

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of:	Bilal Muhsin, et al.	
U.S. Patent No.:	10,736,507	Attorney Docket No. 50095-0135IP2
Issue Date:	August 11, 2020	
Appl. Serial No.:	15/880,071	
Filing Date:	January 25, 2018	
Title:	PHYSIOLOGICAL MONITOR WITH MOBILE COMPUTING DEVICE CONNECTIVITY	

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**PETITION FOR *INTER PARTES* REVIEW OF UNITED STATES PATENT
NO. 10,736,507 PURSUANT TO 35 U.S.C. §§ 311–319, 37 C.F.R. § 42**

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LIST OF EXHIBITS

APPLE-1001	U.S. Patent No. 10,736,507 (“the ’507 patent”)
APPLE-1002	U.S. Patent No. 10,736,507 File History
APPLE-1003	Declaration of Dr. Thomas Kenny
APPLE-1004	RESERVED
APPLE-1005	U.S. Patent Application Pub. No. 2008/0004904 to Tran (“Tran”)
APPLE-1006	U.S. Patent No. 6,658,276 to Kianl et al. (“Kianl”)
APPLE-1007	Lorenzo T. D’Angelo, et al., A Sensor Network to iPhone Interface Separating Continuous and Sporadic Processes in Mobile Telemedicine, 33rd Annual International Conference of the IEEE EMBS Boston, Massachusetts USA, August 30 - September 3, 2011 (“D’Angelo”)
APPLE-1008	U.S. Patent No. 7,812,826 to Ording et al. (“Ording”)
APPLE-1009	U.S. Patent Application Pub. No. 2007/0093786 to Goldsmith et al. (“Goldsmith”)
APPLE-1010	U.S. Patent Application Pub. No. 2010/0324387 to Moon et al. (“Moon”)
APPLE-1011	Y. Mendelson, et al., A Wearable Reflectance Pulse Oximeter for Remote Physiological Monitoring, Proceedings of the 28th IEEE EMBS Annual International Conference New York City, USA, Aug 30-Sept 3, 2006
APPLE-1012	Declaration of June Munford
APPLE-1013	U.S. Patent No. 8,195,848 to Jones (“Jones”)

- APPLE-1014 Exemplary Infringement Claim Chart for the '507 patent from *Apple Inc. v. Masimo Corporation et al.*, Case No. 1-22-cv-01378 (D. Del. Oct. 20, 2022)
- APPLE-1015 Exemplary Infringement Claim Chart for the '911 patent from *Apple Inc. v. Masimo Corporation et al.*, Case No. 1-22-cv-01378 (D. Del. Oct. 20, 2022)
- APPLE-1016 – 1059 [RESERVED]
- APPLE-1060 U.S. District Courts–Combined Civil and Criminal Federal Court Management Statistics (Sep. 30, 2023) | United States Courts (uscourts.gov), https://www.uscourts.gov/sites/default/files/data_tables/fcms_na_distprofile0630.2023.pdf
- APPLE-1061 Memorandum, Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation (USPTO June 21, 2022) (“Director’s Guidance”)
- APPLE-1062 Apple’s Complaint for Patent Infringement (Design), *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01377 (D. Del. Oct. 20, 2022)
- APPLE-1063 Apple’s Complaint for Patent Infringement (Utility), *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01378 (D. Del. Oct. 20, 2022)
- APPLE-1064 Defendant Masimo Corporation’s Answer to Complaint and Counterclaims, *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01378 (D. Del. Dec. 12, 2022)
- APPLE-1065 Order Granting Joint Motion to Amend the Case Schedule, *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01378 (D. Del. Sep. 21, 2023)

- APPLE-1066 Stipulation by Apple Inc.
- APPLE-1067 Email Identifying Masimo's District Court Invalidity Grounds
(Nov. 16, 2023)
- APPLE-1068 Excerpt of Apple's District Court Expert Invalidity Report, *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01378 (Nov. 22, 2023)
- APPLE-1069 Order Granting Unopposed Motion to Stay Certain Patent Counterclaims, *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01378 (Jan. 10, 2023)

LISTING OF CLAIMS

Claim 1	
[1pre]	A mobile pulse oximetry system for informing a user of mobile measurement of oxygen saturation (“SpO2”), the mobile pulse oximetry system comprising:
[1a]	an SpO2 measurement system including:
[1b]	an optical sensor configured to output one or more signals responsive to light from a light source attenuated by tissue of the user at a measurement site, said one or more signals responsive to an oxygen saturation of said tissue; and
[1c]	a processing board in data communication with the optical sensor and a mobile computing device including a display and cellular communication, wherein the processing board is configured to:
[1d]	receive said one or more signals from the optical sensor;
[1e]	process said one or more signals to generate SpO2 measurement values; and
[1f]	output the SpO2 measurement values to the mobile computing device; and
[1g]	one or more hardware processors of the mobile computing device configured to execute an application, the application configured to execute commands to:
[1h]	generate a graphical user interface having a plurality of display portions;
[1i]	display, in at least one portion of the plurality of display portions, a representation of a physiological parameter of a plurality of physiological parameters comprising at least the SpO2 measurement values; and

[1j]	display, in a different portion of the plurality of display portions, a plurality of user inputs configured to allow the user to interact with at least one of the plurality of display portions or the application;
[1k]	wherein the processing of the one or more signals to generate SpO2 measurement values is performed only on the processing board, thereby freeing up memory available to the mobile computing device; and
[1l]	wherein the processing board is configured to draw power for operation from the mobile computing device.
Claim 2	
[2pre]	The mobile pulse oximetry system of claim 1, wherein the application is configured to execute commands to:
[2a]	perform a trend analysis on received SpO2 measurement values; and
[2b]	display results of the trend analysis in at least one portion of the plurality of display portions.
Claim 3	
[3]	The mobile pulse oximetry system of claim 2, wherein the display is touch-sensitive, and wherein the application is configured to execute commands to narrow or expand the displayed results of the trend analysis in response to the user using a pinch gesture.
Claim 4	
[4]	The mobile pulse oximetry system of claim 1, wherein the application is configured to execute commands to set reminders to take future measurements.
Claim 5	
[5]	The mobile pulse oximetry system of claim 1, wherein the application is configured to execute commands to output one or more alarms associated with SpO2 measurement values that are above or below threshold SpO2 measurement values.

Claim 6	
[6]	The mobile pulse oximetry system of claim 1, wherein the application is configured to execute commands to output one or more reminders to use the optical sensor to take measurements of SpO2 measurement values at predetermined times or cycles.
Claim 7	
[7]	The mobile pulse oximetry system of claim 1, wherein the application is configured to execute commands to update the representation of the physiological parameter to comprise one or more of a plurality of graphical representations of the SpO2 measurement values, the plurality of graphical representations comprising at least one of bar graphs or charts.
Claim 8	
[8]	The mobile pulse oximetry system of claim 1, wherein the application is configured to execute commands to output an alert, via a network to a designated physician or other care provider, regarding abnormal SpO2 readings.
Claim 9	
[9]	The mobile pulse oximetry system of claim 1, wherein the mobile computing device comprises a smartphone.
Claim 10	
[10]	The mobile pulse oximetry system of claim 1, wherein the mobile computing device comprises a wearable computing device.
Claim 11	
[11]	The mobile pulse oximetry system of claim 1, wherein the mobile computing device comprises a wristwatch.
Claim 12	

[12]	The mobile pulse oximetry system of claim 1, wherein the SpO2 measurement system is configured to wirelessly transmit the SpO2 measurement values to the mobile computing device.
Claim 13	
[13pre]	A computer-implemented method of informing a user of mobile measurement of oxygen saturation (“SpO2”), the computer-implemented method comprising:
[13a]	outputting, from an optical sensor of an SpO2 measurement system, one or more signals responsive to light from a light source attenuated by tissue of the user at a measurement site, said one or more signals responsive to an oxygen saturation of said tissue; and
[13b]	via a processing board of the SpO2 measurement system, the processing board in data communication with the optical sensor and a mobile computing device including a display:
[13c]	receiving said one or more signals from the optical sensor;
[13d]	processing said one or more signals to generate the SpO2 measurement values; and
[13e]	outputting the SpO2 measurement values to the mobile computing device; and
[13f]	via an application configured to execute commands on the mobile computing device:
[13g]	generating a graphical user interface having a plurality of display portions;
[13h]	displaying, in at least one portion of the plurality of display portions, a representation of a physiological parameter of a plurality of physiological parameters comprising at least the SpO2 measurement values; and
[13i]	displaying, in a different portion of the plurality of portions, a plurality of user inputs configured to allow the user to interact with at least one of the plurality of display portions or the application.

Claim 14	
[14pre]	The computer-implemented method of claim 13, further comprising, via the application:
[14a]	performing a trend analysis on received SpO2 measurement values; and
[14b]	displaying results of the trend analysis in at least one portion of the plurality of display portions.
Claim 15	
[15]	The computer-implemented method of claim 13, further comprising, via the application, outputting one or more alarms associated with SpO2 measurement values that are above or below threshold SpO2 measurement values.
Claim 16	
[16]	The computer-implemented method of claim 13, further comprising, via the application, outputting one or more reminders to use the optical sensor to take measurements of SpO2 measurement values at predetermined times or cycles.
Claim 17	
[17]	The computer-implemented method of claim 13, further comprising, via the application, updating the representation of the physiological parameter to comprise one or more of a plurality of graphical representations of the SpO2 measurement values, the plurality of graphical representations comprising at least one of bar graphs or charts.
Claim 18	
[18]	The computer-implemented method of claim 13, further comprising, via the application, outputting an alert, via a network to a designated physician or other care provider, regarding abnormal SpO2 readings.
Claim 19	

[19]	The computer-implemented [method of] claim 13, further comprising wirelessly transmitting the SpO2 measurement values from the SpO2 measurement system to the mobile computing device.
Claim 20	
[20]	The computer-implemented method of claim 13, further comprising, via the application, enabling the user to set reminders to take future measurements.

Apple Inc. (“Apple” or “Petitioner”) petitions for *Inter Partes* Review (“IPR”) of claims 1-20 (“Challenged Claims”) of U.S. Patent No. 10,736,507 (“the ’507 patent”).

I. REQUIREMENTS FOR IPR UNDER 37 C.F.R. § 42.104

A. Standing

Apple certifies that the ’507 Patent is available for IPR. Apple is not barred or estopped from requesting this review.

B. Challenge and Relief Requested

Requested IPR grounds are listed below. Accompanying explanations and support are provided in a Declaration from Dr. Thomas Kenny. APPLE-1003, ¶¶31-242.

