fail to demonstrate why or how a POSITA would have combined the references to render the claims obvious. *See id.*

In more detail, the ’491 Patent sought to improve on portable devices, particularly wearable devices (e.g., wristwatches), that had traditionally included “relatively limited functionality” or “were only able to perform a specialized set of functions or tasks.” EX-1001, 1:35-39. To that end, the ’491 Patent provides a wearable electronic device with an enhanced feature set—including, among other features, “touch input, force input, an interchangeable attachment system, health

monitoring functionality, wireless power charging.” *Id.*, 1:22-28, 1:42-45. To facilitate this “wide range of functionality,” the ’491 Patent contemplates a specific assembly and configuration of components integrated into the “relatively compact space of” its wrist-worn device. *Id.*, 1:42-45, 1:53-59. This includes providing a wireless charging component (e.g., a wireless charging receive coil) and a “biosensor module” behind a cover in the rear portion of the device, with this cover being configured to facilitate transmission of optical signals to/from the biosensor module and wireless power signals to the wireless charging receive coil. *Id.*, 2:47-67, 5:29-44, 44:31-45:25.

Indeed, during prosecution, this specific arrangement and configuration of the claimed cover, which facilitates transmission of both optical and wireless power signals, was the reason the claims were allowable over the art of record. *See* EX-1002, 593-603, 607-609, 468-473, 10-12; *see also* EX-1001, 1:22-28, 2:47-58, 39:40-46, 40:43-57, 44:31-51, 45:15-25.

With respect to the independent claims, Petitioner presents a combination of the Kotanagi and Honda references (or alternatively, a combination of the Kotanagi, Honda, and Choi references) to argue obviousness of claim features reciting a rear cover in the claimed device that is configured to pass optical signals to/from a biosensor module and wireless power to a wireless charging receive coil. *See* EX-1001, claims 1, 7, and 14. Petitioner’s proposed combination seizes on

Kotanagi's wrist-worn device that detects pulse rate via optical elements disposed in a protruding part formed in the device's rear portion, and seeks to implement wireless charging in this device by providing a wireless charging coil, as disclosed in Honda, behind a cover glass element fixed to the rear protruding part of the device. *See, e.g.*, Petition, 22-31, 34-40, 48-54.

This proposed combination, however, ignores critical teachings of Kotanagi and Honda that not only preclude the combination proposed by Petitioner but would also counsel against it. For example, Kotanagi imposes size restrictions on the device's rear protruding part, which in turn limits the size and positioning of the wireless charging receive coil in a manner that is contrary to Honda's teachings and stated goals of achieving quick and efficient wireless charging. *See* EX-2038, ¶¶117-213; §§VII.A-C *infra*. In particular, a POSITA would not have been motivated nor would have a reasonable expectation of success in providing the coil in the allegedly available space behind the cover glass in Kotanagi's device. *See id.* That is because the size of coil that could be provided in this allegedly available space would be small and would significantly limit the amount of wireless power signal transmission. *See id.* And, the limited charging capability of such a coil is further substantially and detrimentally impacted by the significant increase in distance between the transmit and receive coils and power transfer-reducing eddy currents and magnetization from metallic materials between the

coils (and within the core region of such coils)—which Honda expressly seeks to avoid but which is nevertheless demanded by Petitioner’s combination. *See id.*

Given the above-described detrimental impact to wireless power transmission in the combination’s proposed configuration, Petitioner has failed to demonstrate that a POSITA would have configured the device in this manner—particularly when considering that the POSITA would have been aware of other well-known and actually functioning configurations (as corroborated by the Fraser reference) that provide a large wireless charging receive coil around optical elements within the device housing and thereby avoid the detrimental impact to wireless charging that Petitioner’s combination injects. *See* EX-2038, ¶¶157-198; §§VII.C-D *infra*. Indeed, as Fraser corroborates, a POSITA would have also recognized that such a large coil would expand beyond the identified cover of the combination’s device. *See id.* And in that case, any inductive coupling and associated “wireless power” transmission that occurs, as the claims require in view of the intrinsic record, would be via the portions of the rear surface/housing beyond the cover—and not via the alleged cover. *See id.*

At best then, Petitioner has presented a device configuration in which a wireless charging coil *could* be provided in Kotanagi’s through hole 22. However, Petitioner has not demonstrated that a POSITA *would* have configured the device in the proposed manner when considering the detrimental impact to wireless

charging stemming from this configuration and given the substantially better alternative that a POSITA would have known about and which would have avoided the above-described issues. On this record, Petitioner has failed to demonstrate that Petitioner's proposed combination would render obvious the independent claims.

Independent claim 1 additionally recites that the electronic watch is configured to measure an electrocardiogram using the first and second electrodes positioned along the rear surface of the watch. Dependent claims 13 and 17 recite similar limitations and Petitioner incorporates by reference its analysis for the corresponding limitations in claim 1. In particular, for these claims, Petitioner seizes on Choi's alleged teachings of ECG measurements using sensors on the watch's surface(s) to argue that Kotanagi's electrodes (alone or in combination with additional electrodes) would be configured to measure ECG. Petition, 50-54. Petitioner's analysis is flawed because it fails to appreciate that Kotanagi's electrodes are used for skin contact detection—and not to measure ECG. *See* EX-2038, ¶¶214-246. And, even if Choi discloses sensors that are used to measure ECG signals, Petitioner has failed to demonstrate why a POSITA would have been motivated to implement ECG measurement capabilities within Kotanagi's device, or how such measurements would be performed using the electrodes in the combination that, according to Kotanagi, have a skin contact detection function.

See id. In the absence of any rational underpinning or reasoned evidence, Petitioner’s cherry-picked aspects of each reference to read onto claims 1, 13, and 17 is impermissible hindsight bias that must be rejected. *See id.*

The above-described deficiencies in the independent claims also permeate the remaining dependent claims, and Petitioner’s analysis for these additional claims fails to overcome these issues. As a result, these additional dependent claims are not rendered obvious for at least the same reasons described with respect to the independent claims.

On this record, Petitioner has failed to demonstrate that the Challenged Claims are unpatentable and therefore, Patent Owner respectfully requests that the Board enter a Final Written Decision confirming the patentability of these claims.

II. THE INVENTION OF THE ’491 PATENT

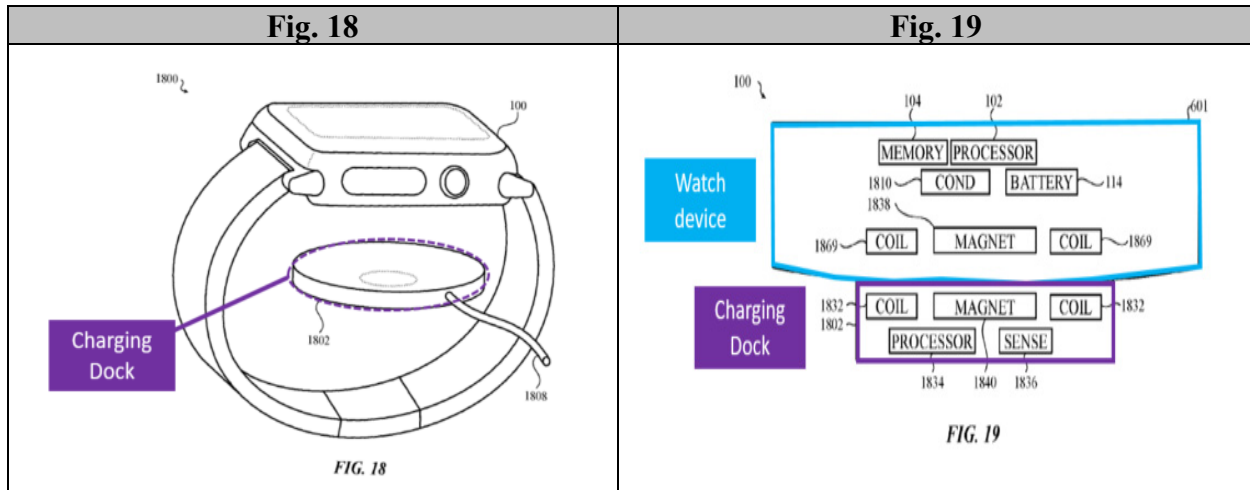
The ’491 Patent relates to “a wearable electronic device” that provides a “wide range” of features, including among others, “wireless power charging” and “health monitoring functionality.” EX-1001, 1:22-28, 1:42-45; EX-2038, ¶¶45-61.

The ’491 Patent explains that traditional portable devices, particularly wearable electronic devices, had “relatively limited functionality or [were] only able to perform a specialized set of functions or tasks.” EX-1001, 1:35-39. “For example, some traditional electronic wristwatches” were “configured to perform a

relatively limited set of functions, including displaying time, date, and performing basic timing functions.” *Id.*, 1:39-42.

In contrast, and “compared to some traditional wearable electronic devices,” the ’491 patent provides “an expansive feature set” that is “integrated into” the “relatively compact space of a wrist-worn device.” *Id.*, 1:42-45, 1:53-59. In some embodiments, the ’491 Patent provides a wrist-worn device that “integrate[s] or combine[s] multiple subsystems”—including a wireless charging receive coil operating in conjunction with a power conditioning circuit and biometric sensors—“into a single device” to provide a wrist-worn device with a wide range of features, including wireless charging and biometric sensing capabilities. *Id.*, 1:22-28, 1:49-59, 7:13-28, 5:32-44, 4:27-52.

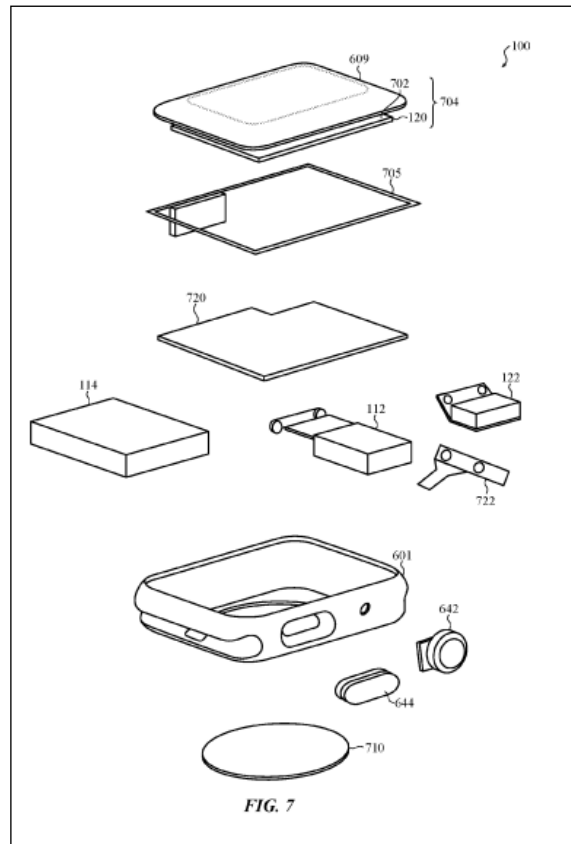
The ’491 Patent discloses a device 100 that can facilitate wireless recharging of its rechargeable battery via a charging dock. *Id.*, 1:22-28, 8:55-67, FIGS. 18-19. A perspective view of the device 100 and the charging dock 1802 is shown in Fig. 18 (below left; annotated), with a simplified block diagram of the device and charging dock being shown in FIG. 19 (below right; annotated). *See id.*, 6:32-35.



As shown above, an “inductive power transmitter dock 1802 ... is configured to couple to and wirelessly transmit power to an inductive power receiver,” such as the watch device 100. *Id.*, 43:6-9. The charging of the device’s battery 114 is facilitated when “a bottom surface of the housing of the device 100 ... partially contact[s] a top surface of the dock housing.” *Id.*, 45:15-25. In particular, the “internal battery 114 is operably connected to a receive coil 1869 via power conditioning circuit 1810” and the receive coil further includes “one or more windings for inductively coupling with a transmit coil 1832 of the dock 1802.” *Id.*, 44:31-51. When the bottom surface of the housing of the device 100 (e.g., the rear cover) contacts the top surface of the dock housing, the “receive coil 1869” receives power from a transmit coil 1832 of the dock 1802 (where the power transfer is facilitated via “electromagnetic induction or magnetic resonance”) and “may pass the received power to [the] battery 114 ... via power conditioning circuit 1810.” *Id.*, 44:18-51, 45:15-25, 26:25-30. The ’491 Patent

further explains that “the transmit coil 1832” and the “receive coil 1869” could each be “shielded with a shield element” “disposed or formed around a portion of the” coil(s). *Id.*, 44:52-60.

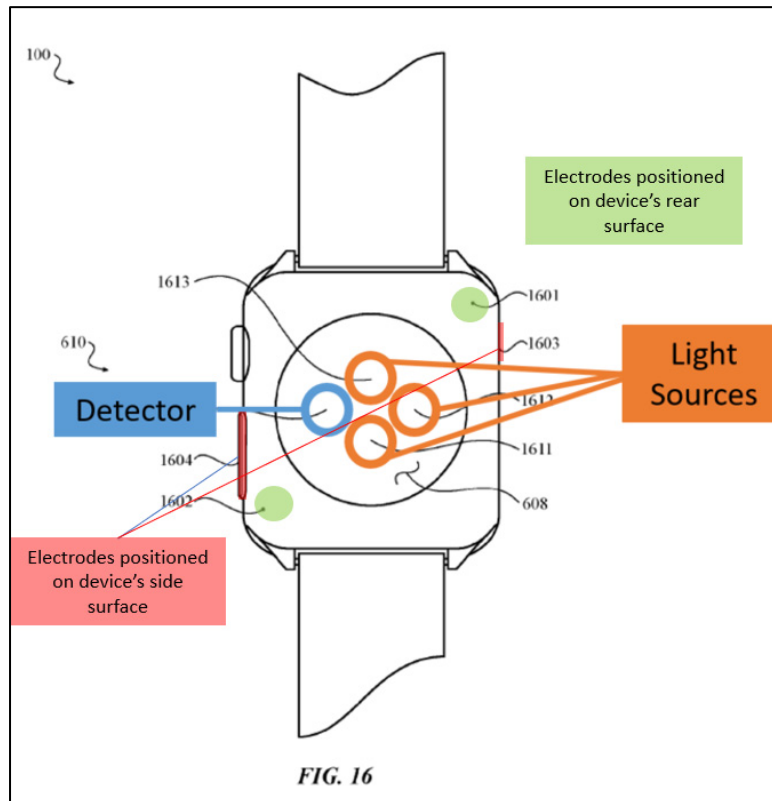
In addition to wireless charging, the device 100 can also facilitate biometric sensing using a “biosensor module” made up of “one or more sensors” that are “used to calculate a health metric,” such as “a heart rate, a respiration rate, blood oxygenation level, a blood volume estimate, blood pressure, or a combination thereof.” *Id.*, 37:49-58; 8:31-43, 13:27-45. The figure on the right shows an exploded view of an example embodiment of the wearable device, with “a biosensor module 710 ...



disposed in an opening formed in the rear surface of the housing 601.” *Id.*, Figs. 7-8, 28:7-29:17, 40:43-50.

In some embodiments, and as depicted in further detail with reference to FIG. 16, the “biosensor module 710 may include one or more light sources, one or more photodetectors, and one or more electrodes or conductive elements that are

configured to detect and measure a physiological condition or property of the user.” *Id.*, 38:23-38, 39:55-40:12, Fig. 16 (reproduced and annotated below).



The light sources 1611-1613 and the detector 1614 on the rear portion of the device “are configured to function as an optical sensor or sensors,” such as “a photoplethysmography (PPG) sensor or sensors.” *Id.*, 38:23-38.

Additionally, the device can include “one or more electrodes” (e.g., electrodes 1601 and 1602 in FIG. 16 above) that can be used to “measure electrical properties of the user’s body.” *Id.*, 13:37-42, 39:40-46. As shown above, “a first electrode 1601 and second electrode 1602 are disposed on the rear face of the device 100” that “make[s] contact with the skin of the user’s wrist when the device

is being worn” and “a third electrode 1603 and fourth electrode 1604 may be disposed along” sides “of the device body 610” that “come into contact with the skin of the user’s other hand (that is not wearing the device 100).” *Id.*, 39:40-54. “For example, the third 1603 and fourth 1604 electrodes may be contacted when the user pinches the device 100 between two digits (e.g., a forefinger and thumb).” *Id.*

“Using the electrodes of the device, various electrical measurements may be taken, which may be used to compute a health metric or other health-related information. By way of example, the electrodes may be used to detect electrical activity of the user's body. In some cases, the electrodes may be configured to detect electrical activity produced by the heart of the user to measure heart function or produce an electrocardiograph (ECG). As another example, the electrodes of the device may be used to detect and measure conductance of the body. In some cases, the measured conductance may be used to compute a galvanic skin response (GSR), which may be indicative of the user's emotional state or other physiological condition.” *Id.*, 39:63-40:12.