Ground	Claims	§102 Prior Art
1A1	13, 15, 18-19	Mendelson
Ground	Claims	§103 Prior Art
1A2	13, 15, 18-19	Mendelson
1B	16, 18, 20	Mendelson, Tran
1C	14, 17	Mendelson, Kianl
1D	1-2, 5, 7, 9, 12-15, 17-19	Mendelson, D’Angelo
1E	3	Mendelson, D’Angelo, Ordning
1F	4-6, 8, 16, 18, 20	Mendelson, D’Angelo, Tran
1G	2, 7, 14, 17	Mendelson, D’Angelo, Kianl
1H	3	Mendelson, D’Angelo, Kianl, Ordning
1I	10-11	Mendelson, D’Angelo, Goldsmith

Ground	Claims	§102 Prior Art
2A	13, 15, 18-19	Mendelson, Moon
2B	16, 18, 20	Mendelson, Moon, Tran
2C	14, 17	Mendelson, Moon, Kianl
2D	1-2, 5, 7, 9, 12-15, 17-19	Mendelson, Moon, D'Angelo
2E	3	Mendelson, Moon, D'Angelo, Ording
2F	4-6, 8, 16, 18, 20	Mendelson, Moon, D'Angelo, Tran
2G	2, 7, 14, 17	Mendelson, Moon, D'Angelo, Kianl
2H	3	Mendelson, Moon, D'Angelo, Kianl, Ording
2I	10-11	Mendelson, Moon, D'Angelo, Goldsmith

Mendelson was made publicly available and interested persons would have been able to locate Mendelson on or shortly after its presentation at the September 2006 IEEE EMBS Annual International Conference. APPLE-1012, ¶¶6, 8-11, 13-15, 18-21; APPLE-1003, ¶¶39-40. D'Angelo was made publicly available and interested persons would have been able to locate D'Angelo on or shortly after its presentation at the August 30th to September 3rd, 2011 IEEE EMBS Annual International Conference. APPLE-1012, ¶¶22, 7-10, 12-13, 16-20; APPLE-1003, ¶112.

Reference	Date	Section
Mendelson	September 2006 (published)	§102(b)
Tran	January 3, 2008 (published)	§102(b)
Kianl	Dec. 2, 2003 (issued)	§102(b)

Reference	Date	Section
D'Angelo	September 2011 (published)	§102(b)
Ording	October 12, 2010 (issued)	§102(b)
Goldsmith	April 26, 2007 (published)	§102(b)
Moon	December 23, 2010 (published)	§102(b)

C. Claim Construction under 37 C.F.R. §§ 42.104(b)(3)

All claim terms should be construed according to the *Phillips* standard.

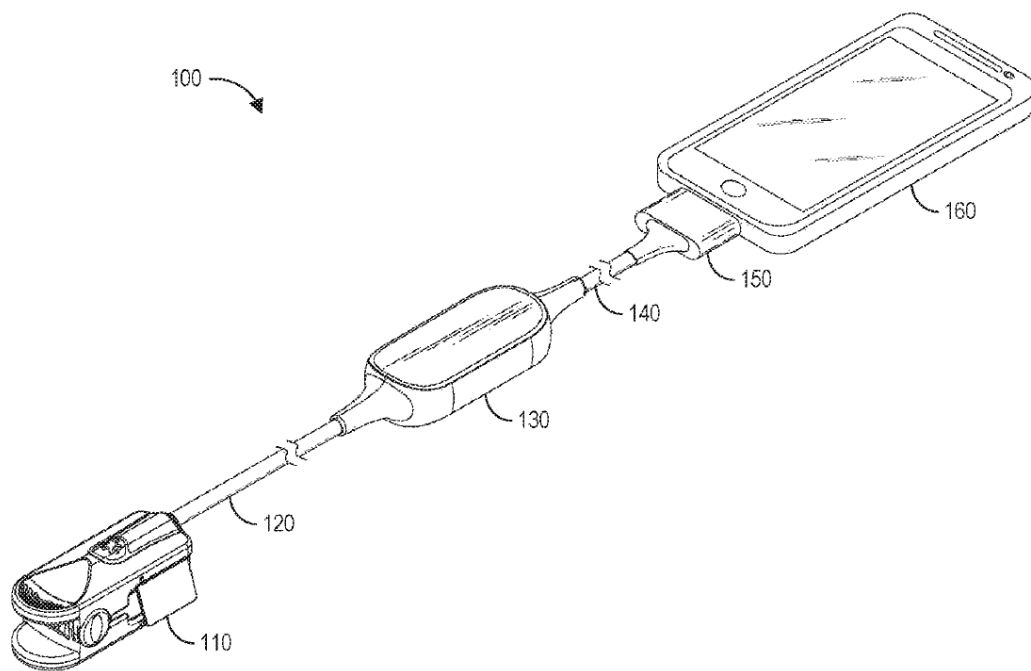
Phillips v. AWH Corp., 415 F.3d 1303 (Fed. Cir. 2005); 37 C.F.R. §42.100. Apple submits that no claim terms need be construed to resolve issues of controversy in the present Petition. *See Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011).

II. SUMMARY OF THE '507 PATENT

A. Brief Description

The '507 patent's physiological monitoring system includes sensor 110, processing module 130, and mobile computing device 160. APPLE-1001, 3:57-62; APPLE-1003, ¶¶34-37. The sensor 110 can be "a pulse oximeter capable of being secured to a digit such as a finger." *Id.*, 4:9-10. The mobile computing device 160 "can be one of a wide range of mobile devices such as...a smartphone...PDA...wristwatch, [or] wearable computing device." *Id.*, 3:65-4:4. The processing module 130 receives sensor data from the sensor 110 and processes the signal "to provide output data for display on the smartphone 160." *Id.*, 4:65-10.

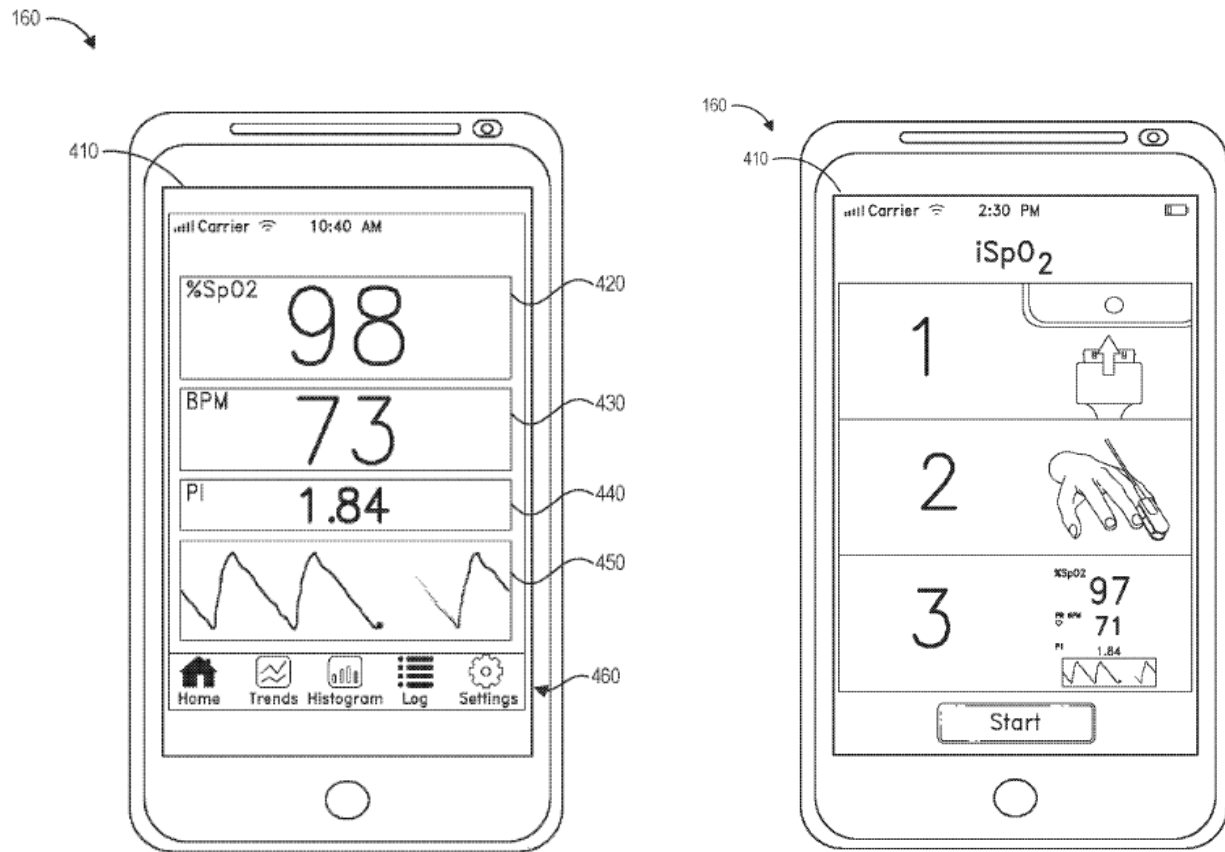
The processing module 130 can wirelessly transmit this data to the mobile computing device 160. *Id.*, 4:39-45. In another embodiment “[t]he processing module 130 and sensor 110 draw power for operation from the mobile computing device.” *Id.*, 7:63-66.



APPLE-1001, Figure 1A.

The mobile computing device 160 can include “an application configured to manage output measurement data from the processing module 130.” APPLE-1001, 5:25-27. “The application functionality can include trend analysis, current measurement information, alarms associated with above/below threshold readings, [and] reminders to take measurement data at certain times or cycles.” *Id.*, 5:27-32.

In Figure 4A, a display 410 of the smartphone 160 displays a user interface with “a plurality of display portions in which a plurality of physiological parameters can be displayed, such as SpO2 display 420, heart rate display 430.” *Id.*, 13:25-33. A user can interact with his physiological monitoring data through an options display portion 460, for example, choosing to view trends in the data by viewing a histogram or other graph. *Id.*, 13:44-50.



APPLE-1001, Figures 4A (left) and 4D.

B. Prosecution History

The '507 patent was allowed after receiving a single office action. APPLE-1002, 107-120. Then-pending claims 2 and 14 (corresponding to issued claims 1

and 13) were amended to include display-related limitations. *Id.*, 96-106. A notice of allowability was issued with further amendments from the examiner adding, “generating a graphical user interface having a plurality of display portions.” *Id.*, 30-41. However, as demonstrated below, the more pertinent references, including Mendelson, D’Angelo, and Moon, provide the recited claim elements in a manner highly consistent with Masimo’s application of the claims for purposes of infringement.

III. APPLICATION OF PRIOR ART TO THE ’507 PATENT CLAIMS

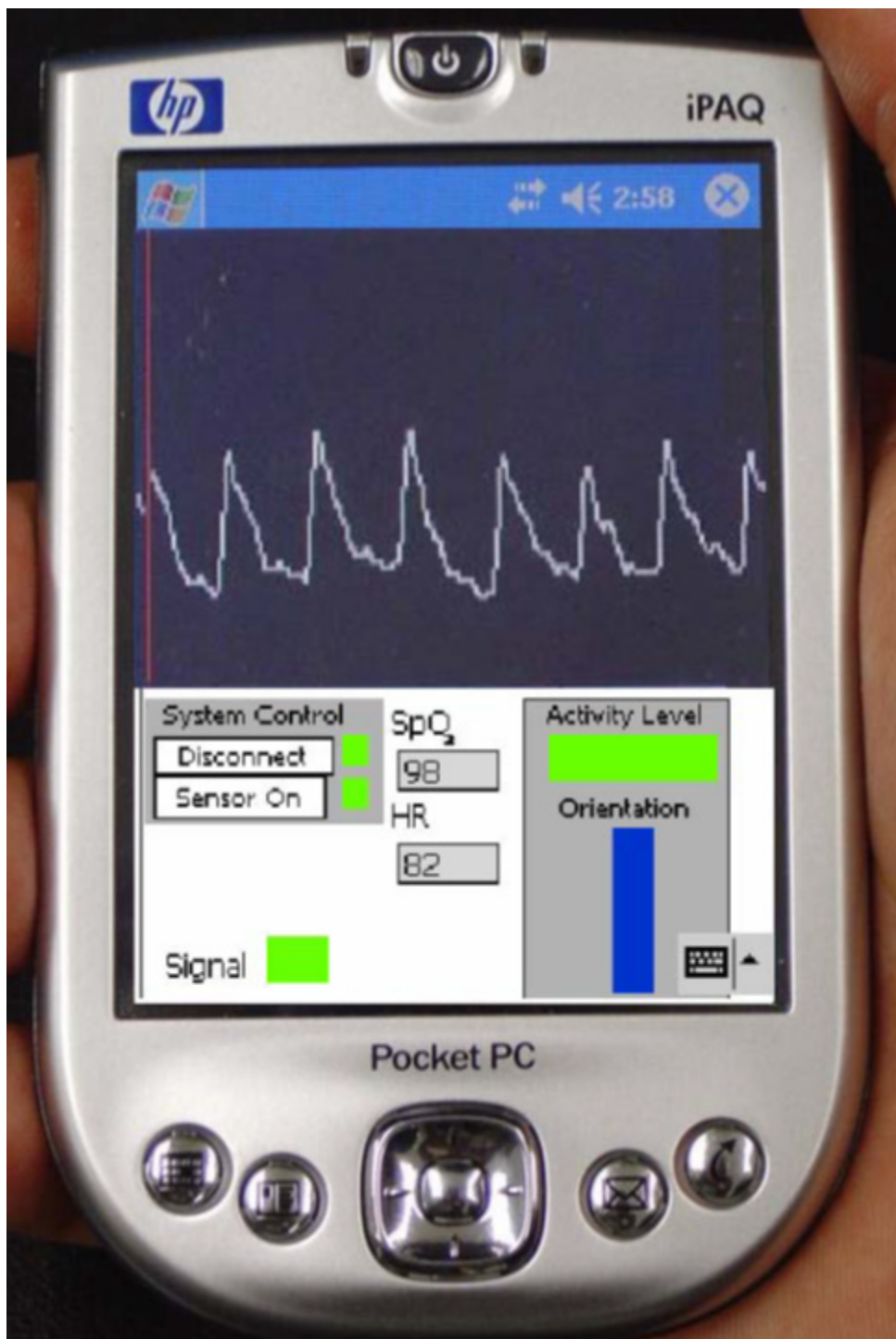
A. GROUNDS 1A1-1A2: Mendelson Anticipates or Renders Obvious Claims 13, 15, and 18-19

1. Overview of Mendelson

Mendelson discloses a physiological parameter monitoring system that is highly similar to that described by the ’507 patent. As with the system of the ’507 patent, Mendelson describes a “physiological monitoring” system for monitoring vital signs including “blood oxygenation and heart rate” that includes three devices/modules in communication with each other: (1) a sensor module, (2) a receiver module, and (3) a PDA that acts as a display and user interface. APPLE-1011, 1-3. The “Sensor Module contains analog signal processing circuitry” and wirelessly transmits sensor data “via an RF link over a short range to a body-worn Receiver Module.” *Id.*, 2. The Receiver Module uses “[d]edicated software...to

filter the signals and compute SpO₂ and [heart rate] based on the relative amplitude and frequency content of the reflected PPG signals.” *Id.* This physiological information is “transmitted wirelessly to a PDA” running, e.g., “LabVIEW software” which displays the data in “various locations on the PDA’s graphical display” including a “scrolling PPG waveform” and “[n]umerical SpO₂ and HR values.” *Id.*, 2-3.

The PDA includes a touchscreen that “enables multiple controls to occupy the same physical space.” APPLE-1011, 3. The GUI of the PDA “allows easy activation of various functions.” *Id.* FIG. 3 shows the GUI including SpO₂, HR, Activity Level, and Orientation parameters, the PPG waveform, and various user interface controls:



APPLE-1011, 3.

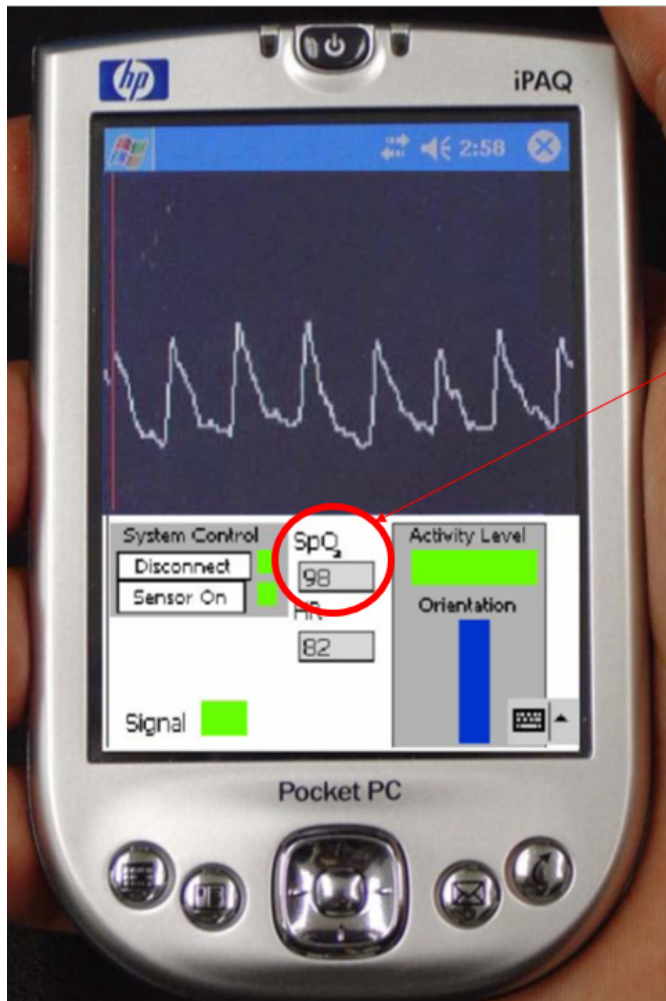
2. Analysis

Claim 13

[13pre] A computer-implemented method of informing a user of mobile measurement of oxygen saturation (“SpO₂”), the computer-implemented method comprising:

Mendelson describes a “wearable pulse oximeter” for measuring “arterial oxygen saturation (SpO₂)” that facilitates “remote noninvasive monitoring of vital signs.” APPLE-1011, 1-2. Mendelson’s pulse oximetry system is designed for mobile measurement of oxygen saturation (under Masimo’s asserted definition for purposes of infringement) by providing a wearable blood oxygenation monitor that is “unobtrusive” and does “not hinder a person’s mobility.” APPLE-1011, 1. Mendelson’s system is configured to measure SpO₂ for users of various “activity level[s] measured by the wearable accelerometer” such as by “electronic filtering of noisy PPG signals” caused by, for example, motion of the user. APPLE-1011, 2-3, APPLE-1003, ¶¶39-52.

The vital sign readings, including SpO₂, are communicated to a mobile device, such as a PDA, for display to the user. APPLE-1011, 2-3.



SpO₂ displayed
to user

APPLE-1011, 3. The vital sign readings can also be transmitted “to a remote location” to allow “medical providers” to assess the wearer’s condition. APPLE-1011, 1-3. APPLE-1003, ¶¶47-52.

[13a] outputting, from an optical sensor of an SpO₂ measurement system, one or more signals responsive to light from a light source attenuated by tissue of the user at a measurement site, said one or more signals responsive to an oxygen saturation of said tissue; and

Mendelson’s “Sensor Module” is “a body-worn *pulse oximeter* that receives

and processes the PPG signals measured by a...*optical reflectance transducer*.”¹

APPLE-1011, 2. “Pulse oximetry is a widely accepted method that is used for noninvasive monitoring of SpO₂ and [heart rate (HR)].” APPLE-1011, 1. LEDs of Mendelson’s pulse oximeter emit light into a wearer’s fingertip, foot, earlobe, forehead, or other exposed skin which are then measured by photodetectors after attenuation through the skin to determine “variations in the quantity of arterial blood that is associated with periodic contractions and relaxations of the heart.” *Id.*, 1-4; APPLE-1003, ¶¶53-56. Thus, the sensor measures “arterial oxygen saturation (SpO₂).” APPLE-1011, 1; APPLE-1003, ¶¶41-42, 54.

Furthermore, “[t]he information acquired by the Sensor Module is transmitted wirelessly via an RF link over a short range to a body-worn Receiver Module.” APPLE-1011, 2. This description of signals sent from the Sensor Module to the Receiver Module in Mendelson corresponds to the patent owner’s apparent interpretation of this element in its exemplary infringement claim charts. APPLE-1014, 3; APPLE-1015, 5-6.

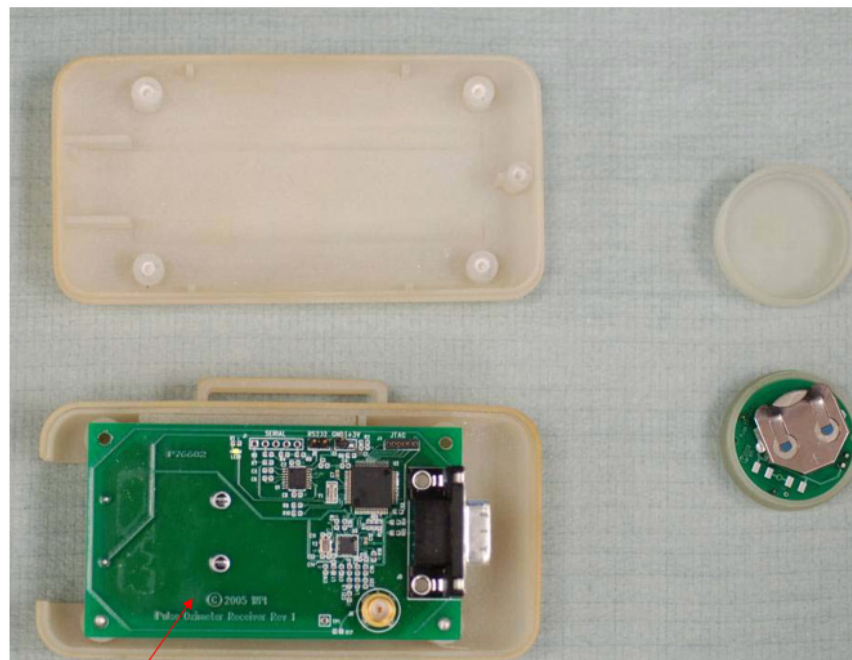
As such, Mendelson’s *optical sensor outputs signals responsive to light from a light source attenuated by tissue of the user at a measurement site*.

APPLE-1003, ¶¶53-56.

¹ All emphasis added unless otherwise noted.