In some embodiments, the biosensor module (which integrates some or all the above-described biosensors) is “separate from and attached to the housing 601 of the device 100.” *Id.*, 40:43-50. For example, and as illustrated with respect to Figs. 7 and 16 (shown above), “the biosensors” can be “disposed relative to or

attached to a rear cover 608 that is formed from an optically transparent material and is configured to be positioned with the opening of the housing 601.” *Id.*

In this manner, the ’491 Patent provides a wearable device with different types of biometric sensing and wireless charging capabilities, and recites a specific configuration in which the (1) same rear cover of the device facilitates both wireless power transmission to the receive coil on the device 100 and optical signal transmission to/from the biosensor module and (2) multiple electrodes are positioned on the device’s housing that facilitate measurement of an electrocardiographic characteristic.

III. PROSECUTION HISTORY OF THE ’491 PATENT

The application for the ’491 Patent (App. No. 16/826,130) was filed on March 20, 2020. EX-1002, 1476-1480. This application claims priority to multiple applications, the earliest of which was filed on September 2, 2014. *See id.*; EX-1001, pp. 1-2; EX-2038, ¶¶62-67.

During prosecution, the Examiner issued an office action, rejecting the then-pending claims (pending claims 21-40) on multiple prior art-based grounds. EX-1002, 1119-1131. Specifically, the Examiner rejected the pending claims in view of multiple references, including Hong (EX-2020), Schmid (EX-2021), and Mistry (EX-2005). *See id.*, EX-1002, 1123-1127.

Applicant subsequently interviewed the Examiner, with the substance of the interview including a discussion of the cited prior art and Applicant's proposal to "define the dielectric cover serving as the point for wireless transfer of energy to recharge the electronic watch" in addition to the claim's existing feature regarding the cover also facilitating optical signal transmission. *See* EX-1002, 607-609. According to the Examiner, while "further search and consideration would be required," "[s]uch amendment would overcome the prior art of record." *Id.*, 607.

Consistent with the discussion during the interview, Applicant filed a response that included claim amendments reciting that the rear cover—which can be optically transparent or formed of a dielectric or non-conductive material—is configured to transmit/receive both optical signals and wireless power signals. *See* EX-1002, 593-603 (see amended claims 21, 28, and 35 that recite these features), 600 (memorializing interview discussion where the examiner "indicated that amendments similar to those presented herein would likely overcome the pending rejections"). This response and the claim amendments included therein resulted in allowance of the claims in the very next action. *See* EX-1002, 468-473, 10-12. The application subsequently issued as the '491 Patent on March 9, 2021. EX-1001, p. 1; EX-1002, 3.

IV. PERSON OF ORDINARY SKILL IN THE ART

Patent Owner contends that a person of ordinary skill in the art on or about the claimed priority date of the '491 Patent would have had at least a bachelor's degree in electrical engineering, mechanical engineering, biomedical engineering, computer engineering, physics, or a related field, and would have had at least two years of relevant work experience with capture and processing of data or information, including but not limited to physiological information, or equivalents thereof. EX-2038, ¶¶40-44, 3-19. Less work experience may be compensated by a higher level of education and vice versa. *Id.*

Petitioner proposes POSITA skill level requires “at least a bachelor’s degree in a discipline related to biomechanical devices, such as Mechanical Engineering, Biomedical Engineering, Electrical Engineering, Physics, Industrial Design, or an equivalent discipline, and at least three years of experience working with or developing electronic medical or consumer devices.” Petition, 7. The analysis presented herein remains unchanged even if this skill level is applied. EX-2038, ¶¶40-44.

V. CLAIM CONSTRUCTION

Petitioner proposed constructions for three claim phrases: (1) “non-conductive cover material,” (2) “defines at least one window,” and (3) “window defined.” Petition, 8-10; EX-2038, ¶¶68-72. With respect to the “non-conductive

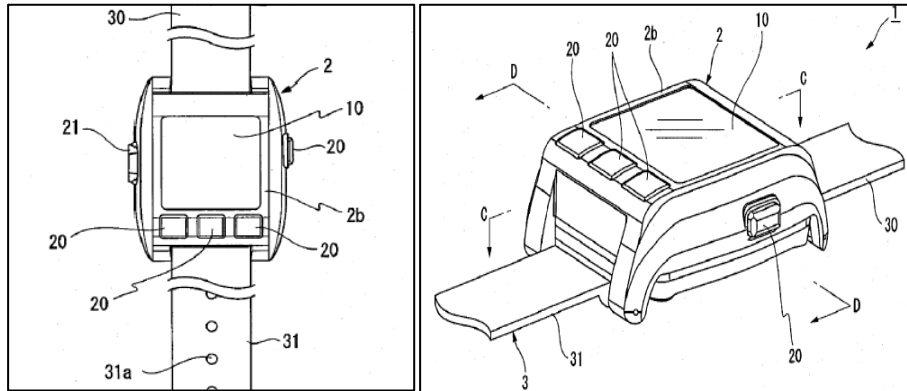
cover material” term, Petitioner contends that “a POSITA would have understood that glass and sapphire are electrically non-conductive, dielectric and optically transparent materials.” Petition, 8. With respect to the claim phrases “defines at least one window” and “window defined,” Petitioner contends that “to ‘define’ an opening simply means to allow passage of light to a relevant component through an opening” and that “[i]n the ’491 patent, the single rear cover 608 ‘defines’ multiple openings by allowing passage of light through the round portions labeled 1611–1614 in Fig. 16.” Petition, 9-10.

Patent Owner does not take a position as to Petitioner’s offered constructions for these phrases. Even applying these constructions, Petitioner has failed to demonstrate obviousness of the Challenged Claims.

VI. THE ASSERTED PRIOR ART

A. Kotanagi (EX-1005)

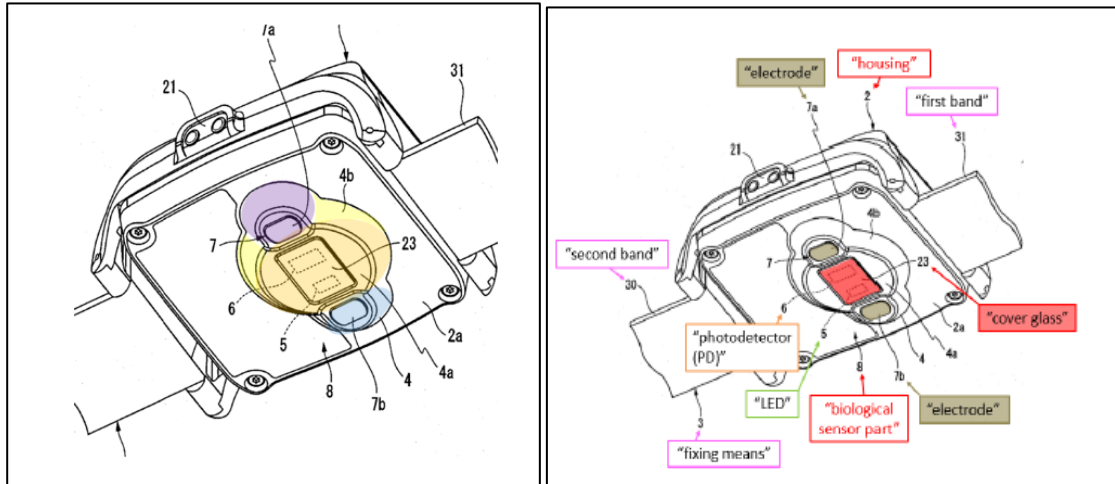
Kotanagi discloses a “biological information measuring device”—an example of which is shown in FIGS. 1-2 below—that is “capable of measuring biological information such as pulse rate while mounted to the wrist (arm).” EX-1005, ¶1, FIGS. 1-2; EX-2038, ¶¶73-89.



In “conventional” wrist-mounted devices, “movement of the user causes muscles to move” and “changes the thickness (diameter) of the wrist, which leads to the risk that a gap may be formed between” the device and the body surface. EX-1005, ¶4. “This diminishes adherence, which may prevent accurate biological information from being detected.” *Id.* Moreover, because such a device “is fixed to the wrist, the feeling of pressure on the wrist increases when attached by a band ... , which makes it difficult to wear for long periods of time.” *Id.*

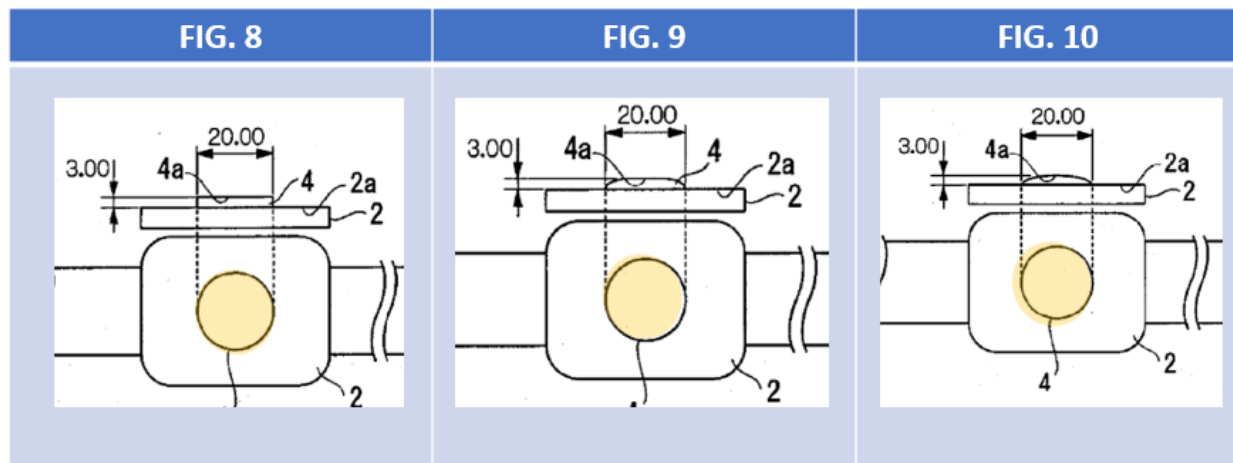
Kotanagi’s “invention” seeks to provide “a biological information measuring device which enhances adherence and can be worn for a long time without causing discomfort.” EX-1005, ¶5. To that end, and as shown below, Kotanagi’s device provides a protruding part 4 (highlight in the image below on the left) formed in the lower surface 2a of the device’s housing 2, with this protruding part including components (as shown in image below on the right) such as a “biological sensor part includ[ed] [in] a main body” of the device, “a light-emitting part,” “a light receiving part,” and “a contact detection part means for detecting whether the light-

emitting part and the light-receiving part are in contact with the living body surface.” EX-1005, ¶7.



As shown above (image on left), protruding part 4 “is formed into a shape combining three circles”—i.e., “by combining, with a central circle [yellow annotation, in figure above on the left], two circles having a smaller diameter than the central circle” (blue and purple annotations, in above figure on the left). EX-1005, ¶54.

Kotanagi also contemplates additional configurations for protruding part 4. For example, instead of forming the protruding part 4 by combining three circles, Kotanagi provides an example in FIGS. 8-10 (shown below) where protruding part 4 is formed “so that the outer periphery is circular” (i.e., formed of a single circle). EX-1005, ¶¶76-81, FIGS. 8-10.

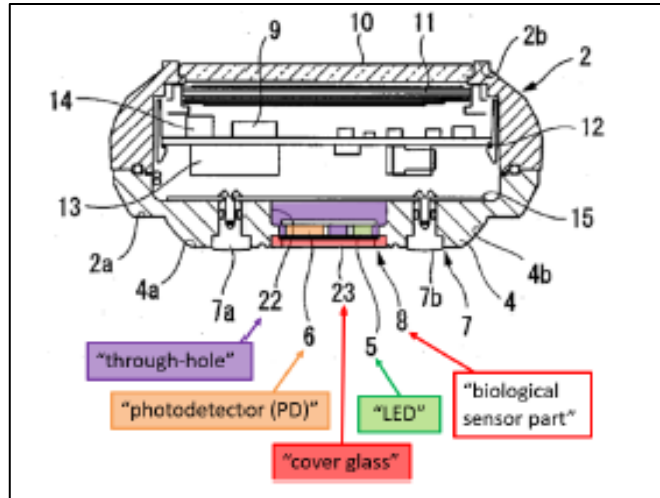


In these configurations of Kotanagi’s “invention,” a “diameter of the protruding part is set to not greater than 20 mm ... so the protruding part can be easily pressed against the living body surface with light force.” EX-1005, ¶¶36-37, 76-81; FIGS. 8-10 (annotated above).

Because the protruding part 4 “protrudes 2 to 4 mm from the lower surface of the main body,” Kotanagi explains that the protruding part (and by extension, the device) can be “reliably brought into contact” with the body surface. EX-1005, ¶¶28, 40. “Therefore, unlike in conventional configurations, it is unnecessary to fix the main body so as to strongly press (so as to compress) the main body against the living body surface with the fixing part. Accordingly, the device does not cause discomfort, even when worn for a long time. Moreover, since the adherence of the biological sensor part is enhanced, light can be emitted and received efficiently, and biological information can be detected with high precision.” EX-1005, ¶40.

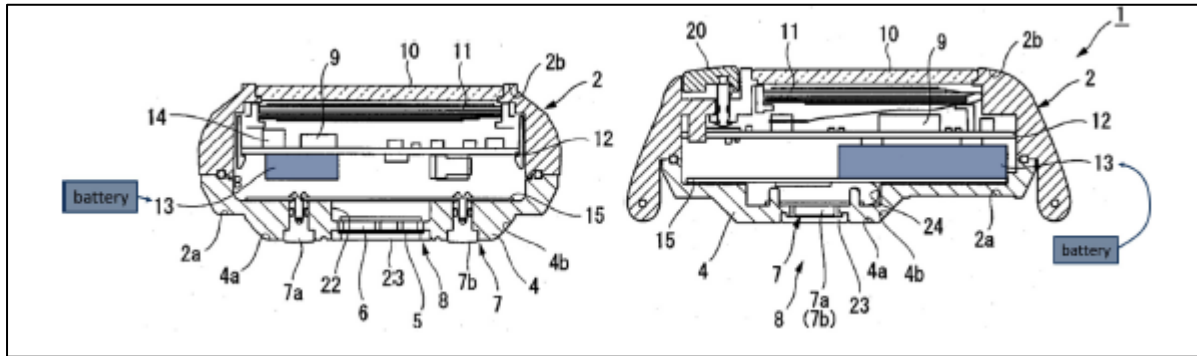
Within the protruding part 4, a biological sensor part 8, which includes a LED 5 and a photodetector (PD) 6, is provided. EX-1005, ¶46. As shown below, the biological sensor part 8 is “formed in the center of the lower surface 4a of the protruding part 4,” with the “LED 5 and the PD 6” being positioned in “the protruding part 4.” *Id.*, ¶¶55-56.

A cover glass 23 covers the through-hole 22 and the biological sensor part 8. EX-1005, ¶55, FIG. 7 (reproduced on right; annotated by Petitioner).



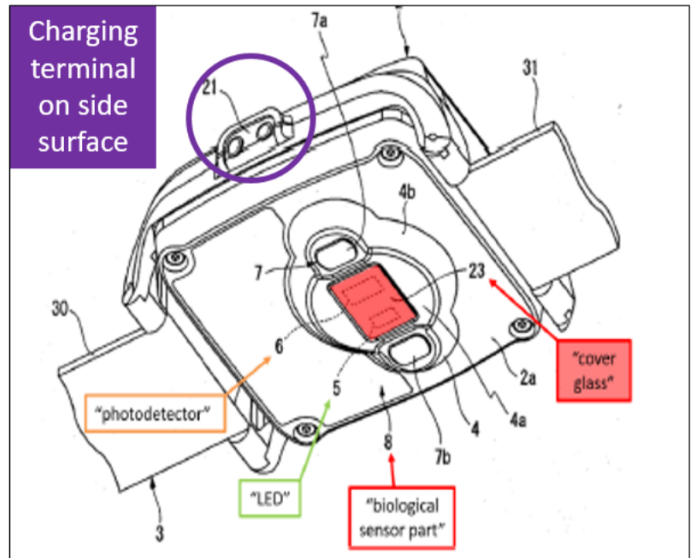
Additionally, electrodes 7a and 7b are also “disposed on the lower surface 4a of the protruding part 4 so as to sandwich the LED 5 and the PD 6.” *Id.*, ¶58. The electrodes are provided “so that the tips thereof protrude slightly more than lower surface 4a of the protruding part 4.” *Id.* The electrodes “detect[] whether there is contact with the living body surface” and when such contact is detected, the LED 5 “emit[s] light toward the ... body” and the PD 6 receives reflected light from the “body out of the light emitted by the LED 5” to generate “a pulse signal ... corresponding to the amount of received light.” *Id.*, ¶¶46, 58-59.

Kotanagi’s device further includes a battery 13 that powers up the device and its different subcomponents:



EX-1005, FIGS. 6-7 (annotated by Petitioner), ¶53. Kotanagi discloses that the battery 13 can be recharged “by supplying power from an external device such as a recharger.” *Id.*, ¶53; *see id.*, ¶72 (“the rechargeable battery 13 can be charged with power by connecting a recharging cord or the like connected to a recharger to the external connection terminal 21”). “In addition, rather than the external connection terminal 21,” Kotanagi contemplates that “a transformer or the like for supplying power to a recharger and to the inside of the housing 2 may be provided so as to recharge the rechargeable battery in a contactless state.” *Id.*, ¶53,

However, Kotanagi does not disclose how the rechargeable battery would be charged in the “contactless state” nor does it disclose the surface via which such charging would be performed. *See id.* The only positional reference for charging that Kotanagi provides is via the “side surface of the housing.” *Id.*,



¶53 (“an external connection terminal (recharging means) 21 for recharging the rechargeable battery 13 ... is provided on *the side surface of the housing 2*”), Fig. 5 (reproduced above; annotated by Patent Owner and Petitioner; showing connection terminal 21 for charging on the side surface of the device’s housing).

B. Honda (EX-1006)

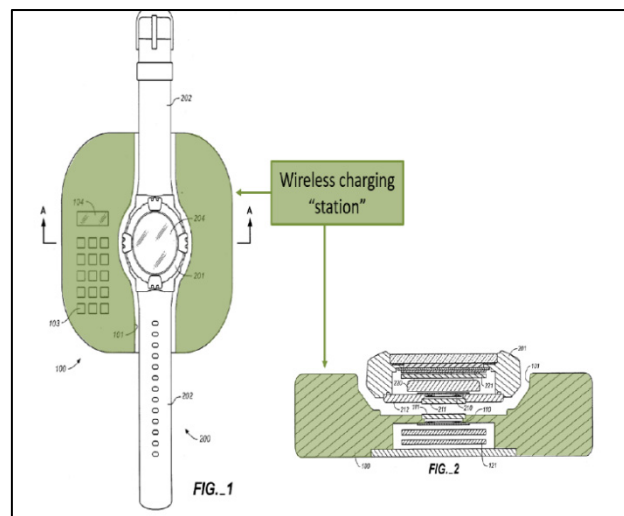
Honda provides an electronic apparatus (e.g., an electronic watch) that enables “efficiency of a power transmission from a charging unit to” the apparatus in a “non-contact” fashion. EX-1006, 1:5-16, 2:55-60; EX-2038, ¶¶90-99.

In particular, Honda seeks to overcome deficiencies in prior contactless charging implementations. First, Honda recognizes that, when the gap between charging coils in the receiver device (e.g., the electronic watch) and the

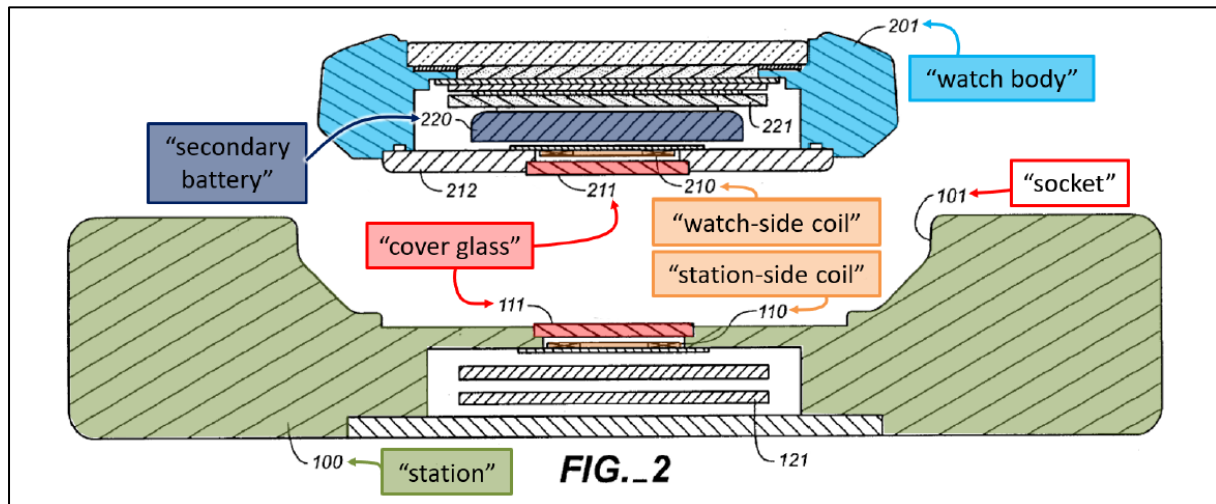
transmitting device (e.g., the charger) “is increased,” “the degree of magnetic coupling weakens, substantially reducing the charging current to the secondary battery for charging.” *Id.*, 2:39-44. Second, Honda recognizes that metal materials in the housing can create eddy currents, which in turn can “weaken[] the electromagnetic coupling” between the charging coils and limit the quick charging of the device’s battery. *Id.*, 2:44-52, 13:25-32.

Honda seeks to address these problems, with one of its goals being to enable “quick” and “efficient” charging of the device’s battery. *Id.*, 2:55-60. To that end, Honda discloses “an electronic apparatus” that “includes a first device and a second device, which perform a power transmission ... through the electromagnetic coupling of coils which are arranged in mutually facing positions in the respective devices,” where the relative inner and outer diameters of coils in the first and second devices can vary by certain predetermined amounts without affecting charge efficiency. *See id.*, 2:66-4:26.

As shown in Figs. 1 and 2 (reproduced on right; annotated by Petitioner), an electronic watch 200 is shown seated in a socket 101 of a station 100 to facilitate a charging operation. *Id.*, 6:4-11.



An expanded version of FIG. 2 is reproduced below and provides a sectional view of the watch 200 shown in FIG. 1. *Id.*, 6:21-22, FIG. 2 (annotated by Petitioner).



As shown, “a watch-side coil 210 for ... battery charging is arranged in a case back 212 of the watch body 201 and is covered with a cover glass 211. The watch body 201 includes a circuit board 221, connected to a secondary battery 220 and a watch-side coil 210.” EX-1006, 6:22-27. In the charging station 100, a station-side coil 110 is arranged in the portion of the socket 101” that faces “the watch-side coil 210, and is covered with a cover glass 111.” *Id.*, 6:28-35. “The station 100 includes a circuit board 121, to which the station-side coil 110, the input section 103, the display section 104, and a primary power source (unshown) are connected.” *Id.*

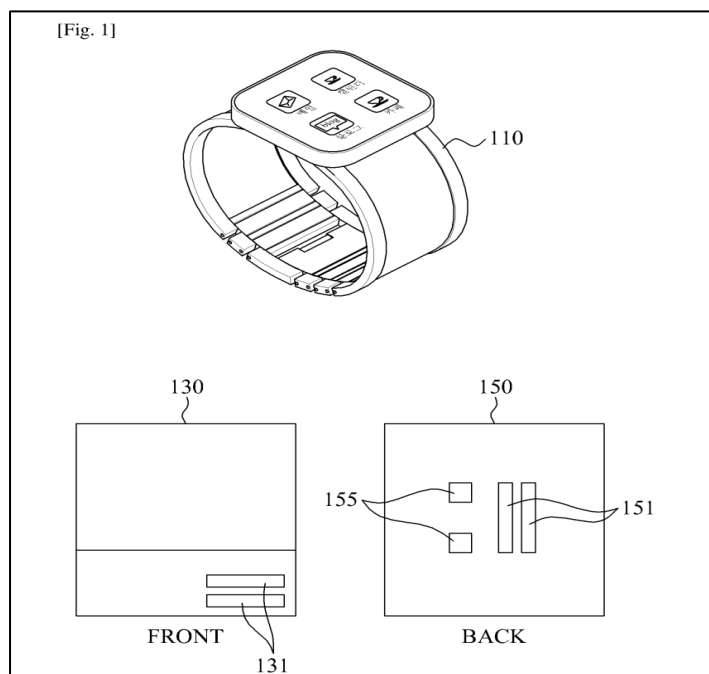
“When the electronic watch 200 is placed onto the station 100, the station-side coil 110 and the watch-side coil 210 are physically out of contact with each other, but magnetically coupled with each other because the surfaces of coil winding of both coils are generally ... parallel to each other.” *Id.*, 6:36-40. Honda also teaches that the “station side coil 110 and the watch side coil are of an air-core type without any core, to limit the magnetization of a watch mechanism, to avoid an increase in the weight of the watch, and to prevent the exposure of a magnetic metal.” *Id.*, 6:41-49.

Additionally, to reduce the charging inefficiencies stemming from the use of metal materials in the device’s housing, Honda contemplates “the use of an insulating material,” such as glass, for “the external housing” that “results in a transmission efficiency ten times as high as the one achieved by a stainless steel product.” *Id.*, 13:45-48, FIG. 15 (and associated description). Honda, however, recognizes that transparent glass covers are “not preferred from the aesthetic point of view” and “electronic components are subject to deterioration by light, particularly by ultraviolet lights.” *Id.*, 13:53-67. To “resolve these problems,” Honda teaches that the inner surface of the glass includes a “deposited surface,” “coat[ing] with a plated surface, a printed surface, or foiled surface” or the glass may be “colored with a pigment.” *Id.*, 13:59-64.

In addition to its charging capabilities and associated descriptions, Honda additionally discloses that the watch 200 “detects biological information including the pulse rate or the heart rate of the body through an unshown sensor and stores it.” *Id.*, 6:17-20, 8:40-42. Honda, however, does not explain where the “unshown sensor” would be provided or positioned in the device, nor does it disclose or suggest such an “unshown sensor” would facilitate transmission of biometric signals through the rear cover/opening in the described device. *See id.*

C. Choi (EX-1011)

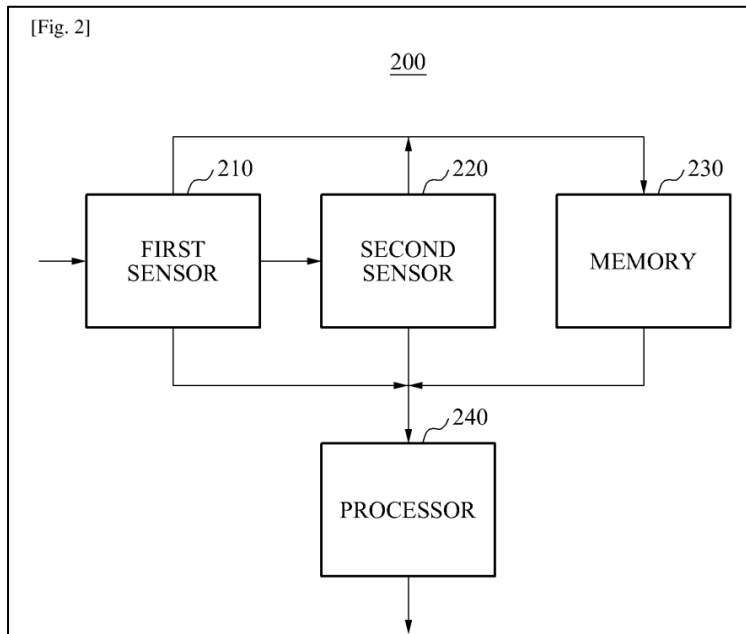
Choi relates “to a wearable device performing user authentication using biosignals.” EX-1011, [1]; EX-2038, ¶¶100-116. An example of Choi’s wearable device is shown below (*id.*, FIG. 1):



As shown, the wearable device includes multiple sensors 131, 151, and 155 provided on the device's front surface 130 and the back surface 150, respectively. EX-1011, [43]-[44]. The wearable device detects, "using at least one of the sensors 131, 151, and 155," a trigger signal. *Id.*, [45]. The trigger signal is generated when the user performs a predetermined gesture, such as, "opening a hand, clenching a fist, rotating a wrist, and/or other gestures known to one of ordinary skill in the art." *Id.*, [45]-[46], [49]. "When the trigger signal is detected," the wearable device initiates the process of the user authentication. *Id.*, [45]-[50].

Once the user authentication process is initiated, "the wearable device may authenticate the user, using a second biosignal detected by the sensor 131 provided on the front surface 130 and/or the sensor 151 provided on the back surface 150. *Id.*, [47], [51]-[52]. "The second biosignal may be unique to each user, and be distinguished from the first biosignal" and can include, e.g., an electrocardiogram (ECG) signal, a photoplethysmogram (PPG) signal, a voice of the user, and/or an impedance signal generated by a body of the user." *Id.*, [47], [52], [54]-[56].

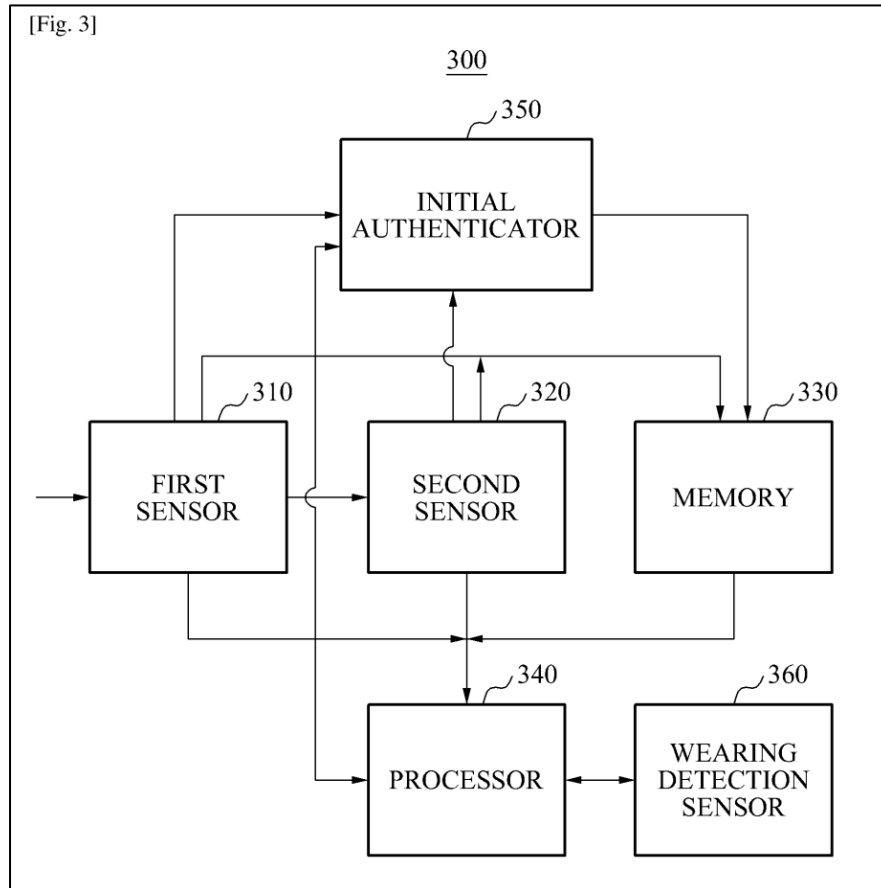
Choi's FIG. 2, which is reproduced below, provides a block diagram of the wearable device:



As shown, the wearable device 200 includes a first sensor 210, a second sensor 220, a memory 230, and a processor 240. *Id.*, [53]. “The first sensor 210 detects a first biosignal generated in response to a gesture performed by a user,” and the “second sensor 220 detects a second biosignal of the user,” which includes, e.g., an ECG signal, a PPG signal, a voice of the user, and/or an impedance signal generated by the body of the user.” *Id.*, [54]-[56].