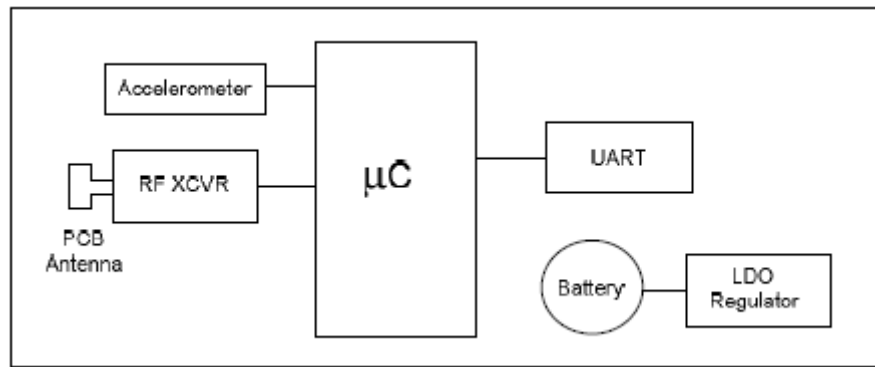
[13b] via a processing board of the SpO₂ measurement system, the processing board in data communication with the optical sensor and a mobile computing device including a display:

Mendelson's SpO₂ measurement system provides the claimed processing board in the form of a "Receiver Module contain[ing] an embedded microcontroller." APPLE-1011, 2; APPLE-1003, ¶¶57-62, 43.



Processing
board of the
Receiver Module

APPLE-1011, 2.



Id.

The Receiver Module includes an “RF transceiver for communicating with the sensor module” (the optical sensor). APPLE-1011, 2. The Receiver Module receives “[s]ignals acquired by the Sensor Module” and uses “[d]edicated software...to filter the signals and compute SpO₂ and HR.” *Id.* The Receiver Module further includes a wireless module “[t]o facilitate bi-directional wireless communications between the Receiver Module and a PDA.” *Id.* The PDA includes a touchscreen for displaying a GUI. *Id.*, 3.

[13c]-[13d] receiving said one or more signals from the optical sensor; processing said one or more signals to generate the SpO₂ measurement values; and

The Receiver Module receives “[s]ignals acquired by the Sensor Module” and uses “[d]edicated software...to filter the signals and compute SpO₂ and HR.” APPLE-1011, 2 (“[t]he information acquired by the Sensor Module is transmitted wirelessly via an RF link over a short range to a body-worn Receiver Module.”), *see also* 1, 4; APPLE-1003, ¶¶63-64, 43.

***[13e] outputting the SpO₂ measurement values to the mobile computing device;
and***

Mendelson discloses that “[t]he data processed by the Receiver Module can be transmitted wirelessly to a PDA” which “collect[s] vital physiological information” from one or more Receiver Modules. APPLE-1011, 2; APPLE-1003, ¶¶65, 44-46. The “stream of data received from the wearable unit” includes “SpO₂ and HR values” which “are displayed” on the PDA. APPLE-1011, 3. In another example, Mendelson describes that the user worn Receiver Module “has short range wireless communication capabilities to transfer SpO₂, HR, body acceleration, and posture information to a PDA carried by medics or first responders.” *Id.*, 4.

[13f] via an application configured to execute commands on the mobile computing device:

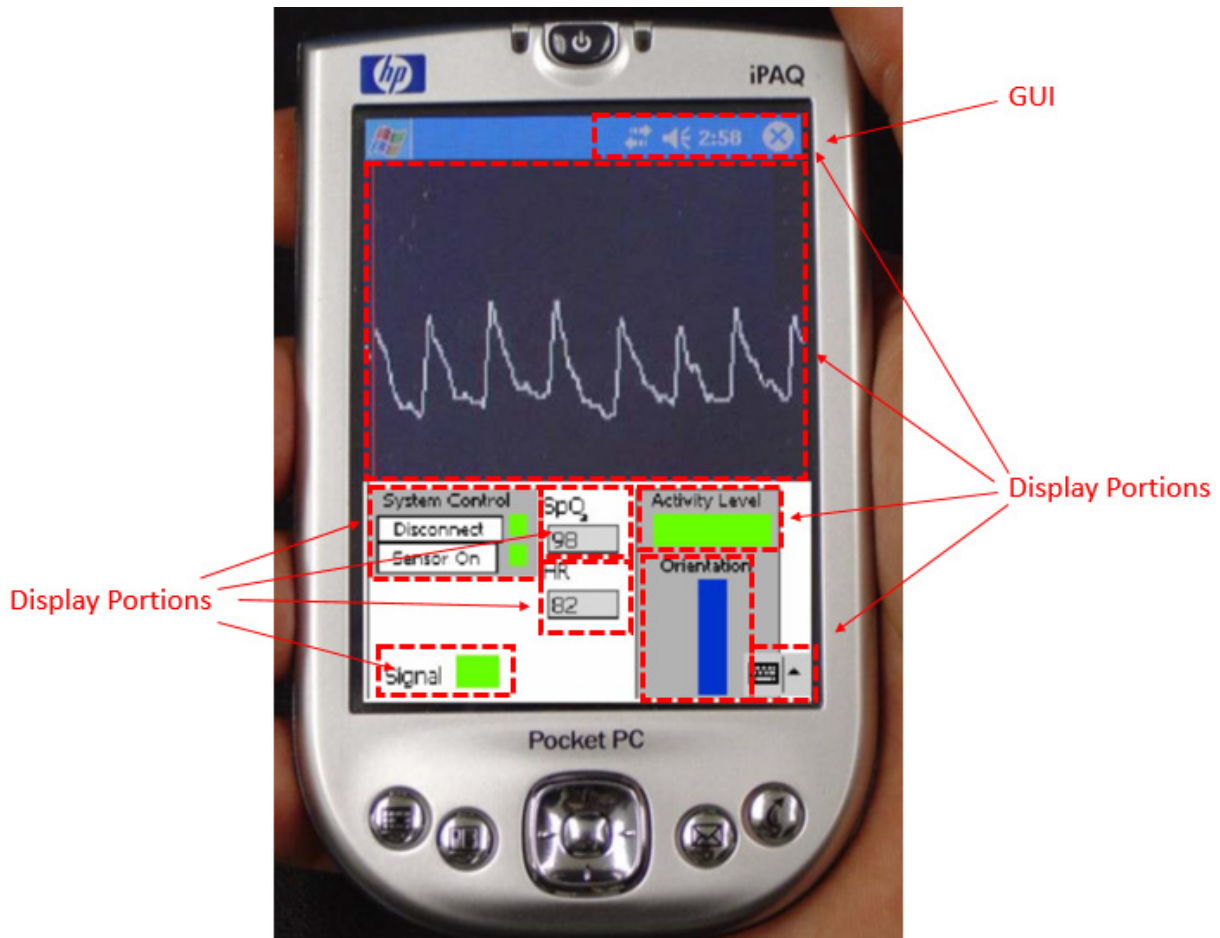
Mendelson’s PDA executes “[a] dedicated National Instruments LabVIEW program...developed to control all interactions between the PDA and the wearable unit via a graphical user interface (GUI).” APPLE-1011, 3. “The LabVIEW program interacts with Windows CE™ on a higher level and allows Windows CE™ to handle the drivers and the direct control of the radio hardware.” *Id.* LabVIEW includes a GUI that “allows easy activation of various functions.” *Id.* A person of ordinary skill in the art (POSITA)² would have recognized from

² APPLE-1003, ¶¶32-33 (defining a POSITA)

Mendelson's disclosures that LabVIEW is an application that executes commands on the PDA (or at least would have found such disclosures to render this element obvious). APPLE-1003, ¶66.

[13g] generating a graphical user interface having a plurality of display portions;

Mendelson's "GUI was configured to present the input and output information to the user and allows easy activation of various functions. APPLE-1011, 3; APPLE-1003, ¶¶67-68, 45. Furthermore "[t]he stream of data received from the wearable unit is *distributed to various locations on the PDA's graphical display.*" *Id.* FIG. 3 shows the display portions of the GUI:



APPLE-1011, Figure 3

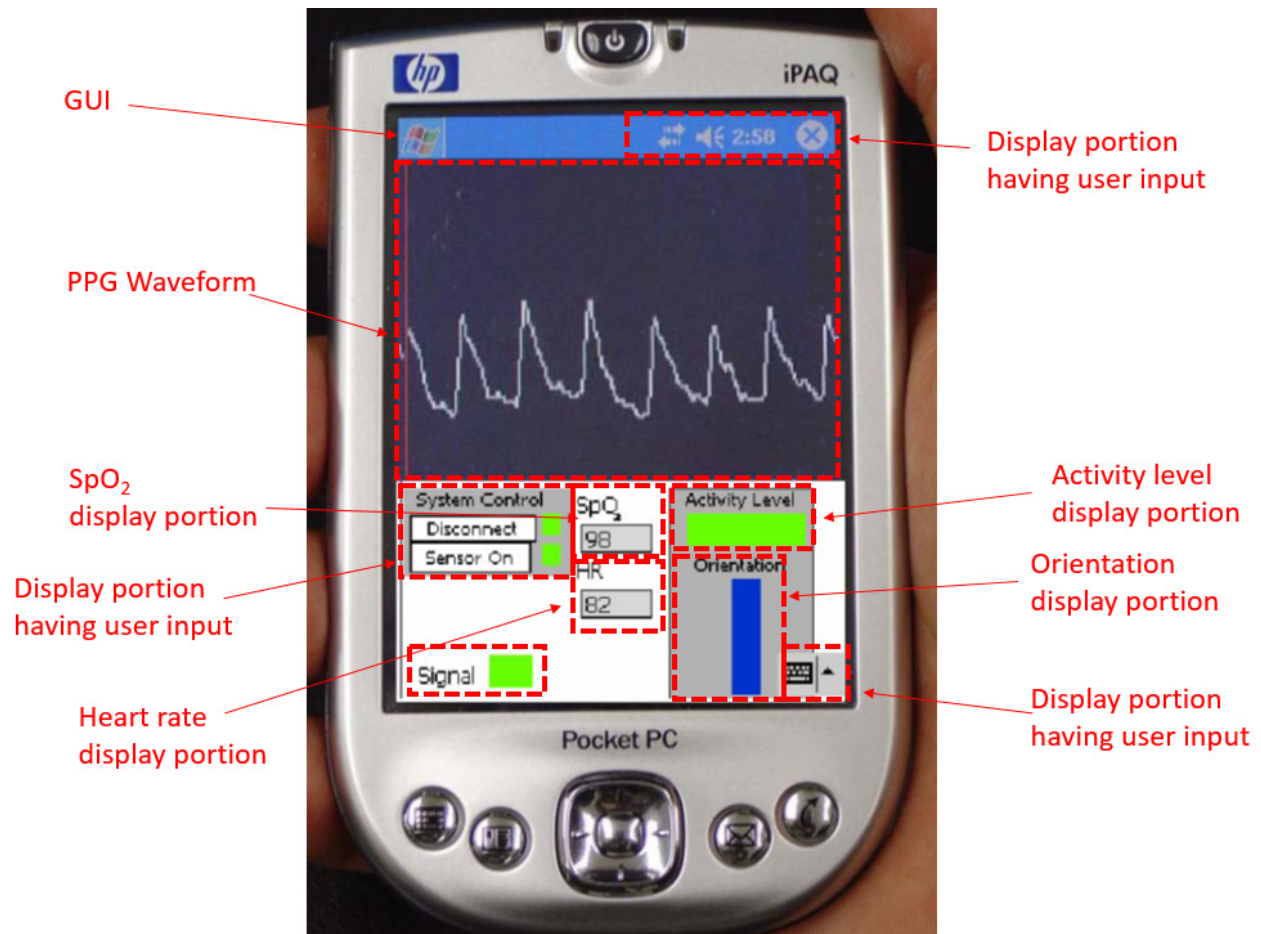
As shown in FIG. 3, the display portions show a “scrolling PPG waveform...[n]umerical SpO₂ and HR values” and indications of orientation and activity level along with various inputs for interacting with the application.