“The processor 240 determines, by referring to the memory 230, whether the first biosignal detected by the first sensor 210 corresponds to the information stored in the memory 230, and initiates a process of user authentication when the first biosignal corresponds to the stored information. The processor 240 authenticates the user by comparing the second biosignal detected by the second sensor 220 to the information stored in the memory 230.” *Id.*, [60].

Choi provides “another example” (*id.*, [62]) of a block diagram of the wearable device, as shown below:



This embodiment includes the same components as described and shown with reference to FIG. 2 (*id.*, [73]), and further includes an initial authenticator 350 and a wearing detection sensor 360. *See id.*, FIG. 3, [67]-[70]. “The initial authenticator 350 receives a gesture and/or a first biosignal and a second biosignal from the user through the first sensor 310 and the second sensor 320, respectively, to set up an initial authentication.” *Id.*, [67]. “The initial authenticator 350 stores,

in the memory 330, the first biosignal corresponding to the input gesture and the second biosignal.” *Id.*

“The wearing detection sensor 360 detects whether the wearable device 300 is detached from the user. The wearing detection sensor 360 may detect a mechanical movement of a band attached to a portion of a body of the user, by being connected to the wearable device 300, or may detect an electrical signal generated in association with attaching and detaching of the band.” *Id.*, [68]-[69].

“For example, the wearing detection sensor 360 may detect a change in which tension or elasticity of the band attached to a wrist of the user increases or decreases. Also, the wearing detection sensor 360 may detect a change in an amount of light detected by a light receiving unit of a photo sensor attached to a back of the wearable device 300, and may detect a change in which an electrical signal or an impedance signal is intensified or weakened when a contact point between the wearing detection sensor 360 and a skin appears or disappears due to the attaching or detaching of the band. Further, the wearing detection sensor 360 may include various sensors that may detect whether the wearable device 300 is worn or not, and may deliver changes detected by the sensors to the processor 340.” *Id.*, [69].

Based on the signal received from the wearing detection sensor, the processor 340 controls whether the user authentication is invalid. *Id.*, [69]-[70].

When the wearing detection sensor is provided with a sensor detecting a change of impedance, the wearable device determines whether the wearable device is detached from the user based on the change of the impedance. *Id.*, [98]-[99].

When the wearable device determines that the wearable device is detached from the user (based on a value of the impedance input to the wearable device being greater than a predetermined level or is changed to be less than the predetermined level), the wearable device controls user authentication to be invalid. *Id.*, [99]-[101]. In this case, “a usage right assigned to the user through the process of the user authentication that is performed when the user wears the wearable device 300 is withdrawn or nullified” and the “user would need to obtain the usage right” “through the process of the user authentication that is performed again when the user resumes wearing the wearable device 300.” *Id.*, [70], [102].

On the other hand, when the wearable device determines that the wearable device is attached to the user (based on “a value of the impedance input to the wearable device” remaining “at the predetermined level” or “increase[ing] to be [at] the predetermined level”), the wearable device controls the user authentication to be maintained. *See id.*, [70], [100]-[104].

In summary, Choi discloses a first sensor for detecting a first biosignal to trigger a user authentication process and a second sensor for detecting a second, different biosignal for authenticating the user. *Id.*, Abstract. Choi further discloses

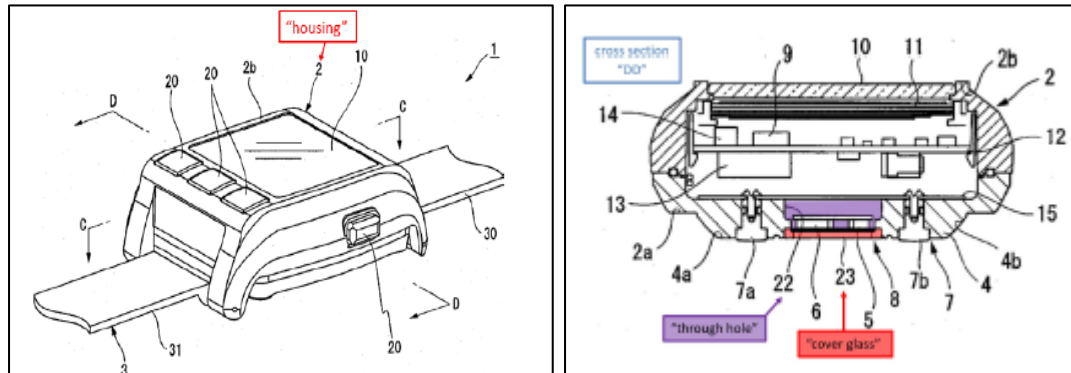
an embodiment in which an additional, “wearing detection sensor” is provided, that detects whether the device is attached to the user, based on which the device controls whether the previous user authentication is valid. *Id.*, [98]-[104], [68]-[70].

VII. THE PROPOSED KOTANAGI-HONDA COMBINATION DOES NOT RENDER OBVIOUS INDEPENDENT CLAIM 7

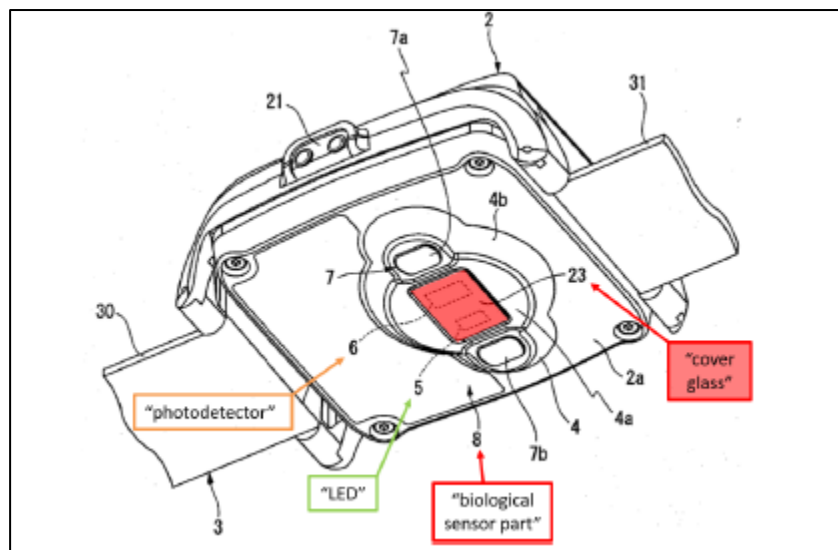
Claim 7 recites a “housing formed from a conductive material and defining a first opening opposite to a second opening,” with a “cover comprising a non-conductive material positioned over the second opening” and with “a biosensor module” and “wireless charging receive coil” positioned/aligned “below the cover.” The claim further recites that (1) the “biosensor module” is “configured to pass an optical signal through a window defined within the non-conductive material of the cover,” and (2) the “wireless charging receive coil” is “configured to inductively couple to an external wireless charging device through the non-conductive material of the cover.” EX-2038, ¶¶117-118.

Petitioner alleges that (1) the claimed “housing” maps to a metal housing of Kotanagi’s device (Petition, 16-17), (2) the claimed “second opening” maps to the “through-hole 22” in the rear portion of Kotanagi’s device (Petition, 16), and (3) the claimed “cover” maps to Kotanagi’s cover glass 23 that is positioned over the

through-hole 22 (Petition, 18-19). *See* EX-1005, FIG. 5 and 7 (reproduced below; annotated by Petitioner). EX-2038, ¶¶119-121.

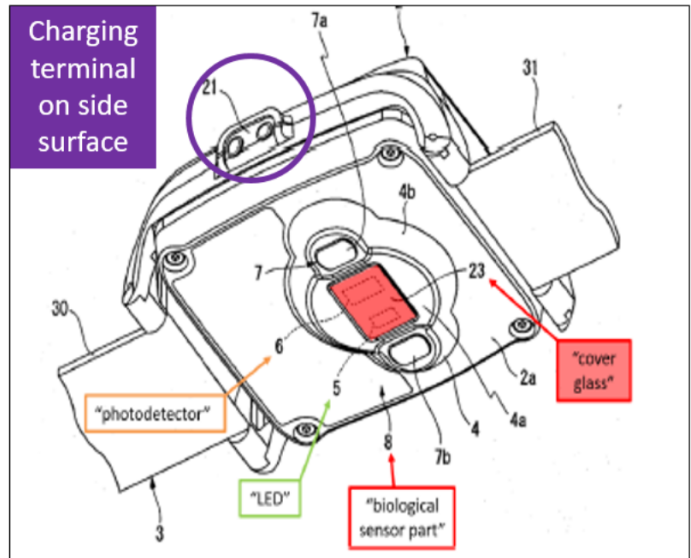


Petitioner further alleges that optical signals pass “through the cover glass” and to the LED 5 and photodetector 6 (the alleged “biosensor module”). Petition, 20-21; EX-1005, Fig. 5 (reproduced below; annotated by Petitioner).



Even if Kotanagi’s disclosure of battery recharging in a “contactless state” is interpreted as suggesting wireless charging (*see* EX-1005, ¶53), Kotanagi does not disclose where any alleged wireless charge receiving coil would be positioned in

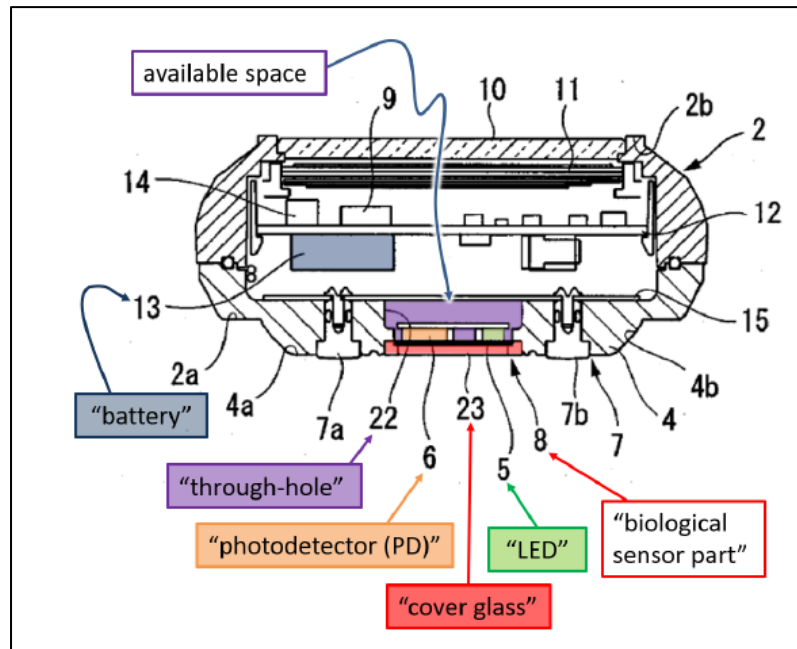
the device nor does Kotanagi disclose that wireless power could or would pass through rear cover glass 23 (i.e., the alleged cover). EX-2038, ¶¶122-123. Indeed, the only positional reference for charging in Kotanagi is in the context of its disclosure of wired charging via the “side surface of the housing”



EX-1005, ¶53 (“an external connection terminal (recharging means) 21 for recharging the rechargeable battery 13 ... is provided on *the side surface of the housing 2*”), Fig. 5 (reproduced above; annotated by Patent Owner and Petitioner; showing connection terminal 21 for charging on the side surface of the device’s housing); EX-2038, ¶123.

Recognizing this deficiency, Petitioner turns to Honda’s teachings and argues that Kotanagi’s device based on these teachings would have led a POSITA to modify Kotanagi’s device to enable wireless power transmission through Kotanagi’s cover glass 23 to a device-side wireless charge receiving coil. See Petition, 22-30. Petitioner further contends that a POSITA would have found it obvious to include Honda’s wireless charge receiving coil within certain allegedly “available space” of through hole 22 that is “behind and around the outside of the

other listed components” shown there (as shown below)—thus allegedly resulting in “magnetic flux [that] would pass through the cover glass....” *See id.*



Petition, 24-25 (citing EX-1005, Fig. 7 (annotated by Petitioner)).

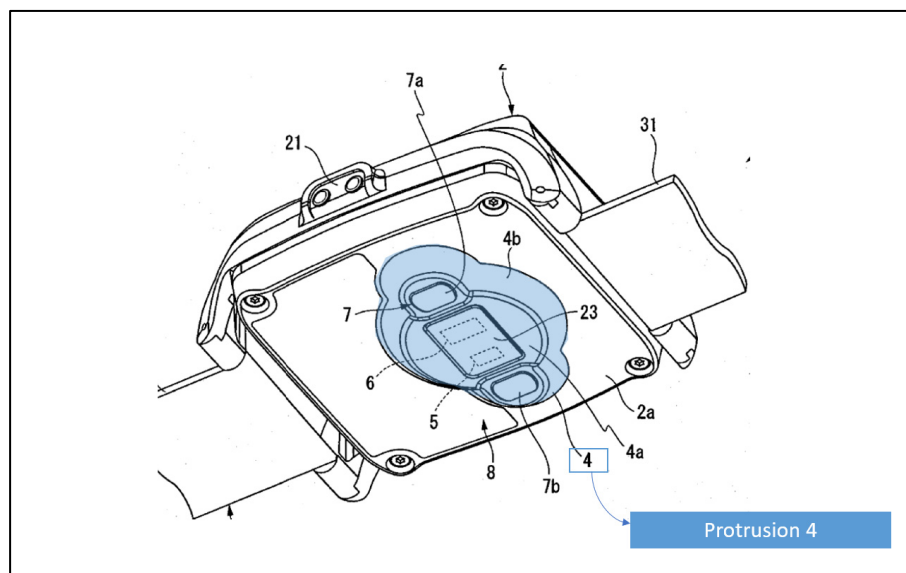
This argument is flawed in multiple respects and ignores critical teachings of Kotanagi and Honda that not only preclude the combination proposed by Petitioner but would have counseled against it. EX-2038, ¶¶124-125. As explained below, Kotanagi imposes size restrictions on the protruding part 4 (to which rear cover glass 23 is fixed, with the cover glass 23 covering through hole 22), which in turn limits the size and positioning of the wireless charging receive coil in a manner that is contrary to Honda’s teachings and its stated goals and purpose of achieving quick and efficient wireless charging. EX-2038, ¶¶126-127. A POSITA would

have therefore not been motivated nor would have a reasonable expectation of success in providing a size-limited wireless charging receive coil in the allegedly available space in Kotanagi's device, particularly given the substantial additional detrimental impact to wireless charging stemming from the significant increase in distance between the transmit and receive coils, and power transfer reducing eddy currents and magnetization from metallic materials between the coils—as Petitioner's combination demands. *Id.*

In view of the above-described issues in Petitioner's proposed configuration, Petitioner has failed to demonstrate that a POSITA would have configured the device in this manner—particularly when considering that the POSITA would have been aware of other well-known and actually functioning configurations of biometric sensing and wireless charging devices (as corroborated by the Fraser reference), which Petitioner recognizes would have been available to a POSITA (*see* Petition, 28-30) and which provide a large wireless charging receive coil around optical elements within the device housing and thereby avoid the detrimental impact to wireless charging that Petitioner's combination injects. EX-2038, ¶128. On this record, Petitioner has failed to demonstrate that a POSITA would have configured the device in the proposed manner when considering the detrimental issues stemming from the proposed configuration and in the face of a substantially better alternative configuration that would avoid these issues. *Id.*

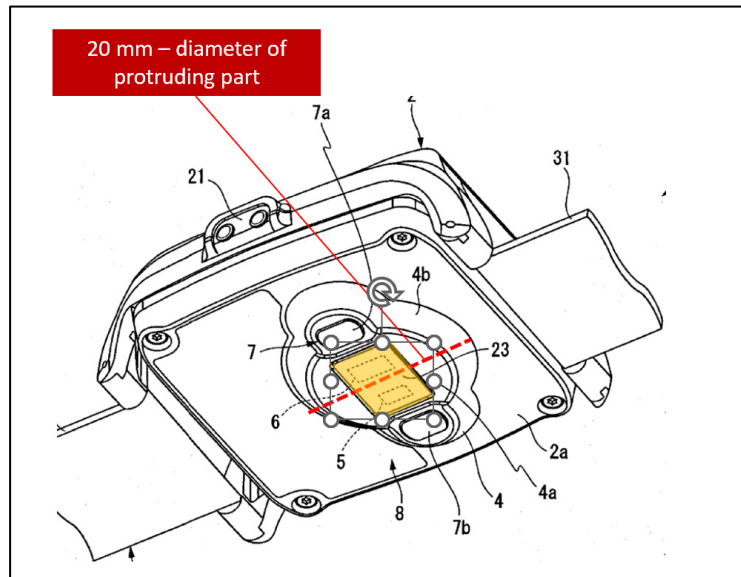
A. *Petitioner ignores the physical restrictions imposed by Kotanagi on its rear protruding part 4 that would limit the size and positioning of the alleged wireless charging receive coil*

Kotanagi sets an upper bound on the diameter of the protruding part 4 shown on the rear surface of its device (annotated in blue below in FIG. 5). EX-2038, ¶¶129-130.



Specifically, Kotanagi states that the device “*according to [its] ... invention*” has a diameter of its protruding part 4 “set to *not greater than* 20 mm.” EX-1005, ¶¶36-37 (emphasis added) (disclosing use of this diameter “so the protruding part can be easily pressed against the living body surface with a light force”), 76-77; EX-2038, ¶¶129-130. Kotanagi’s Fig. 5, which is reproduced below, has been annotated using a red dashed line to show the 20 mm diameter of protruding part 4’s outer periphery, and further shows cover glass 23 (annotated in

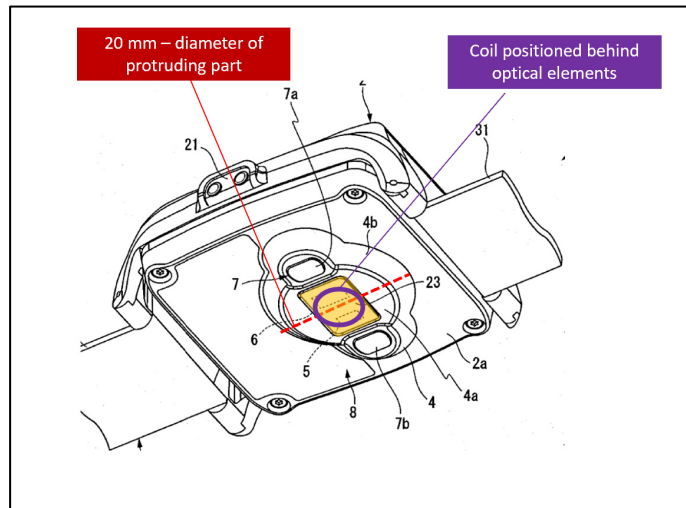
orange) positioned within protruding part 4. *See also* EX-1005, FIGS. 8-10 (showing 20 mm diameter of outer periphery of protruding part 4); EX-2038, ¶131.



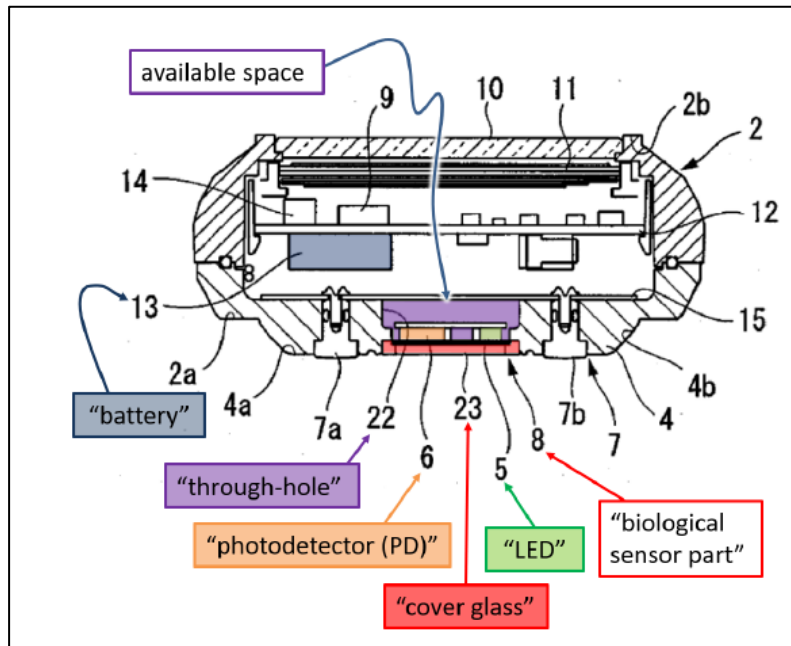
As shown above, the rectangular cover glass 23 (orange) has a width that is roughly half or less than half (~10 mm or less) of the diameter of the protruding part's diameter. EX-2038, ¶132. Petitioner contends that the coil would be provided in the "available space" of through hole 22 behind cover glass 23, so as to allow wireless "power to pass through" Kotanagi's cover glass 23 (the alleged "cover"). Petition, 22-30; EX-2039, 47:21-48:6 (testifying that the charging coil in the proposed combination would be provided entirely behind the cover glass 23), 26:19-27:7, 51:20-52:8, 55:20-56:7, 42:5-10, 47:21-48:6; EX-2038, ¶133.

A POSITA would have thus understood that, for Honda's wireless charging receiving coil to fit within the available space behind cover glass 23, the coil would

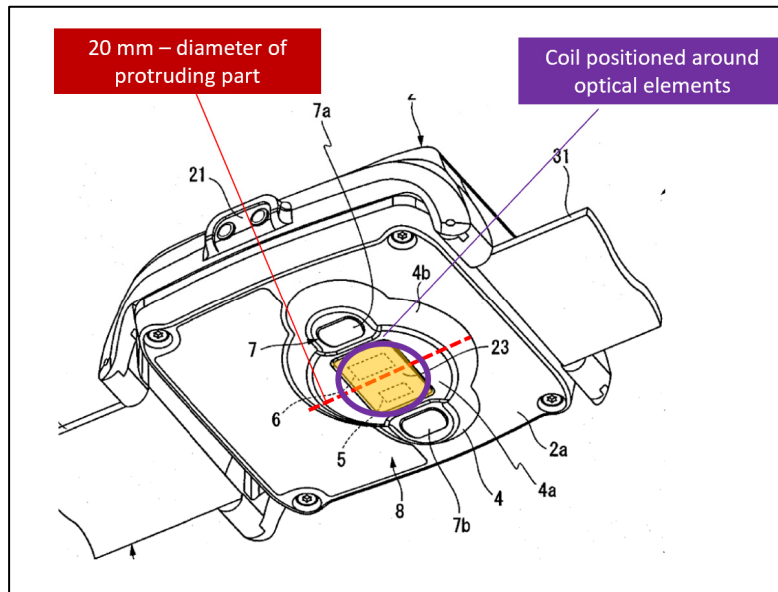
have a diameter no greater than the width of the rectangular cover glass (~10 mm; contemplated coil shown below in purple). EX-2038, ¶134.



Additionally, as Petitioner proposes, the coil would be positioned behind the optical elements and the flexible board 24 to which they are affixed (EX-1005, ¶¶55-57; Petition, 24), so as not to overlie (and thereby interfere) with the optical transmission path of the LED 5 and PD 6 (referred to herein as the optical elements). EX-2038, ¶135. Indeed, Kotanagi explains the importance of these optical elements being positioned so as to “touch the inside of the glass cover 23” and in doing so, being “as close to the living body surface ... as possible.” EX-1005, ¶55; EX-2038 ¶¶135-138.



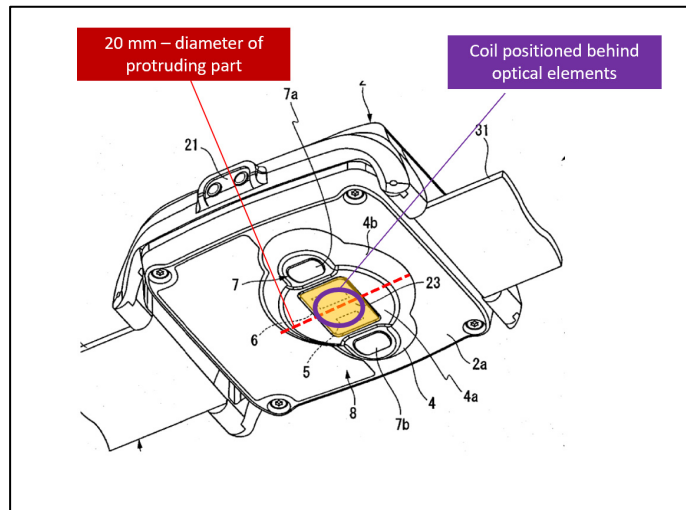
Petitioner argues in the alternative that the coil could also be positioned “behind the cover glass, surrounding the LED and PD;” however, in such a configuration, the coil would need to have a relatively larger diameter to encircle the optical elements. Petition, 24-25. Indeed, as shown below, in such a configuration, the coil would extend into the protruding part 4 lower surface 4a beyond cover glass 23. *Id.*



As explained below, a POSITA would not have been motivated nor would have had a reasonable expectation of success in implementing the proposed combination in either of these configurations. EX-2038, ¶¶139-140.

B. A POSITA would have avoided the significant wireless charging degradation that occurs from positioning the wireless charging receive coil behind Kotanagi's optical elements

As explained above (*see* §VII.A *supra*), Kotanagi imposes a size restriction on the protruding part 4 formed in the rear portion of its device, within which the cover glass 23 is positioned over the through hole 22. EX-2038, ¶141. Despite this size restriction, Petitioner's proposed combination positions the wireless charging receive coil behind the optical elements and the flexible board to which these elements are affixed, as explained above (*see* §VII.A *supra*). *See id.*



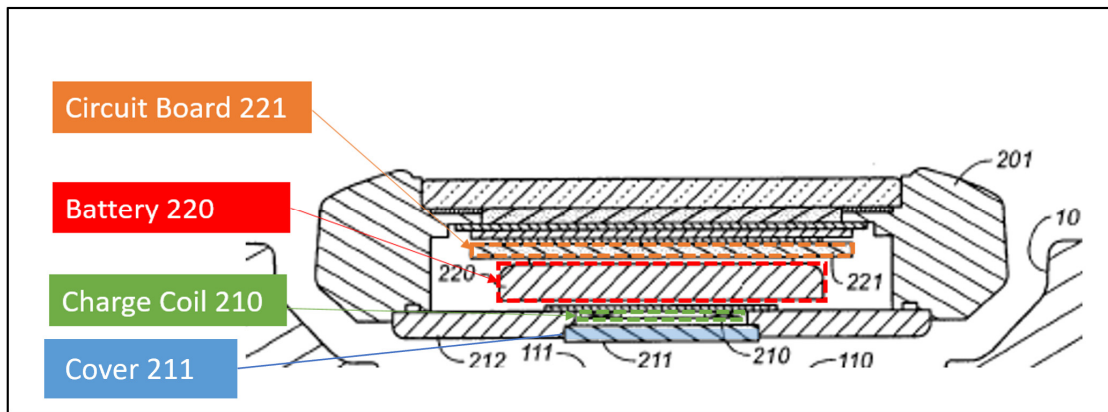
Petitioner’s proposal to implement a wireless charging receive coil in the allegedly available space in Kotanagi’s device would frustrate Honda’s goals and intended purpose. EX-2038, ¶142. Specifically, Honda’s express goals and intended purpose are to enable “quick” and “efficien[t]” wireless charging by reducing distance between wireless charging coils and avoiding magnetic field-degrading materials in the transmission path between the coils. EX-1006, 2:30-3:8, 6:41-45, 13: 3-52, 5:9-15, FIGS. 14-15; *see id.*, 3:9-4:32; EX-2038, ¶142.

However, as explained below, Petitioner’s proposed configuration (1) limits the size of the wireless charging receive coil—which has a direct impact on wireless power transmission strength, and (2) introduces distance and metallic materials in the transmission path between the wireless charging receive coil and the wireless charging transmit coil—thereby significantly degrading wireless

charging efficiency of the already-limited wireless charging receive coil in precisely the manner that Honda seeks to avoid. EX-2038, ¶143.

First, Petitioner’s proposed configuration frustrates Honda’s stated goal of quick and efficient charging achieved by reducing the space between the charging receive and transmit coils. *See* EX-1006, 2:38-43, 2:55-60 (explaining that, as gap between coils is increased, “the degree of magnetic coupling weakens, substantially reducing the charging current to the secondary battery”), 13:3-54, 5:9-15, FIGS. 14-15 and associated description; EX-2038, ¶144. Indeed, Honda recognizes that, as the distance between the coils decreases, the “transmission efficiency increases in accordance with a quadratic curve.” EX-1006, 13:14-16. In fact, “*at a distance of 3 mm or less*” between the transmit and receive coils, Honda teaches that the “transmission efficiency is approximately *100 times* the one in the conventional art having *a distance of 5 mm.*” *Id.*, 13:17-19, FIG. 14; EX-2038, ¶¶145-151.

A POSITA would have therefore recognized that Honda achieves this high charging efficiency by positioning the wireless charging receive coil (in the wrist-worn device) directly adjacent to the cover glass, as shown below:



See EX-1006, Fig. 2 (annotated; showing Honda's watch embodiment with its wireless charging receive coil (green annotation) positioned directly adjacent to the watch's cover 211 (blue annotation)); FIGS. 14-15 and associated text (describing transmission efficiency in view of materials between coils, when distance between coils is 3 mm); EX-2038, ¶¶145-151.

Yet, Petitioner's configuration calls for the wireless charging receive coil to be positioned spaced away from cover glass 23 with optical elements and a flexible board 24 present therebetween—thus demanding precisely the increased spacing that Honda expressly seeks to avoid. See EX-1006, 2:38-43, 2:55-60, 13:3-64, FIGS. 14-15; EX-2038, ¶¶145-151 (explaining that, per Honda, adding just 2 mm of additional spacing causes a 100 times reduction in charging efficiency); *see also id.*; EX-2040, p. 42; EX-2041, p. 2; EX-2042, 5.

Second, positioning Honda's wireless charging receive coil behind Kotanagi's optical elements and the flexible board is contrary to Honda's goal of quick and efficient power transmission because such a configuration would inject

the very types of noise and interference that Honda expressly seeks to avoid. EX-2038, ¶152. Honda teaches that use of metal materials between the transmitting and receiving coils, gives rise to eddy currents, which reduce charging efficiency. *See* EX-1006, 2:48-59 (“eddy currents take place in the electrically conductive metal material, weakening the electromagnetic coupling”), 13:25-32; EX-2038, ¶131. Indeed, even Petitioner expressly acknowledges Honda’s teaching of metal being “inferior for power transmission due to, e.g., eddy currents.” Petition, 26-27 (citing same); EX-2039, 28:17-20, 30:20-32:1.

This is precisely why Honda seeks to provide glass for its rear cover, and a POSITA would have recognized that this is also why Honda contemplates air-core type coils (i.e., coils “without any core”) given that such coreless coils “limit the magnetization of a watch mechanism ... and ... prevent the exposure of a magnetic metal.” EX-1006, 6:41-46; EX-2038, ¶¶153-154, 187-188. Thus, to achieve its goal of quick and efficient charging, a POSITA would have recognized that Honda seeks to reduce eddy currents and magnetization from metallic materials in the transmission path between the receive and transmit coils. *See id.*

However, a POSITA would have recognized that Kotanagi’s optical elements and the board to which they are connected (EX-1005, ¶¶55-56) —behind which the coil would be positioned in the proposed combination—are typically made of metal-based materials. EX-2038, ¶155; *see* EX-2033, Abstract, ¶¶11, 23-

25, 29 (corroborating that light emitting diode (LED) is made from metal-based materials, including among other components, “a metal substrate,” “a metal layer,” “a mirror layer,” and “electrode[s]”); EX-2034, ¶¶24, 25, 27, 29 (describing use of metal in LEDs, where the LED includes semiconductor layers, electrodes, metal-based carriers, and a reflective layer made of metal); EX-2035, ¶¶14-15, 29-30 (describing a photodetector that, includes among other components, “a metal layer,” a photodiode having a semiconductor region, and an electrode); EX-2036, ¶¶1-2, 21-22, 79, 82, 84 (describing a photodetector for portable communication tools as including semiconductor elements and electrodes made of, at least in part, metal); EX-2037, 3:37-42, 4:6-17, 4:28-32 (describing components of the LED, including electrodes made at least in part of metal, and a metal-based reflector).