APPLE-1011, 3; APPLE-1003, ¶¶67-68, 45-46.

[13h] displaying, in at least one portion of the plurality of display portions, a representation of a physiological parameter of a plurality of physiological parameters comprising at least the SpO₂ measurement values; and

Mendelson’s GUI displays representations of a plurality of physiological parameters including, “a scrollable PPG waveform,” “[n]umerical SpO₂ and [heart

rate] values,” “activity level,” and “orientation.” APPLE-1011, 3. FIG. 3 shows the different display portions including SpO₂ measurement values. APPLE-1003, ¶¶69, 45-46.



APPLE-1011, FIG. 3.

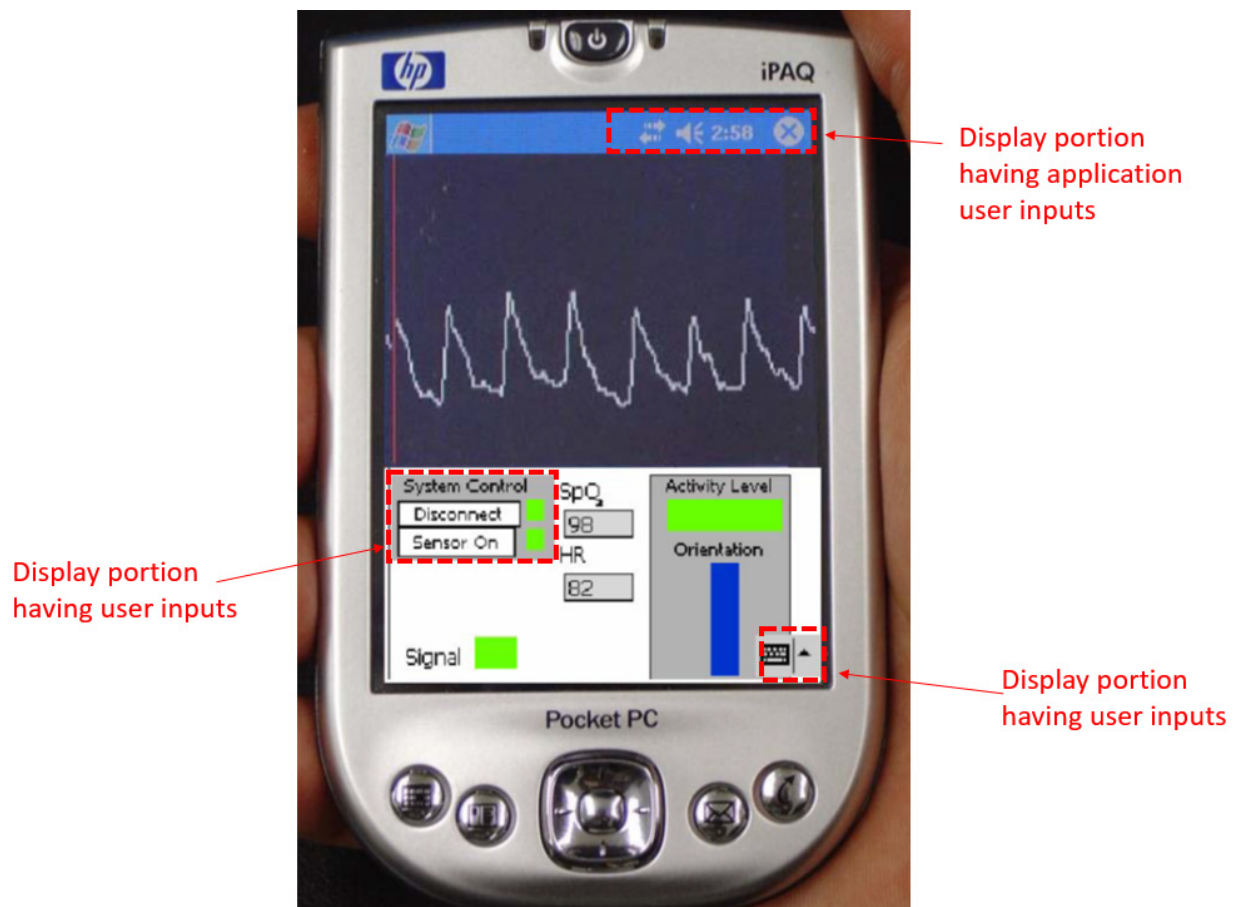
[13i] displaying, in a different portion of the plurality of portions, a plurality of user inputs configured to allow the user to interact with at least one of the plurality of display portions or the application.

Mendelson includes several display portions that meet this element. For example, Mendelson describes that “[t]he user interacts with the wearable system using a simple GUI” that “allows easy activation of various functions.” APPLE-

1011, 3. Mendelson further discloses that the GUI displayed on the PDA's touchscreen "*enables multiple controls to occupy the same physical space.*" *Id.*; APPLE-1003, ¶¶70-73, 45. The language "configured to allow the user to interact with at least one of the plurality of display portions or the application" does not appear to be limiting, however, to the extent that this language is given weight, based on Mendelson's description of its GUI as configured to "allow[] easy activation of various functions," a POSITA would have found it obvious for the GUI to be configured to allow the user to interact with at least one of the plurality of display portions or the application. APPLE-1011, 3; APPLE-1003, ¶¶71-72.

As shown in the annotated FIG. 3, below, the display portion in the upper right includes a plurality of user inputs for interacting with the application, e.g., those configured to allow adjusting the volume, switching to a previous or next view, and closing the application. APPLE-1003, ¶¶73, 70. Along the left side, a display portion includes multiple user inputs for "system control" including disconnecting from a sensor and turning the sensor on and off. Mendelson describes that "the System Control panel...manages the connection and sensor control buttons." APPLE-1011, 3. A POSITA would have found it obvious to use such actions to change the values displayed for the physiological parameters including SpO₂, HR, Activity Level, and Orientation and therefore allow user interaction with at least one of the plurality of display portions and with the

application, or it at least would have been obvious to a POSITA to implement the system in such a manner. APPLE-1003, ¶73. The display portion in the lower right includes multiple user inputs in the form of keys of a virtual keypad displayed in response to selection of the control that a POSITA would have recognized as indicating (or at least rendering obvious) a control for interacting with the application. APPLE-1003, ¶73.



APPLE-1011, FIG. 3.

A POSITA would have understood and found obvious that these options are *configured to allow the user to interact with the display portions or the*

application. APPLE-1003, ¶¶70-73.

Claim [15] The computer-implemented method of claim 13, further comprising, via the application, outputting one or more alarms associated with SpO₂ measurement values that are above or below threshold SpO₂ measurement values.

Mendelson describes that “[a]larm limits could be set to give off a warning sign if the physiological information exceeds preset safety limits.” APPLE-1011, 3. This “physiological information” includes “SpO₂” values. *Id.*, 1-3. In another example, Mendelson describes emitting an “alert on alarm conditions” in response to “physiological values out of their normal range.” *Id.*, 2. Such alarms are all part of the “LabVIEW program.” *Id.*, 3; APPLE-1003, ¶74.

Claim [18] The computer-implemented method of claim 13, further comprising, via the application, outputting an alert, via a network to a designated physician or other care provider, regarding abnormal SpO₂ readings.

Mendelson describes monitoring vital signs of mobile users to “allow[] the telemetry of physiological information to ***medical providers***” to facilitate “the ability to determine a casualty’s condition remotely.” APPLE-1011, 1. This includes transmitting heart rate and SpO₂ information “to a remote location.” *Id.* This includes “use in combat casualty care, such as for remote triage, and for use by first responders, such as firefighters.” *Id.*, 2. A POSITA would have recognized that first responders are care providers. APPLE-1003, ¶75. Furthermore, this section of Mendelson indicates that that “[t]he system can be programmed to ***alert***

on alarm conditions, such as sudden trauma, or *physiological values out of their normal range*.” APPLE-1011, 2; APPLE-1003, ¶75. These “physiological values” include “SpO₂” values. *Id.*, 1-3. This communication of physiological information including alarm conditions can occur through a “personal area network.” APPLE-1011, 1, 3-4; APPLE-1003, ¶76. Mendelson therefore provides, or at least renders obvious, this element.

Claim [19] The computer-implemented [method of] claim 13, further comprising wirelessly transmitting the SpO₂ measurement values from the SpO₂ measurement system to the mobile computing device.

Mendelson’s Receiver Module “has short range *wireless* communication capabilities to transfer *arterial oxygen saturation (SpO₂)*, heart rate (HR), body acceleration, and posture information *to a PDA*.” APPLE-1011, 1. Mendelson goes on to describe that the Receiver Module includes a wireless module “[t]o facilitate *bi-directional wireless communications between the Receiver Module and a PDA*.” *Id.*, 2. Furthermore, “[t]he data processed by the Receiver Module can be transmitted wirelessly to a PDA” which “collect[s] vital physiological information” from one or more Receiver Modules. *Id.*; APPLE-1003, ¶¶77-78.

B. GROUND 1B: The Mendelson-Tran Combination Renders Obvious Claims 16, 18, and 20

1. Overview of Tran

Tran discloses “methods and systems for monitoring a person.” APPLE-1005, [0002]; APPLE-1003, ¶¶80-83. One such system is shown in Figure 1A

below. Appliances in the system can include “patient monitoring devices that can be worn by the patient” such as a pulse oximeter. *Id.*, [0054], [0251], [0335] (“blood oxygen saturation monitor”), [0389].