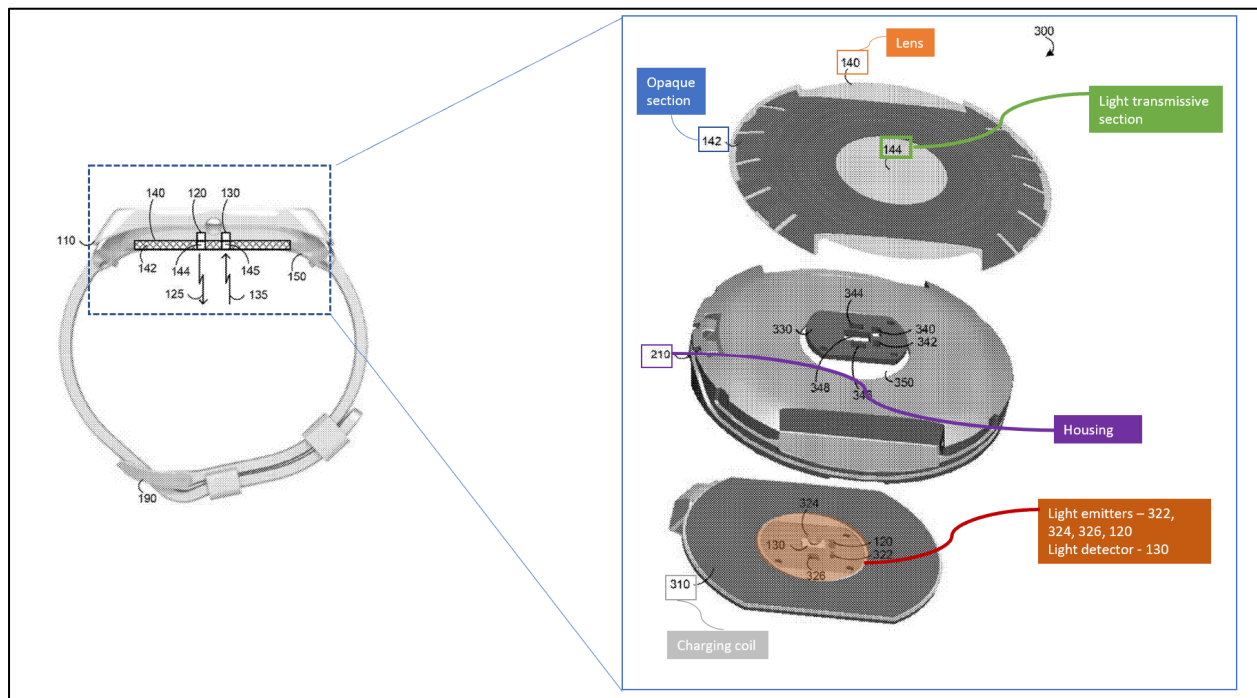
Thus, positioning elements made of such materials between the transmit and receive coils, per Petitioner’s proposed combination, significantly reduces charging efficiency and would be counter to Honda’s teachings and express goals of achieving “quick” and “efficien[t]” wireless charging by avoiding metallic materials in the wireless power transmission path and added spacing between coils. *See* EX-1006, 2:38-43, 2:55-60, 13:3-54, FIGS. 14-15; EX-2038, ¶156.

C. A POSITA would have turned to other actually functioning wireless charging configurations to avoid the signal degradation issues in Petitioner's proposed configuration

Given the above-described degradations in wireless signal transmission, a POSITA would not contemplate or concoct Petitioner's proposed configuration—particularly when the POSITA would have known of other actually functioning configurations of wireless charging coils and optical elements in rear portions of wrist-worn devices that counteract these very issues that Honda seeks to avoid or mitigate. EX-2038, ¶157.

As explained further below, a POSITA would have been aware of a wrist-worn device—such as the device disclosed in Fraser—that implements a larger wireless charging receive coil covering a substantial portion of the rear watch surface and in doing so, counteracts the signal degradations that come from interposing materials and/or spacing between the wireless charging receive and transmit coils (as Petitioner's proposed configuration demands). EX-2038, ¶158. And yet, if Kotanagi's device were configured to have a larger coil that extends beyond the cover to overlie the rear housing surface in Kotanagi, any inductive-coupling and associated wireless power transmission that occurs, as the claim requires in view of the intrinsic record, would occur through the rear housing surface and not the cover. EX-2038, ¶159.

In more detail, a POSITA in the relevant timeframe would have been confronted with devices, such as those disclosed by Fraser, which provide wireless charging and biometric sensing capabilities, and describes an express configuration of wireless charging coil and optical elements in its device to enable these capabilities. EX-2038, ¶¶160-161; EX-1041, FIGS. 1, 3, ¶¶24-30. A side view and a corresponding exploded view of Fraser's device is provided below (EX-1041, FIGS. 1 and 3 annotated below):



As shown in the exploded view (on the right), Fraser's device includes a lens 140 making up the device's rear surface that is directly adjacent to the wearer's wrist/body. EX-1041, ¶¶24-25, FIG. 3. This lens 140 includes an opaque section 142 and a light transmissive section 144. *Id.* The housing 210 is provided next

and above the lens 140, and the charging coil 310 with the optical elements (120, 130, 322-326) it encircles are provided above the housing 210. *Id.*, ¶¶24-26.

Thus, Fraser's charging coil 310—much like in Petitioner's proposed combination—is spaced away from the device's rear surface (i.e., the lens 140 surface) via the device's housing and includes optical elements in the core section of this coil—which, at least in part, are made from metallic materials. EX-2038, ¶¶160-162. The key differences, however, in Fraser's device relative to Petitioner's proposed configuration are that (1) the charging coil is not confined to a small size and instead extends to cover a substantial portion of the rear device surface (beyond the portion that would corresponding to the protrusion within which the optical elements are provided) and (2) the charging coil is provided behind the device's rear surface that extends beyond the central portion of the lens 140 behind which the optical elements (photodetectors and LEDs) are provided. EX-2038, ¶163.

A POSITA would have recognized that this configuration in Fraser counteracts the above-described degradation in wireless power transmission caused by spacing/distance between transmit and receive coils and positioning of metallic and magnetization inducing elements within their transmission path (between the coils as well as in the core region of the coil). EX-2038, ¶164.

Indeed, when modeling and simulating the wireless power transmission of a device with a charging receive coil as shown in Fraser, and those with a type of the smaller coil as contemplated by Petitioner's proposed combination, the difference in wireless signal transmission is *roughly two orders of magnitude more* in a Fraser-like device relative to the proposed combination's device. EX-2038, ¶¶165-170 (citing EX-2023, -2024, -2025, -2026, -2027, -2028, -2029, -2030, -2031, -2032, as substantiating methodology used for the modeling). Specifically, this modeling indicates that, if it takes a device with coils as shown in Fraser to charge a battery in *1 hour*, the device in Petitioner's proposed combination with a smaller coil would charge the same battery in *100 hours*. EX-2038, ¶¶165-170.

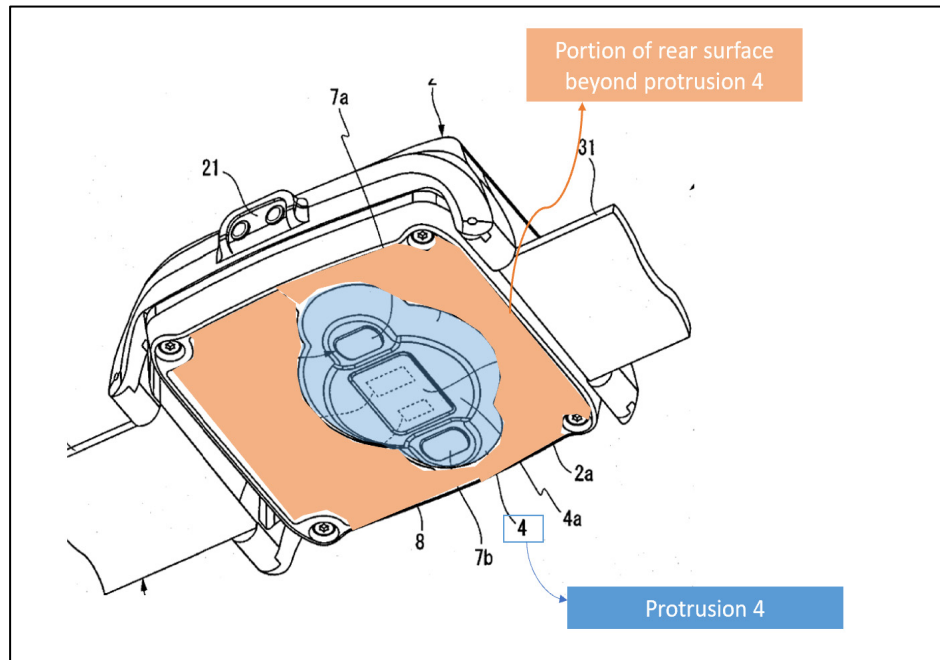
This modeling also shows the negative impact on wireless power transmission as the distance between the transmit and receive coils increases, as called for by Petitioner's proposed configuration. EX-2038, ¶¶165-170. Indeed, and consistent with Honda's teaching, when modeling and simulating the wireless power transmission of a device with a receive coil as shown in Fraser, and those with smaller coil as contemplated by Petitioner's proposed combination, increased spacing between the transmit and receive coils has an even greater negative impact on wireless power transmission (i.e., the difference in wireless signal transmission due to increased spacing between transmit and receive coils is *roughly 2.5 orders of magnitude more* in a Fraser-like device relative to the proposed combination's

device). EX-1006, 13:13-21; EX-2038, ¶¶165-170. Thus, if the Fraser-like device would take *1 hour* to charge the device's battery, Petitioner's proposed configuration, with the increased spacing between coils, would take *about 500 hours to charge the same battery*. See *id.* And, while this modeling does not expressly account for the impact of interfering metal, a POSITA would have recognized the negative impact of such material would be more detrimental and significant in the smaller coil in Petitioner's combination. See *id.*

Therefore, if the wireless charging receive coil were positioned behind the optical elements in Kotanagi's device, as Petitioner seeks via its combination, a POSITA would have recognized that such a coil would be much larger and would encompass a larger portion of the device's rear surface—as in Fraser. EX-2038, ¶170. This, as a result, would counteract the wireless power transmission degradation issues caused by the added spacing and the presence of charge degrading materials in the transmission path between the wireless charging receive and transmit coils. *Id.*

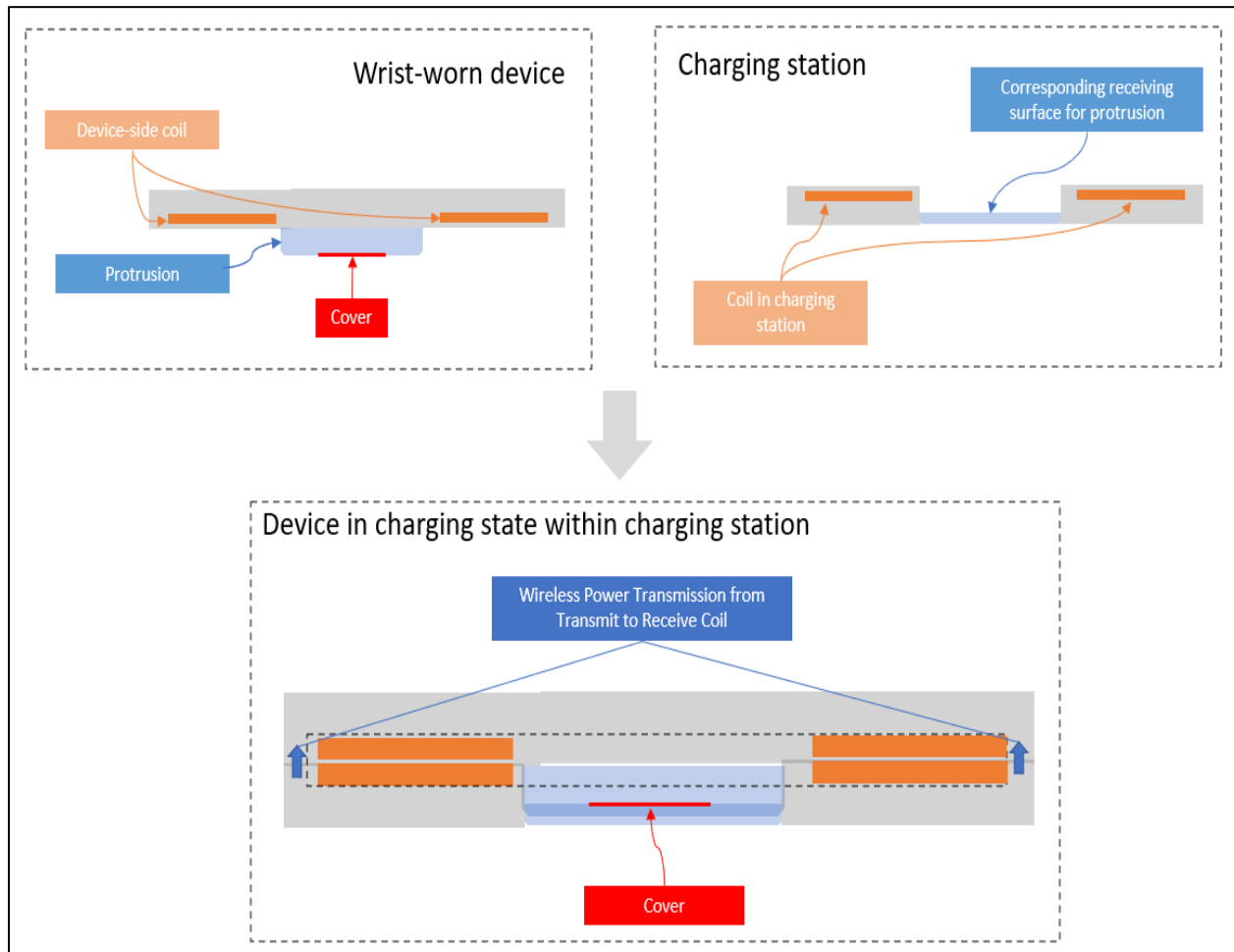
As shown below, when configuring the wireless charging coil similar to that of Fraser, a POSITA would have recognized that the wireless charge receiving coil would extend beyond the space provided behind Kotanagi's rear cover 23 and even the protruding part 4 of Kotanagi's device (because of the space constraints

imposed by electrodes 7a and 7b that sandwich the rear cover 23 and optical elements 5 and 6 within protruding part 4) (see EX-2038, ¶¶171-172):



In such a configuration, and as the above annotated figure illustrates, the “wireless charging receive coil” would not be “below the cover,” as per the claim in view of the intrinsic record. EX-2038, ¶172. Additionally, a POSITA would have recognized that, in the context of the claim in view of the intrinsic record, any alleged inductive coupling of the wireless charging receive coil and an external wireless charging device would not be “through the non-conductive material of the cover” (i.e., the alleged cover glass 23 in Kotanagi) and instead, would be through the rear housing surface beyond the protruding part 4 (and the cover glass 23

affixed thereto). *Id.* This is also illustrated using the following mockups of the combination's device and charging station (EX-2038, ¶173):



Per the above sectional mockups of the device and the charging station (at the top), (1) the device's larger coil would surround protruding part 4 and extend to overlie the areas of the rear housing surface beyond the protruding part 4 and (2) the external wireless charging device (e.g., Honda's charging station) would be shaped to receive the rear surface of such a device, including a shaping that accommodates the device's protrusion 4 (*see* Petition, 25-26, 83-89). EX-2038,

¶¶173-175. And when the device is inserted into the charging station (as illustrated at the bottom of the above mockups), the device-side coil and the charging station coil would be adjacent to each other, and separated by the respective device and charging station's housing. *Id.*

Thus, in this configuration, the protruding part 4 and cover glass 23 affixed to it—would be spaced away from the coils and therefore would not be the conduit for the inductive coupling and associated wireless power transmission between the coils. EX-2038, ¶176.