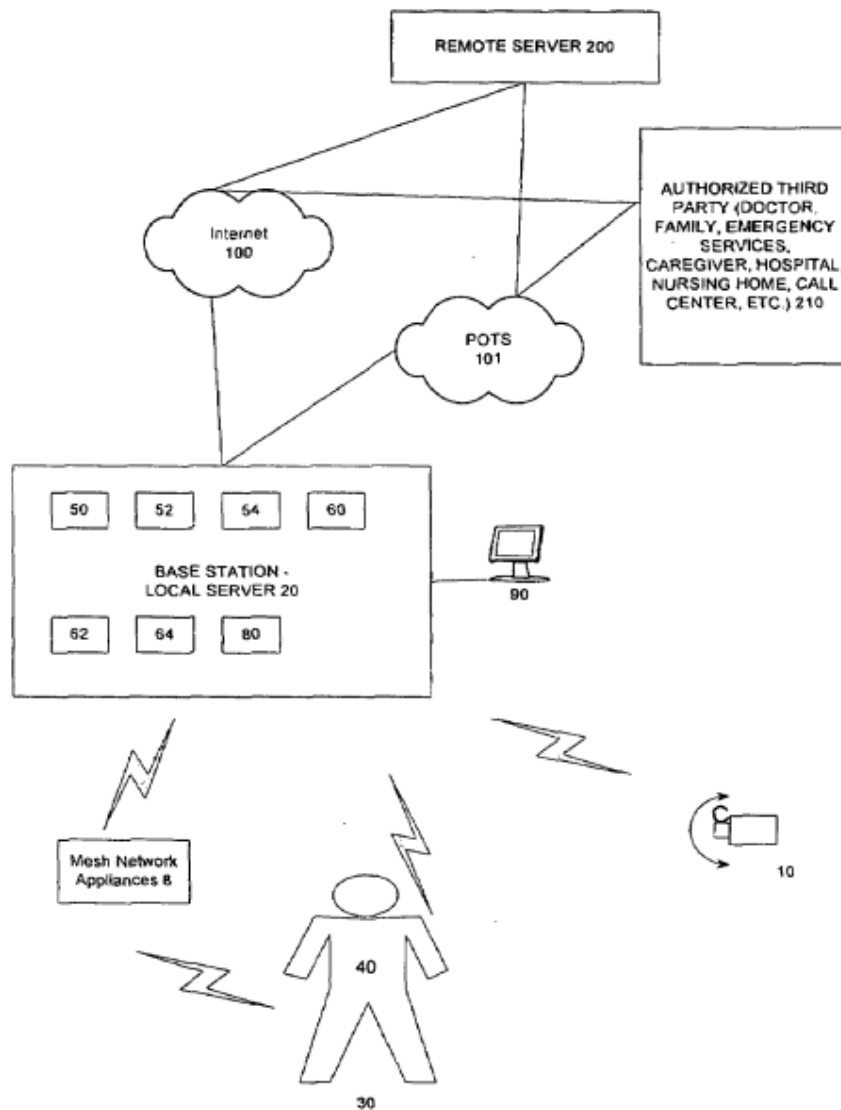


FIG. 1

APPLE-1005, Figure 1A.

“In one embodiment, users may set up alerts or reminders that are triggered when one or more reading[s] meet a certain set of conditions, depending on parameters defined by the user.” *Id.*, [0255]. An alert may be sent out when a data parameter exceeds a predetermined value. *Id.*, [0260]. A user can designate authorized individuals, such as clinicians or caregivers, to receive alerts and set reminders and alerts. *Id.*, [0257], [0261].

2. Combination of Mendelson and Tran

A POSITA would have been prompted to apply Tran to Mendelson to output reminders to the user to take SpO₂ measurements, allow the user to set such reminders to take future measurements, and to output an alert via a network to a designated physician or other care provider in response to abnormal SpO₂ readings. APPLE-1003, ¶¶84-94. First, such modifications would have ensured that the user’s SpO₂ levels are monitored at regular intervals so that appropriate action can be taken responsive to abnormal readings. APPLE-1003, ¶¶85-86. Mendelson specifies the importance of issuing “alert[s] on alarm conditions” when “physiological values” such as SpO₂ are “out of their normal range.” APPLE-1011, 2. Mendelson also discloses the importance of such measurements to “facilitate remote noninvasive monitoring of vital signs.” *Id.*, 1-2. Tran complements this

functionality by teaching that “users may set up alerts or reminders” that occur according to a user specified “time duration in units such as hours, days, weeks or months.” APPLE-1005, [0255]. Such reminders could be included in a “to do list” displayed to the user. *Id.*, [0418]. Such an application of Tran to Mendelson would have been particularly beneficial in the use cases of Mendelson in which the user is monitoring their own vital signs rather than the vital signs being monitored by a remote care giver. APPLE-1003, ¶86.

Second, such measurement reminders would have negated the need for continual monitoring of such parameters in at least some scenarios. APPLE-1003, ¶87. Mendelson identifies “reduce[d] power consumption” as an “essential attribute[] of wearable physiological devices” to overcome “the most significant limitation [of] battery longevity.” APPLE-1011, 1-2. Allowing for a configuration in which the system does not continually monitor SpO₂ levels in at least some scenarios while providing the user with reminders to make such measurements, as taught by Tran, would have increased the power savings and therefore extended battery longevity while ensuring that SpO₂ measurements are still collected at sufficient intervals. APPLE-1003, ¶87.

Third, allowing the user to “set up alerts or reminders” according to “parameters defined by the user” can ensure that the reminders to take future SpO₂ measurements are provided to the user at proper intervals to ensure that any

abnormal readings are properly captured and addressed. APPLE-1005, [0255]; APPLE-1003, ¶88. Allowing the user to set the parameters for such reminders, as taught by Tran, would have allowed for flexibility such that the user is reminded to take such measurements at a time that is most convenient to them (such as when the user is awake, not likely to be engaged in another activity, not in the shower, etc.), to ensure proper compliance with taking such measurements and improve health outcomes. APPLE-1003, ¶88.

Fourth, a POSITA would have applied Tran to Mendelson to send alerts to a designated physician or other care provider regarding abnormal SpO₂ readings because Mendelson already expressly describes the importance of allowing remote monitoring of vital signs (including SpO₂) by medical providers and the importance of issuing alerts when such “physiological values [are] out of their normal range.” APPLE-1011, 1-2. Tran describes that providing such alerts to remote care providers beneficially alert “remote healthcare provider[s]” to sudden changes in physiological parameters that can “indicate a problem” to allow such healthcare providers to quickly and accurately respond to the healthcare event. APPLE-1005, [0028], [0129], [0260]; APPLE-1003, ¶¶89-90. The user or caretaker can “choose[] the condition that they would like to be alerted to and [provide] the parameters (e.g. threshold value for the reading) for alert generation.” APPLE-1005, [0255]. This allows the healthcare provider to ensure that they are

only alerted to physiological parameter readings (including abnormal SpO₂) when such a reading is concerning for that particular patient. APPLE-1003, ¶90.

Fifth, applying Tran's teachings to Mendelson's system would have allowed for a wider variety of uses for the resulting system. It would have been obvious that the needs of some ordinary civilian users might depart from the needs of the military battlefield users that Mendelson was focused on. APPLE-1003, ¶91.

Finally, a POSITA would have been prompted to modify Mendelson's system to allow users to set reminders for future measurements of SpO₂ at predetermined times, and output such reminders, as well as send alerts to remote care providers regarding abnormal SpO₂ readings (as suggested by Tran) because doing so would be merely the application of a known technique to a known system ready for improvement to yield predictable results. APPLE-1003, ¶¶92-93; *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007). Here, both Mendelson and Tran disclose systems for remotely monitoring vital signs, including blood oxygenation, for users, and a POSITA would have recognized that applying Tran's suggestions to Mendelson's system would have led to predictable results with a reasonable expectation of success without significantly altering or hindering the functions performed by Mendelson's system. APPLE-1003, ¶93.

3. Analysis

Claim [16] The computer-implemented method of claim 13, further comprising, via the application, outputting one or more reminders to use the optical sensor to take measurements of SpO2 measurement values at predetermined times or cycles.

As discussed with respect to claim 13, Mendelson's device records SpO₂ and heart rate. APPLE-1011, 1-4. Tran similarly discloses taking multiple physiological measurements including "blood oxygen saturation" using a pulse oximeter. APPLE-1005, [0054], [0246], [0335], [0417]. Tran provides that in the predictable combination "users may set up alerts or ***reminders***" that occur at certain "interval[s]" which can be "a time duration in units such as hours, days, weeks or months" based on "parameters defined by the user." APPLE-1005, [0255]. A POSITA would have understood that such reminders would have beneficially applied to "one or more reading[s]" including the SpO₂ and heart rate readings disclosed by both Mendelson and Tran. APPLE-1005, [0255]; APPLE-1003, ¶¶95-96, 82, 84-86. Furthermore, a POSITA would have recognized that such reminders would have been output via the application (e.g., LabVIEW) in the predictable combination because Mendelson describes that LabVIEW "control[s] all interactions" in the system. APPLE-1003, ¶96; APPLE-1011, 3.

Claim [18]

As previously discussed, Mendelson discloses that "[t]he system can be programmed to ***alert on alarm conditions***, such as sudden trauma, or ***physiological***

values out of their normal range” and further discloses remote monitoring of patients. APPLE-1011, 1-3. Tran provides that in the predictable combination, “users may *set up alerts* or reminders that are triggered when one or more *reading meet a certain set of conditions*, depending on parameters defined by the user” including when readings, such as blood oxygen level meet a “threshold value for the reading.” APPLE-1005, [0255], [0252], [0054], [0246], [0335], [0417]; APPLE-1003, ¶97. Furthermore, “[t]he user chooses the destination where the alert may be sent.” *Id.*, [0255]. The alerts are communicated through a network. *Id.*, [0005], [0009], [0028], [0255]. A POSITA would have understood that such alerts would have beneficially applied to “one or more reading[s]” including the SpO₂ and heart rate readings disclosed by both Mendelson and Tran. APPLE-1005, [0255]; APPLE-1003, ¶¶97, 82, 86, 96. This includes “alert[ting] caretakers to out-of-the-ordinary” readings to allow such caretakers to take proper action for the patient. APPLE-1005, [0129], [0252], [0260], [0320]. A POSITA would have recognized that such alerts would have been output via the application (e.g., LabVIEW) in the predictable combination because Mendelson describes that LabVIEW “control[s] all interactions” in the system. APPLE-1003, ¶97; APPLE-1011, 3.

Claim [20] The computer-implemented method of claim 13, further comprising, via the application, enabling the user to set reminders to take future measurements.

Tran provides that in the predictable combination “*users may set* up alerts or *reminders*” that occur at certain “interval[s]” which can be “a time duration in units such as hours, days, weeks or months” based on “*parameters defined by the user.*” APPLE-1005, [0255]. In another example, “[a]n authorized person could set the reminders and alerts parameters.” *Id.*, [0257]. The reminder can be part of a “to do list.” *Id.*, [0418]. A POSITA would have understood that such reminders would have beneficially applied to “one or more reading[s]” including the SpO₂ and heart rate readings disclosed by both Mendelson and Tran and that such reminders to take readings are reminders to take future measurements. APPLE-1005, [0255]; APPLE-1003, ¶¶98, 82, 86, 96-97. Furthermore, a POSITA would have recognized that such reminders would have been set via the application (e.g., LabVIEW) in the predictable combination because Mendelson describes that LabVIEW “control[s] all interactions” in the system. APPLE-1003, ¶¶98.

C. GROUND 1C: The Mendelson-Kianl Combination Renders Obvious Claims 14, 17

1. Overview of Kianl

Kianl describes a blood oxygen saturation measurement system that includes “[a] pulse oximetry user interface ha[ving] a display and a plurality of views each configured to occupy the display.” APPLE-1006, Abstract; APPLE-1003, ¶¶99-

102. The system is configured to switch between interface displays including “a pleth view that presents a pulse waveform” and “a trend view that presents a trend graph” with a selectable icon for switching between views. APPLE-1006, Abstract, 2:18-46.

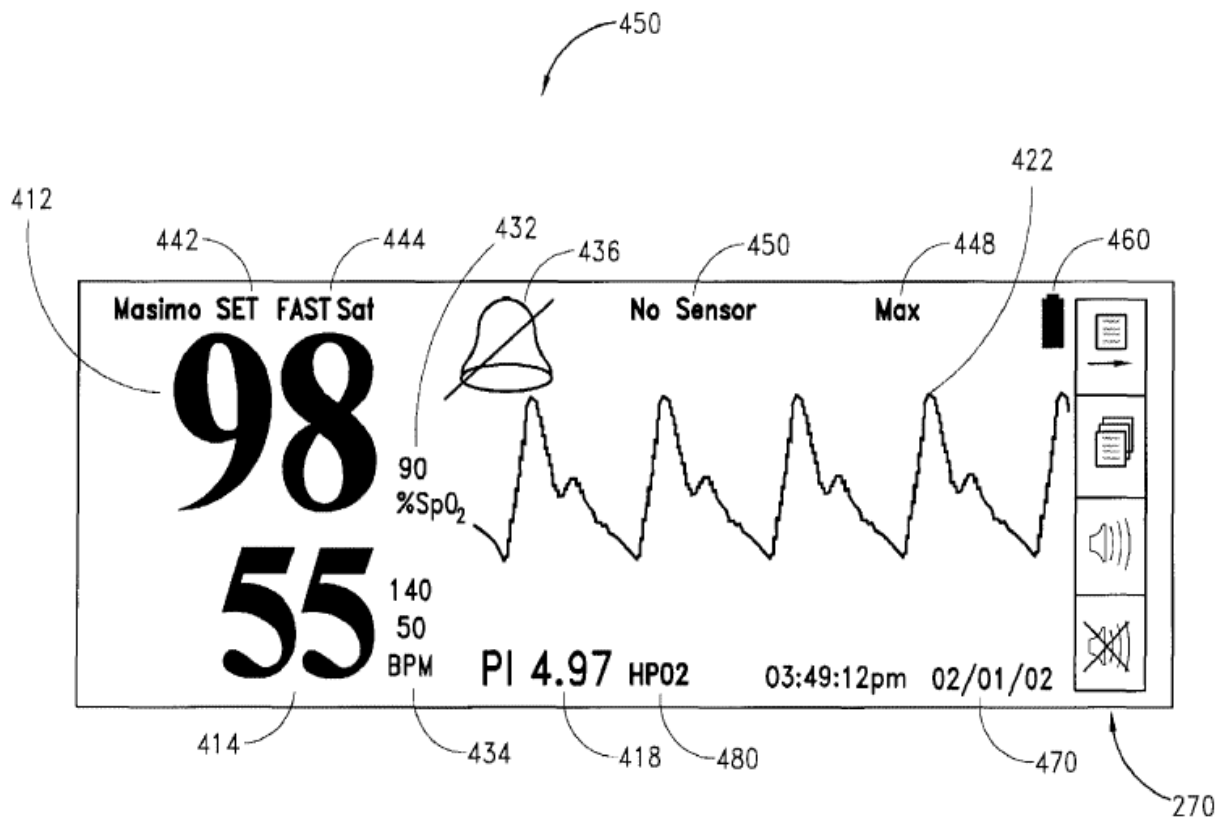


FIG. 4

APPLE-1006, FIG. 4.

“The oxygen saturation 412 displays a functional arterial hemoglobin oxygen saturation measurement in units of percentage SpO₂.” APPLE-1006, 6:1-3.

The display also includes a “pulse waveform 422” of blood oxygen level. *Id.*, 6:10-15. FIG. 10 includes “a pulse rate trend graph 1050” along with blood oxygen trend information over time. APPLE-1006, 11:6-49, 12:18-26.

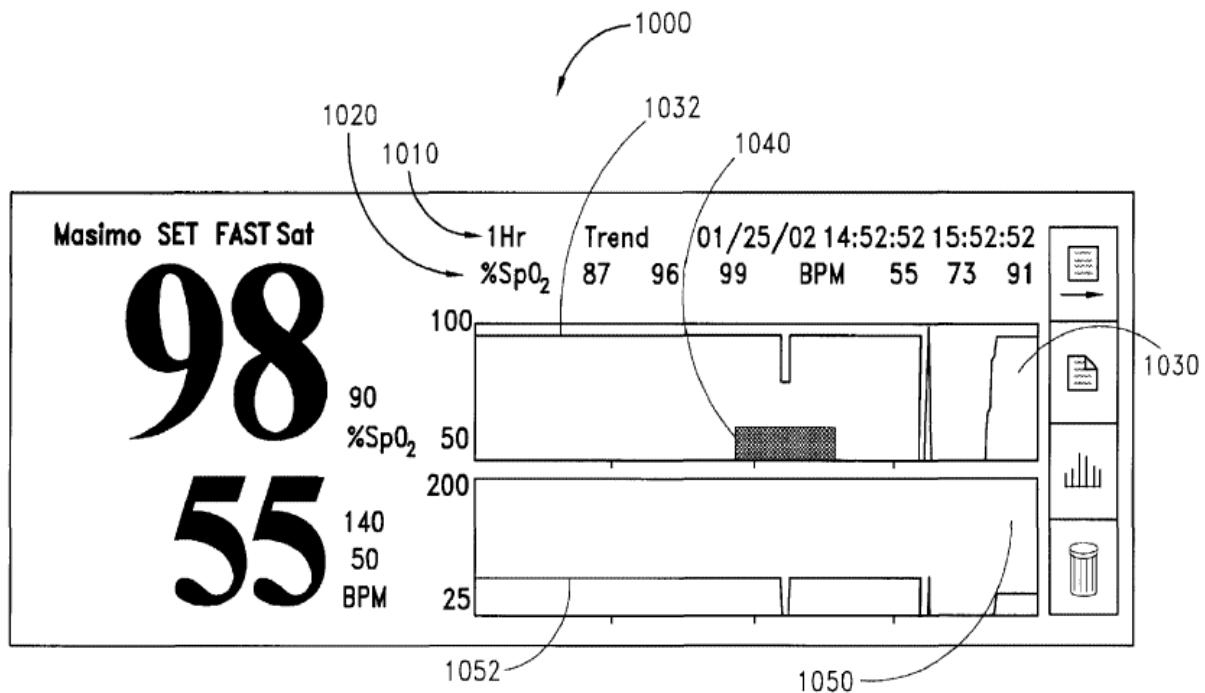


FIG. 10

APPLE-1006, FIG. 10. Kianl further describes a trend setup menu that allows the user to identify which trend analyses should be performed on the SpO₂ data. *Id.*, 15:10-56. Kianl also describes printing trend data and other data collected and generated by the system in various analog charts, including “printing” such information to various “trend views” of the system displayed on the user device, as

shown, for example, in FIG. 10. *Id.*

2. Combination of Mendelson and Kianl

Multiple reasons would have prompted a POSITA to apply Kianl to Mendelson to perform a trend analysis on received SpO₂ data, display the trend analysis results, and to display SpO₂ measurement values in a plurality of graphical representations including charts. APPLE-1003, ¶¶103-109. First, a POSITA would have recognized that “calculating a data trend” of measured SpO₂ data would have allowed health practitioners to readily identify abnormal patterns, conditions, and other health concerns based on the blood oxygen saturation data. APPLE-1006, 2:32-41; APPLE-1003, ¶104. Providing such data trend analysis automatically in the system would have led to more efficient identification of potential health concerns. *Id.* Second, allowing the user to easily switch between various SpO₂ data views, including trend analysis views and real-time measurement values and waveforms would have provided the most complete information for healthcare providers and users to allow for consideration of all such relevant information when assessing the patient’s condition. APPLE-1003, ¶105. Third, providing various graphical representations of SpO₂ values would have allowed healthcare providers and other users to more easily mentally process such information, leading to quicker and more accurate responsiveness to potential health conditions indicated by such information. APPLE-1003, ¶106. A POSITA would have

recognized that making processed physiological data easier to understand and react to would have improved the overall usefulness of the resulting system. *Id.* Fourth, providing touch screen user interface options for switching between such views would have increased the overall usability of the system. APPLE-1003, ¶107. Finally, such a modification also would have been merely the application of a known technique to a known system ready for improvement to yield predictable results and therefore a POSITA would have had a reasonable expectation of success in such a modification. APPLE-1003, ¶¶108-109; *KSR*, 550 U.S. at 417.

Claim [14] The computer-implemented method of claim 13, further comprising, via the application: performing a trend analysis on received SpO2 measurement values; and displaying results of the trend analysis in at least one portion of the plurality of display portions.

Kianl discloses that in the predictable combination the system “calculat[es] a data trend responsive to the physiological signal and provid[es] the pulse waveform in a first display view” as part of “a pulse oximetry user interface.” APPLE-1006, 2:32-36. FIG. 10 shows “a trend view 1000” that includes “an oxygen saturation trend graph 1030.” APPLE-1006, 11:6-31; APPLE-1003, ¶¶110, 100-103.

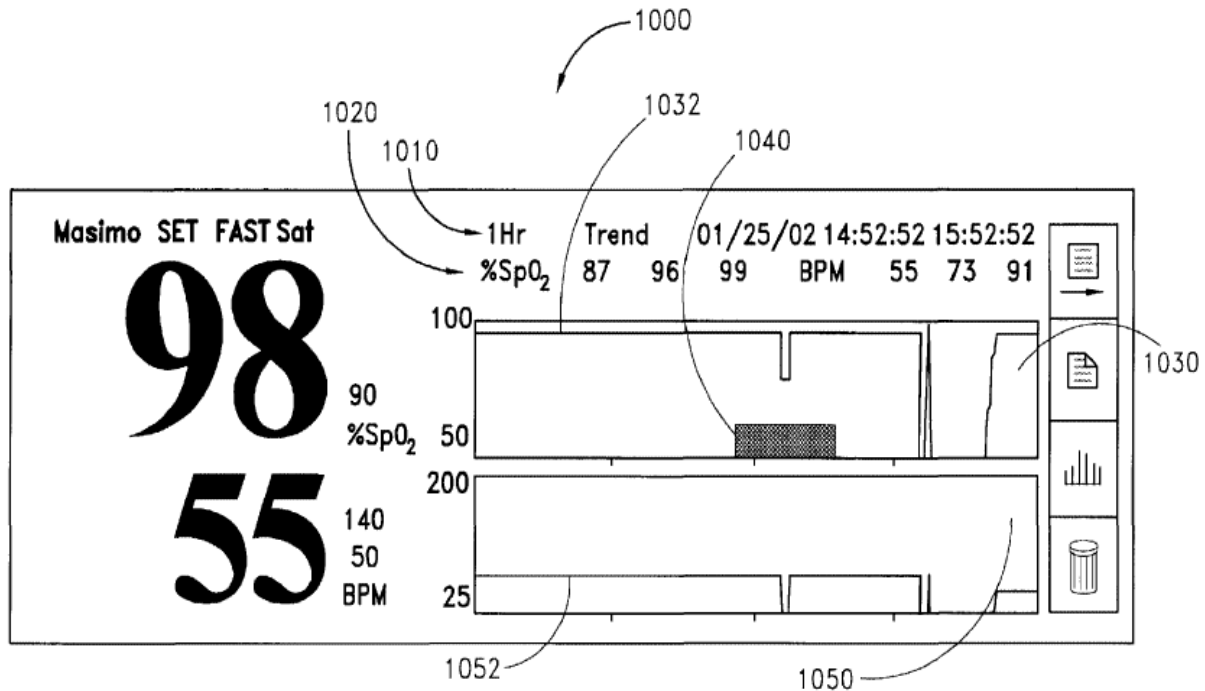


FIG. 10

APPLE-1006, FIG. 10. Kianl further discloses a “trend setup menu 1900” that allows the user to specify what trends are calculated and displayed based on the SpO₂ measurement data. *Id.*, 15:11-40.