A POSITA would have therefore recognized that positioning the coil in the allegedly available space behind the optical elements would limit the size of the coil, and by extension, reduce the device's wireless power transmission rate and efficiency. EX-2038, ¶177. Moreover, this configuration would be contrary to Honda's goals of enabling quick and efficient wireless charging, which are achieved by avoiding the very structural aspects mandated by Petitioner's proposed configuration—namely, (1) spacing between the coil and the rear device cover and (2) metallic materials in the wireless power transmission path between the wireless charging receive and transmit coils, which produce power transfer reducing eddy currents and magnetization. *Id.*

Given the above-described issues in the combination's proposed configuration, Petitioner has failed to demonstrate that a POSITA would have

configured the device in this manner—particularly when considering that the POSITA would have been aware of other well-known and actually functioning configurations of biometric sensing and wireless charging devices (as corroborated by the Fraser reference) that provide a large wireless charging receive coil around optical elements within the device housing and thereby avoid/counteract the above-described issues that Petitioner’s combination injects. EX-2038, ¶178. As Fraser corroborates, a POSITA would have also recognized that such a large coil would expand beyond the identified cover of the combination’s device. EX-2038, ¶179. And in such a configuration, the wireless charging receive coil would not be “below the cover” and any inductive coupling that occurs between the wireless charging receive coil and the external charging station, as the claim requires in view of the intrinsic record, would be through the device’s rear housing surface beyond the protruding part 4 and not through the “non-conductive material of the cover” (i.e., cover glass 23 in Kotanagi). *Id.*

At bottom, Petitioner has merely presented a device configuration in which a wireless charging coil *could* be provided in Kotanagi’s through hole 22. However, Petitioner has not demonstrated that a POSITA *would* have configured the device in the proposed manner when considering the detrimental impact to wireless charging stemming from this configuration and given the substantially better alternative available that avoids/counteracts those issues. EX-2038, ¶180. On this

record, Petitioner has failed to demonstrate why or how Petitioner's proposed combination would render obvious claim 7. *See id.*

D. A POSITA would have also avoided the significant wireless charging degradation that occurs from positioning the wireless charging receive coil around Kotanagi's optical elements

In Petitioner's alternative configuration, the wireless charging receive coil would be positioned around Kotanagi's optical elements. Specifically, Petitioner contends that "a POSITA would have ... enlarge[d] Kotanagi's opening and cover glass to make room for a coil behind the cover glass, surrounding the LED and PD." Petition, 24-25.

As a starting point, in this proposed configuration, Petitioner has failed to demonstrate that the opening and the cover glass could or would in fact be expanded, given the size restrictions imposed by Kotanagi on the rear protruding part 4 and the presence of other components like the electrodes 7a and 7b on this surface that limits any contemplated expansion of the cover glass and the opening. EX-2038, ¶¶181-183; *see* EX-2039, 47:21-48:6, 26:19-27:7, 51:20-52:8, 55:20-56:7, 42:5-10 (Petitioner's expert confirming that coil would need to be behind just the cover glass 23). Petitioner cites no evidence teaching or suggesting that the opening in Kotanagi's housing and its cover glass 23 can be expanded. *See* Petition, 24-25, 29-30; EX-2038, ¶183.

Even Petitioner's reliance on Fraser does not support this modification. Specifically, Petitioner relies upon Fraser's teachings of its coil surrounding light emitters (*see* Petition, 29 (citing EX-1041, [0026], FIG. 3), but offers no evidence or analysis indicating any feasible expansion of a cover glass or opening in the housing—particularly in view of Kotanagi's device, as Petitioner's proposed modification demands. EX-2038, ¶183. Petitioner has therefore failed to meet its burden of demonstrating that a larger wireless charging receive coil, when positioned around the optical elements 5 and 6, would or could still fit behind just cover glass 23, as Petitioner's configuration requires. EX-2039, 47:20-48:6; EX-2038, ¶183.

In fact, Fraser demonstrates that the wireless charging receive coil would be positioned around and beyond the sensor components provided in the central portion of the rear housing. EX-1041, [0026], FIG. 3; EX-2038, ¶184. Thus, in view of Fraser—which Petitioner relies upon—when the coil surrounds the optical elements, a POSITA would have recognized that the coil would expand beyond the cover glass 23 and would not fit behind the cover glass 23 behind which the optical elements are positioned. EX-2038, ¶¶184-185; *see* Petition, 24-25, 28-30 (Petitioner's intent to expand the cover glass 23 of Kotanagi's device only further confirms that the coil would not fit behind Kotanagi's cover glass 23).

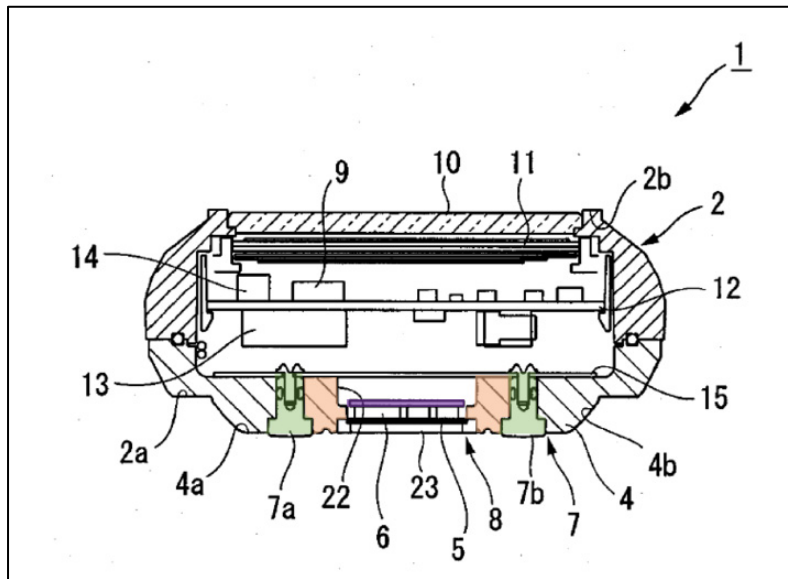
As such, a POSITA would have understood that the coil would expand to overlies portions of the housing/protruding part 4—as in Fraser where the coil overlies a substantial portion of the bottom device surface beyond the centrally located optical elements—which then would result in the same power transmission degradations stemming from interposing metal housing materials between coils, as contemplated by Petitioner’s combination (as described above in §VII.B *supra*). EX-2039, 20:15-22:2, 25:3-26:3, 45:13-19, 55:20-56:7 (testifying that the proposed Kotanagi-Honda combination would have a metal housing and that the protruding part is formed in the housing), 47:21-49:7, 28:17-20, 30:20-32:1 (testifying that if coil expands beyond the cover glass and is “behind conductive material,” then there would be “weakening of the electromagnetic coupling,” which would “degrade the transfer of power from a transmit coil to a receive coil”); EX-2038, ¶¶185, 141-156.

Even assuming *arguendo* that the larger diameter coil could be provided entirely behind the cover glass 23 (which Petitioner has failed to demonstrate), such a configuration would frustrate Honda’s goals of seeking to enable quick and efficient wireless charging of the device, as explained below. EX-2038, ¶186.

First, positioning the coil around Kotanagi’s optical elements would not avoid the above-described signal degradation stemming from providing metallic

materials in the core of the coil—which again are counter to Honda’s teachings (see §VII.A-C *supra*). EX-2038, ¶¶187-188, 141-180.

Second, a POSITA would have recognized that wireless charging efficiency is related to the size and number of turns of the charging coil. EX-2038, ¶189. In the proposed configuration, however, the space limitations imposed by Kotanagi around the optical elements and between the cover and the flexible board (to which the optical elements are affixed) would reduce the number of possible turns of the charging coil, which then places significant constraints on the wireless charging capability of the coil and the device as a whole. EX-2038, ¶190. Kotanagi discloses and shows electrodes 7a and 7b that are “disposed on the lower surface 4a of the protruding part 4 ... sandwich[ing] the LED 5 and the PD 6.” EX-1005, ¶58. Additionally, Kotanagi’s device includes (1) portions of housing in the remaining lateral/horizontal space between the optical elements and the electrodes (shown in orange below) and (2) flexible board 15 (shown in purple below) that restricts the vertical space between cover 23 and this board (to which the optical elements are affixed). EX-2038, ¶¶190-192.



Thus, under Petitioner's proposed combination, if the wireless charging receive coil is positioned around the optical elements 5/6, a POSITA would have recognized that such a coil would not extend much further—horizontally or vertically—given the presence of housing, electrodes, and the flexible board adjacent to the optical elements 5 and 6. EX-2038, ¶¶190-192. As a result, the coil, while slightly larger in diameter (relative to the configuration discussed with reference to §§VII.A-B) would nevertheless have significantly fewer turns in the horizontal and vertical directions, which would directly and negatively impact wireless power transmission. *Id.*; see also *id.*, ¶¶141-180.

Also, when modeling such a coil relative to a Fraser-like larger coil, a POSITA would have observed that the wireless power transmission of the smaller coil would be *one order of magnitude less* than that of the Fraser-like coil (see §§VII.A-B *supra*). EX-2038, ¶¶193-195 (noting that while charging a Fraser-like

battery would take 1 hour, charging the smaller coil of the proposed combination would take 10 hours); *see also id.*, ¶¶157-180. And, while this modeling does not expressly account for the impact of interfering metal, a POSITA would have recognized the negative impact of such material would be more detrimental and significant in the relatively smaller coil in Petitioner's combination. EX-2038, ¶¶193-195, 188.

Thus, given the above-described issues in this proposed configuration, Petitioner has failed to demonstrate that a POSITA would have configured the device in this manner—particularly when considering that the POSITA would have been aware of other well-known and actually functioning configurations of biometric sensing and wireless charging devices (as corroborated by the Fraser reference) that provide a large wireless charging receive coil around optical elements within the device housing, thereby more capably avoiding or counteracting the detrimental impact to wireless charging that Petitioner's combination injects. EX-2038, ¶195.

Indeed, as Fraser corroborates and as explained in §VII.C *supra*, a POSITA would have also recognized that such a large coil would expand beyond the identified cover of the combination's device. EX-2038, ¶¶196, 141-180. And in such a configuration (and as explained above in §VII.C *supra*), any inductive coupling and associated wireless power transmission that occurs, as the claim

requires in view of the intrinsic record, would pass through the device's rear housing surface beyond the protruding part 4 and not the cover or the alleged second opening behind it. *See id.*

Again, Petitioner has presented a device configuration in which a wireless charging coil *could* be provided in Kotanagi's through hole 22. However, Petitioner has not demonstrated that a POSITA *would* have configured the device in the proposed manner when considering the detrimental issues stemming from this configuration and given the substantially better alternative available that avoids/counteracts those issues. EX-2038, ¶¶197-198. On this record, Petitioner has failed to demonstrate why or how Petitioner's proposed combination would render obvious claim 7. *Id.*

VIII. THE PROPOSED KOTANAGI-HONDA COMBINATION DOES NOT RENDER OBVIOUS INDEPENDENT CLAIM 14

Independent claim 14 recites "an electronic device" that has "a housing defining ... a second opening," and "a biosensor module" and "wireless charging receive coil" that are "aligned with the second opening." The claim further recites "a cover ... disposed over the biosensor module and the wireless charging receive coil" wherein the device "is configured to receive wireless power through ... the cover using the wireless charging receive coil." Similar to its analysis for claim 7,

Petitioner alleges that the claimed “second opening” maps to through hole 22 in Kotanagi’s device (Petition, 32) and the claimed “cover” maps to Kotanagi’s cover glass 23 (Petition, 35-37). Also, similar to its claim 7 analysis, Petitioner alleges that wireless power would be received by a wireless charging receive coil through the cover. Petition, 37-40.

As described with reference to claim 7, a POSITA would not have been motivated nor would have had a reasonable expectation of success in providing the wireless charging receive coil in this alleged second opening in the manner proposed by Petitioner given the significant wireless signal degradation issues stemming from this proposed configuration. EX-2038, ¶¶200-206, 117-198; *see* §VII.A-D *supra*.

Additionally, and as explained above, Petitioner has failed to demonstrate that a POSITA would have configured the device in this manner—particularly when considering that the POSITA would have been aware of other well-known and actually functioning configurations of biometric sensing and wireless charging devices (as corroborated by the Fraser reference) that provide a large wireless charging receive coil around optical elements within the device housing and thereby avoid the detrimental issues that Petitioner’s combination injects. EX-2038, ¶¶200-206, 117-198; *see* §VII.A-D *supra*. Indeed, as Fraser corroborates, a POSITA would have also recognized that such a large coil would expand beyond

the identified cover of the combination's device. *Id.* And in that case, any wireless power transmission that occurs, as the claim requires in view of the intrinsic record, would pass through the device's rear housing surface beyond the protruding part 4 and not through the alleged cover (i.e., cover glass 23 in Kotanagi) or the alleged second opening (i.e., through hole 22) behind it. *Id.*

At best then, Petitioner has presented a device configuration in which a wireless charging coil *could* be provided in Kotanagi's through hole 22. However, Petitioner has not demonstrated that a POSITA *would* have configured the device in the proposed manner when considering the detrimental impact to wireless charging stemming from this configuration and given the substantially better alternative available that avoids/counteracts those issues. EX-2038, ¶¶199-206, 117-198. On this record, Petitioner has failed to demonstrate why or how Petitioner's proposed combination would render obvious claim 14. *Id.*

IX. THE PROPOSED KOTANAGI-HONDA-CHOI COMBINATION DOES NOT RENDER OBVIOUS INDEPENDENT CLAIM 1

A. The Proposed Combination Does Not Render Obvious Limitation [1g]

Limitation [1g] recites an electronic watch that includes “a charging coil positioned within [its] housing” formed “from a metal material,” wherein the charging coil is “configured to receive wireless power through the dielectric

material of the cover” in the “rear opening of the housing.” Similar to its analysis for claim 7, Petitioner alleges that the claimed “rear opening” maps to through hole 22 in Kotanagi’s device (Petition, 42-43) and the claimed “cover” maps to Kotanagi’s cover glass 23 (Petition, 46-47). Also, similar to its claim 7 analysis, Petitioner alleges that wireless power would be received by a wireless charging receive coil through the cover. Petition, 48-49, 53-54.

As described with reference to claim 7, a POSITA would not have been motivated nor would have had a reasonable expectation of success in providing the wireless charging receive coil in this alleged second opening in the manner proposed by Petitioner given the significant wireless signal degradation issues stemming from this proposed configuration. EX-2038, ¶¶208-213, 117-198; *see* §VII.A-D *supra*.

Additionally, and as explained above, Petitioner has failed to demonstrate that a POSITA would have configured the device in this manner—particularly when considering that the POSITA would have been aware of other well-known and actually functioning configurations of biometric sensing and wireless charging devices (as corroborated by the Fraser reference) that provide a large wireless charging receive coil around optical elements within the device housing and thereby avoid the detrimental issues that Petitioner’s combination injects. EX-2038, ¶¶117-198, 208-213; *see* §§VII.A-D *supra*. Indeed, as Fraser corroborates, a

POSITA would have also recognized that such a large coil would expand beyond the identified cover of the combination's device. EX-2038, ¶¶208-213, 117-198. And in that case, any wireless power transmission that occurs, as the claim requires in view of the intrinsic record, would pass through the device's rear housing surface beyond the protruding part 4 and not through the alleged cover (i.e., cover glass 23 in Kotanagi) or the alleged second opening (i.e., through hole 22) behind it. *Id.*; see §§VII.A-D *supra*.

At best then, Petitioner has presented a device configuration in which a wireless charging coil *could* be provided in Kotanagi's through hole 22. However, Petitioner has not demonstrated that a POSITA *would* have configured the device in the proposed manner when considering the detrimental impact to wireless charging stemming from this configuration and given the substantially better alternative available that avoids/counteracts those issues. EX-2038, ¶¶208-213, 117-198. On this record, Petitioner has failed to demonstrate why or how Petitioner's proposed combination would render obvious claim 1. *Id.*

B. The Proposed Combination Does Not Render Obvious Limitations [1h] and [1j]

These limitations recite that “a first electrode positioned along a rear surface of the electronic watch; and a second electrode positioned along the rear surface of the electronic watch,” wherein the “the electronic watch is configured to measure

an electrocardiogram using the first electrode and the second electrode.” Petitioner contends that these limitations would have been obvious in view of Kotanagi’s teachings of electrodes on its rear surface and Choi’s teachings of sensors on front and back of the device to detect an ECG signal. Petition, 51-54.

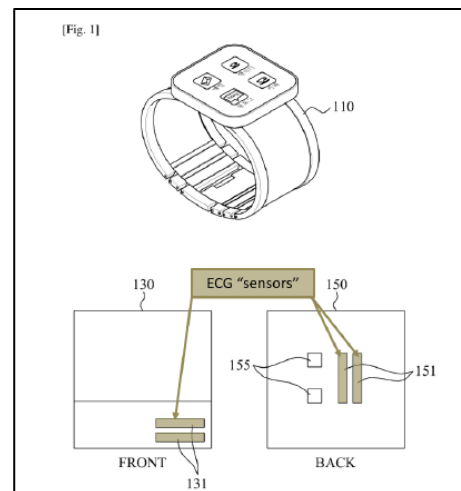
Specifically, Petitioner contends that “a POSITA would have used Kotanagi’s existing electrodes and Choi’s teachings to either: (1) use signals from Kotanagi’s existing electrodes to obtain an ECG; or (2) add one or more additional electrodes to Kotanagi (as taught by Choi) and use both it and the existing electrodes to obtain an ECG.” Petition, 52.

As a starting point, Petitioner’s obviousness arguments are flawed because they are premised on characterizations of the references that are refuted by their express teachings. EX-2038, ¶¶214-217. **First**, Petitioner alleges that “Kotanagi’s rear electrodes interact with the optical sensor to achieve pulse measurement.” Petition, 51. This is incorrect. EX-2038, ¶218. The rear electrodes do not “achieve pulse measurement,” as Petitioner contends. Instead, Kotanagi explains that these electrodes “have a function of detecting whether there is contact with the living body surface B based on the potential difference between the electrodes” and when contact is detected, the “data processing part 9” of Kotanagi’s device “control[s] the operation of the LED 5 so as to emit light from the LED 5.” EX-1005, ¶¶59, 13; EX-2038, ¶218. Thus, the function of the electrodes is to detect

skin contact—and not to “achieve pulse measurement,” which is performed using different components of Kotanagi’s device. *See id.*

Second, Petitioner argues that a POSITA would have considered Petitioner’s proposed alternative electrode arrangements given that (1) Kotanagi allegedly teaches that more than two electrodes may be provided (Petition, 51-52), and (2) Choi teaches that front and back sensors may not be needed for ECG measurements (*id.*). As to the first assertion, even if the cited disclosure in Kotanagi is interpreted as teaching or suggesting more than two electrodes, these electrodes would still be implemented to perform the stated function for Kotanagi’s electrodes—i.e., to detect skin contact and not to perform an ECG measurement. Indeed, Kotanagi does not teach or suggest ECG measurements by its device. *See generally* EX-1005; EX-2038, ¶¶219-220.

Petitioner’s second assertion in view of Choi is expressly refuted by Choi’s disclosures. Choi teaches that “[t]o detect the ECG signal ... a signal detected in at least two different portions of the body of the user may be needed, and thus, the sensors 131 and 151 are provided on the front 130 and back 150, respectively.” EX-1011, ¶52, FIG. (reproduced on right; annotated by Petitioner). Choi further states that, when detecting an impedance signal



generated by the body of the user, *aside from the ECG signal*, a sensor used to receive the ... signal may be provided on either the front 130 or the back 150.” *Id.* Thus, these teachings in Choi contemplate ECG sensor positioning on two different surfaces—instead of only a single surface, as characterized by Petitioner. EX-2038, ¶¶221-222.

When accounting for Kotanagi’s and Choi’s actual teachings, and as explained further below, Petitioner has failed to demonstrate why or how a POSITA would have combined the teachings of these references in the proposed manner. EX-2038, ¶223.

Petitioner first asserts that a POSITA would have been “motivated ... to expect success in combining the teachings of Kotanagi and Choi” because, per Petitioner, they “both teach a watch with both optical and electrode biosensors.” Petition, 53. As an initial matter, Petitioner has offered no basis to conclude that a potential difference measurement in Kotanagi’s device by its electrodes makes those electrodes “biosensors.” EX-2038, ¶224. Even if that were the case, simply because two device have some structural similarities (e.g., watch with similar components) is not a sufficient motivation to combine their teachings. *See William Wesley Carnes, Sr., Inc. v. Seaboard International Inc.*, IPR2019-00133, Paper 10, at 18 (PTAB May 8, 2019) (“[A] statement of similarity ... does not constitute an articulated reasoning with rational underpinning as to why a POSITA would

combine elements of one reference with another, and why a POSITA would modify the teachings of the references to arrive at the claimed invention”).

Petitioner next argues that (1) Choi and Kotanagi provide “similar electrodes” that generate “analogous” measurements and (2) “[b]ecause Kotanagi already has multiple electrodes, any further modification from Choi (e.g., to process electrode signals differently or to add an electrode)” would have been obvious. *See* Petition, 53. These arguments are flawed in multiple respects, as explained below. EX-2038, ¶225.

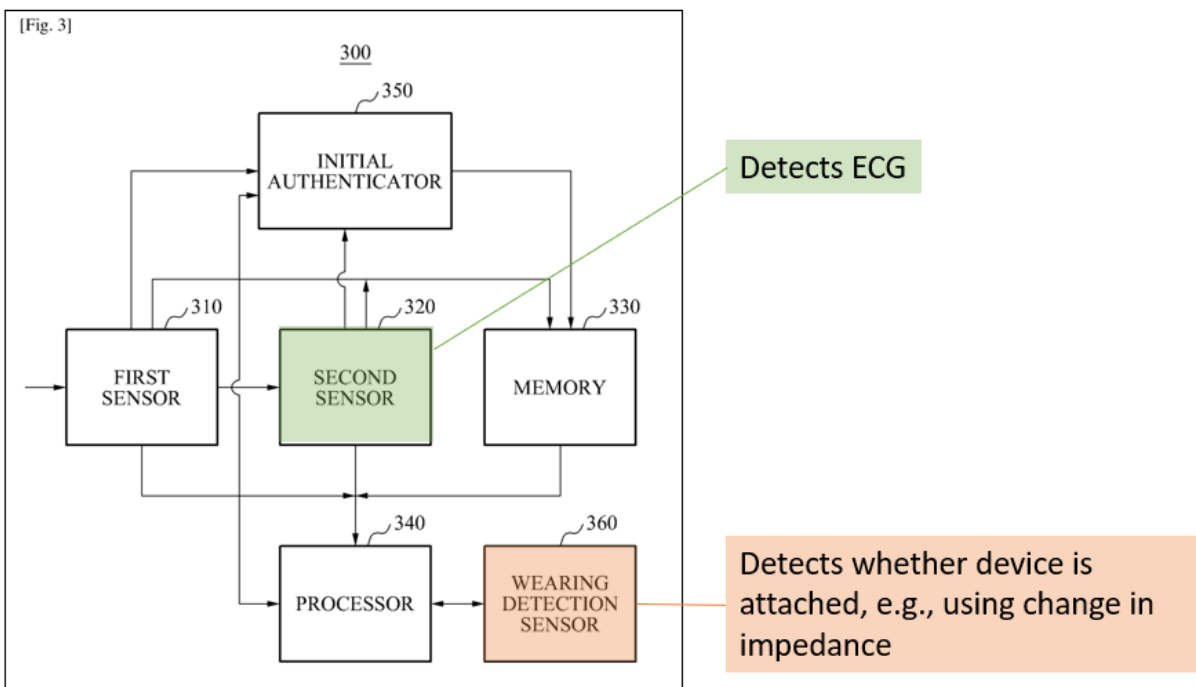
Kotanagi does not disclose or contemplate any ECG capability, nor does it disclose or suggest electrode positioning on any surface other than the device’s rear surface. EX-2038, ¶226; EX-1005, ¶¶13, 59. Thus, even if Kotanagi is interpreted as contemplating multiple electrodes, given the skin contact detection function of the electrodes, Kotanagi’s electrodes would be positioned only on its device’s rear surface—i.e., the surface in contact with the arm/wrist/body of the device wearer—and functions to detect skin contact. *Id.* Indeed, positioning any of Kotanagi’s electrodes on a device surface other than the surface that contacts the wrist of the wearer would frustrate the above-described skin contact detection function of Kotanagi’s electrodes. EX-2038, ¶231. Thus, contrary to Petitioner’s assertion, there would be no reason or motivation to position electrodes on a front surface of Kotanagi’s device (as Petitioner seems to suggest in view of Choi),

when considering that doing so would be counter to the skin contact detection function of this device. EX-2038, ¶232.

Moreover, Petitioner has also not explained why or how the potential difference measurements in Kotanagi are “analogous” to ECG measurements in Choi. EX-1038, ¶¶233, 227-230. Notably, Petitioner and its expert do not offer any evidence or analysis showing parity between the processes and effects between measuring a potential difference between the pair of electrodes for purposes of skin contact (as in Kotanagi) and the use of electrodes for determining ECG (as in Choi)—which a POSITA would have recognized are different. *See id.*

Even assuming *arguendo* that ECG measurements are analogous to impedance detection (as Petitioner contends without support), and even if ECG measurements would result in Kotanagi’s watch having “improved biosensing,” as Petitioner asserts (Petition, 27-28), the Petition fails to demonstrate how such functionality would be implemented in Kotanagi’s device. EX-2038, ¶234. Specifically, Petitioner has failed to demonstrate that signals from the same electrodes in Kotanagi—which only have a skin contact detection function—and/or any additional electrodes, would be leveraged to achieve ECG measurements. *See* Petition, 53-54. Even Petitioner’s allegation in this regard that “process[ing] electrode signals differently” in Kotanagi would have been obvious in view of Choi, does not pass muster. Petition, 53-54; *see* EX-2038, ¶¶226-230. Petitioner

has not shown that Choi teaches using the same electrodes for both skin contact detection and ECG measurements. EX-2038, ¶235. Rather, Choi teaches using a wearing detection sensor that detects whether the band is attached to the user, which is different and separate from the sensor used to detect ECG, as shown below. EX-1011, FIG. 3 (reproduced below; annotated), [68]-[70], [98]-[102]; EX-2038, ¶235.



Additionally, while Choi describes detecting a “second biosignal”—which can include ECG or impedance—using sensors on the front and/or back surface of its device (EX-1011, [47], [54]-[56]), Petitioner has not identified any teaching in Choi that shows use of the *same* sensor(s) for detecting *both* ECG and impedance—or that *both* ECG and impedance are even used as the second

biosignal. EX-2038, ¶236. Indeed, Choi uses the second biosignal to authenticate the user (EX-1011, [47], [54]-[56]) and Petitioner has not identified any teaching in Choi disclosing or suggesting that **both** ECG and impedance are used or would be used as the second biosignal for this purpose. EX-2038, ¶¶236-238. Moreover, even if both ECG and impedance are detected, Choi's disclosure of a separate wearing detection sensor that uses impedance signals to detect "wearing detection" would suggest to a POSITA that Choi contemplated separate sensors for ECG and impedance measurements. *Id.*; *see also id.*, ¶¶226-230.

Thus, on the present record, Petitioner has not presented sufficient evidence to demonstrate that the same electrodes in Kotanagi—which have a skin contact detection function—would be leveraged alone or in combination with additional electrode(s)—to generate signals that would be "process[ed]" "differently" to additionally obtain ECG measurements. EX-2038, ¶239; Petition, 53.

Additionally, if Petitioner's combination seeks to reconfigure Kotanagi's electrodes to generate ECG measurements (instead of detecting skin contact), that would frustrate Kotanagi's specific goal and purpose of using the electrodes to ensure skin contact and enhance adherence of its wrist-worn device to the wearer's body. *See* EX-2038, ¶240; EX-1005, ¶5 ("an object thereof is to provide a biological information measuring device which enhances adherence").

Finally, in its obviousness analysis, Petitioner identifies references that purportedly disclose watches with ECG functionality, and further alleges that configuring the electrodes to “measure an ECG would have” been “an application of 1980-era technology.” Petition, 54. The reference to “1980-era technology” appears to be referring to the non-ground reference, Schmid (EX-1029), which was filed and issued in the early 1980s and which was used by Petitioner as part of its analysis for this limitation. EX-1029, p. 1; *see* Petition, 52 (citing EX-1029, FIG. 1, 3:7-15, 4:34-45). However, a POSITA would not have had a reasonable expectation of success in implementing an “electronic watch [that] is configured to measure an electrocardiogram using the first and the second electrode” in view of Schmid. EX-2038, ¶¶241-242. That is because, while Schmid’s electrodes are used to measure ECG, Schmid’s wrist-worn device is not configured to measure ECG. EX-2038, ¶243. In particular, Schmid’s electrodes on its wrist-worn device are coupled to a separate apparatus that is configured to measure ECG and thus, its wrist-worn device itself is not “configured to measure” ECG signals. *See, e.g.*, EX-1029, 1:6-11 (the “invention relates to ... electrode assemblies adapted to determine bioelectrical conditions, *especially in association with an apparatus for evaluating and/or plotting such signals as, for example, in EKG evaluations*”), 5:3-10 (“The heart-frequency measuring assembly ... comprises a housing 2 which can be similar to a *wristwatch housing or case and which contains the electrodes*

in an electrode set or a plurality of such electrode sets, *which can be connected by cables, contact pins or the like to a conventional recording, evaluation or registration circuit e.g. the electronics of a conventional EKG machine.*”), 6:29-35 (“The housing 2 is also provided with contact sleeves 3 *enabling the cable connection between the electrodes and a remote circuit, e.g. an EKG machine,* for use especially when the electrodes are applied to other body portions.”).

Moreover, simply because ECG measuring watches were known in the art, as Petitioner contends (Petition, 54), does not demonstrate why or how Kotanagi’s existing electrodes—which have a skin contact detection function—alone or in combination with additional electrode(s) would be configured to measure ECG. EX-2038, ¶244.

In summary, Petitioner’s proposed combination lacks sufficient evidence demonstrating why or how a POSITA would have combined teachings of different references, and absent sufficient reasoned basis and rationale, Petitioner’s selective picking of portions of different references to read onto the claims is an exercise in impermissible hindsight-driven analysis that should be rejected. EX-2038, ¶¶245-246.

For the foregoing reasons, Petitioner has failed to demonstrate obviousness of limitations 1h and 1j in view of Kotanagi’s and Choi’s teachings. *Id.*

X. THE PROPOSED KOTANAGI-HONDA-CHOI COMBINATIONS DO NOT RENDER OBVIOUS CLAIMS 13 AND 17

Claim 13 recites that “the wearable electronic device further comprises: a first electrode positioned along a rear surface of the wearable electronic device; and a second electrode positioned along the rear surface of the wearable electronic device; and the wearable electronic device is configured to measure an electrocardiographic characteristic using the first and second electrodes.” Claim 17 recites that the “electronic device further comprises: a first electrode disposed along an exterior of the electronic device; and a second electrode disposed along the exterior of the electronic device; and the first and second electrodes are configured to measure an electrocardiographic characteristic of the user.”

For both claims, Petitioner contends that “a POSITA would have understood that Kotanagi in view of Choi teaches the[s] limitations” in view of the analysis presented for the similar limitations in limitations 1h and 1j of independent claim 1. Petition, 60-61. For the reasons described above with reference to claim 1 (*see* §IX.B *supra*), Petitioner has failed to demonstrate that Kotanagi’s watch would be “configured to measure an electrocardiographic characteristic using the first and second electrodes” as required by the claims and in view of the teachings of the Choi reference. EX-2038, ¶¶247-249, 214-246.

**XI. THE PROPOSED COMBINATIONS DO NOT RENDER OBVIOUS
CLAIMS 2-6, 8-12, 15-16, AND 18-19**

Claims 2-6, 8-12, 15-16, and 18-19 are not rendered obvious by the presented combination for at least the reasons described above with reference to independent claims from which these claims depend. EX-2038, ¶250.

XII. CONCLUSION

For the foregoing reasons, Patent Owner respectfully requests a final written decision confirming patentability of the Challenged Claims.

Respectfully submitted,

Date: January 16, 2024

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CERTIFICATION UNDER 37 CFR § 42.24(d)

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Patent Owner Response totals 13,979, which is less than the 14,000 allowed under 37 CFR § 42.24(b)(1).

Respectfully submitted,

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e)(4), the undersigned certifies that on January 16, 2024, a complete and entire copy of this Patent Owner Response and its supporting exhibits were provided via email, to the Petitioner by serving the email correspondence addresses of record as follows:

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