Claim [17] The computer-implemented method of claim 13, further comprising, via the application, updating the representation of the physiological parameter to comprise one or more of a plurality of graphical representations of the SpO₂ measurement values, the plurality of graphical representations comprising at least one of bar graphs or charts.

Kianl discloses that in the resulting combination, the system provides a plurality of graphical representations of the SpO₂ measurement values including “a

pleth view that presents a pulse waveform” and “a trend view that presents a trend graph.” APPLE-1006, 2:18-31, 1:33-37; APPLE-1003, ¶¶111-112. The “pulse waveform 422” of FIG. 4 shows the pleth SpO_2 waveform while FIG. 10 demonstrates the “trend view 1000” including “oxygen saturation trend graph 1030.” APPLE-1006, 5:65-6:15, 11:6-49.

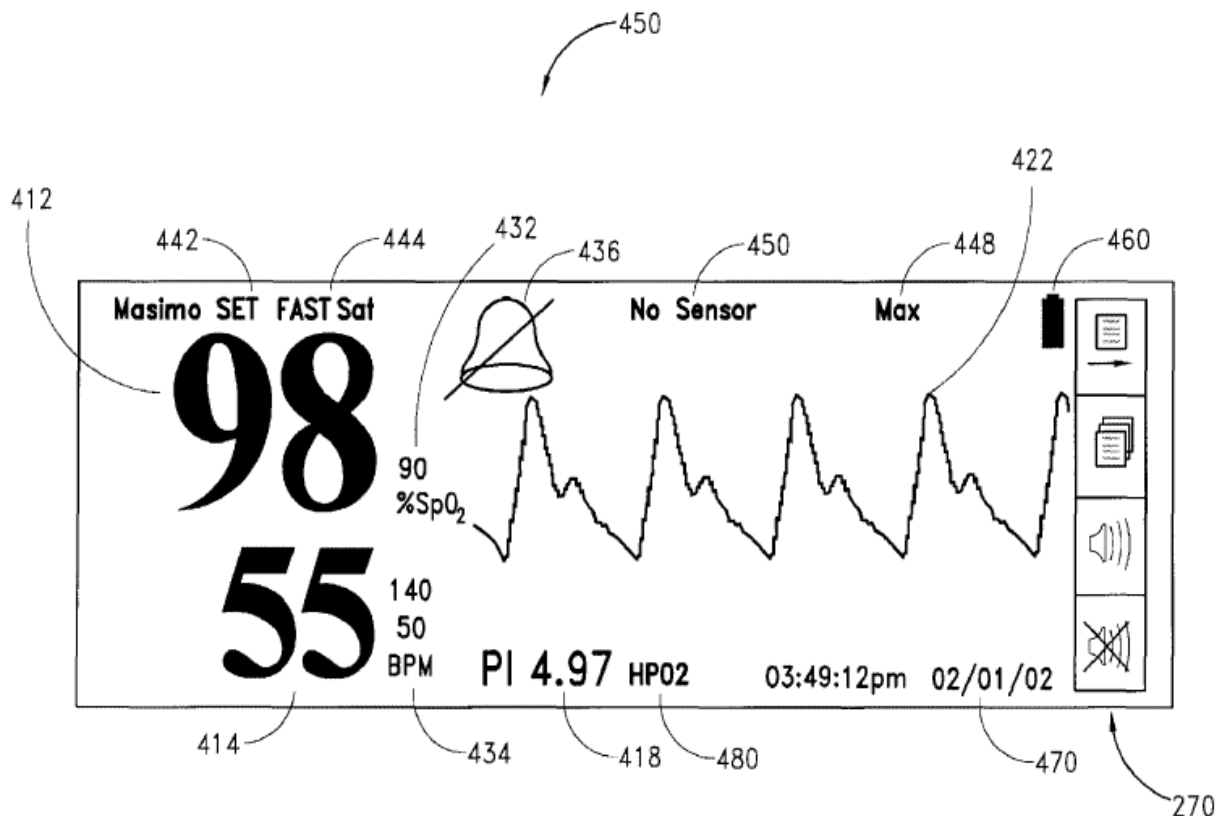


FIG. 4

APPLE-1006, FIG. 4.

“The oxygen saturation 412 displays a functional arterial hemoglobin

oxygen saturation measurement in units of percentage SpO_2 .” APPLE-1006, 6:1-3. The display also includes a “pulse waveform 422” of blood oxygen level. *Id.*, 6:10-15. FIG. 10 includes “a pulse rate trend graph 1050” along with blood oxygen trend information over time. APPLE-1006, 11:6-49, 12:18-26.

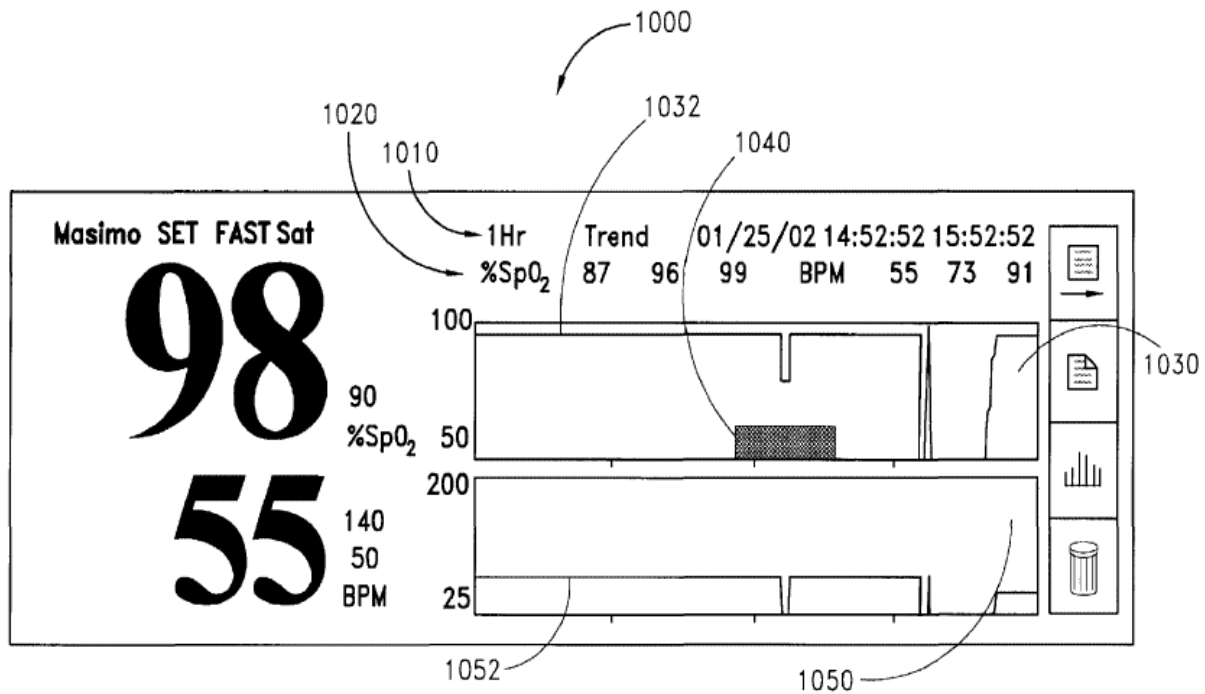


FIG. 10

APPLE-1006, FIG. 10. These trends are plotted over time and therefore a POSITA would have recognized that the display of these different representations of SpO_2 measurement data are updated with each new measurement. APPLE-1006, 11:6-49, 14:18-30; APPLE-1003, ¶¶111-112. Kianl further discloses a “trend setup

menu 1900” that allows the user to specify what trends are calculated and displayed based on the SpO₂ measurement data. *Id.*, 15:11-40. This menu includes an option to output the measured SpO₂ data as an “analog dump” including “an analog chart” of the data. A POSITA would have recognized that it would have been beneficial to include this chart as displayed data on the GUI of the resulting PDA device in addition to or in place of printing such information to more readily provide the information to the user or healthcare provider during the triage and assessment periods described in Mendelson. APPLE-1003, ¶¶112, 101-103, 108; APPLE-1011, 1-4. Displaying such information on the interface rather than in print would have negated the need for a printer which would have been beneficial in such remote settings outside of a healthcare facility. APPLE-1003, ¶112.

**D. GROUND 1D: The Mendelson-D’Angelo Combination
Renders Obvious Claims 1-2, 5, 7, 9, 12-15, 17-19**

1. Overview of D’Angelo

D’Angelo describes a system “for interfacing assistant devices and smartphones.” APPLE-1007, 1528; APPLE-1003, ¶¶114-120. The system includes a management device, shown below in Figure 4, that communicates with a variety of sensor network nodes that monitor and process various health parameters in real time. APPLE-1007, 1528-30. The management device

processes the data received from the sensors and can interface with a smartphone to display the measurements. *Id.*, 1529-31.



APPLE-1007, Figure 4.

D'Angelo teaches that its management device, when connected to a smartphone, draws power directly from the smartphone to allow it to operate even when the battery is dead. *Id.*, 1530. As shown in Figure 3 below, “[t]he second addition is a connection between the smartphone’s power output pin and the management device’s charging pin, allowing to read out the management device with the smartphone even when its battery is empty.” *Id.*

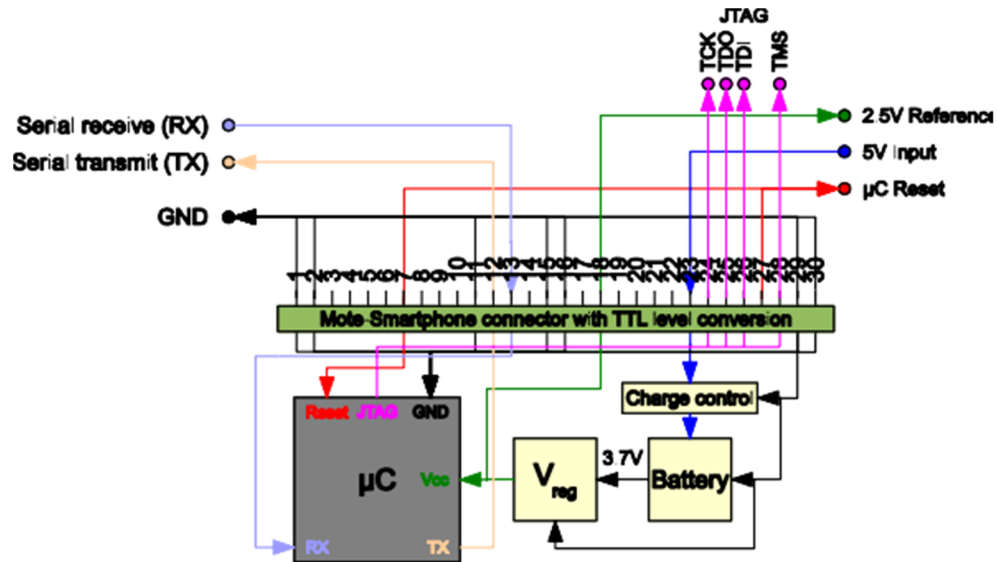
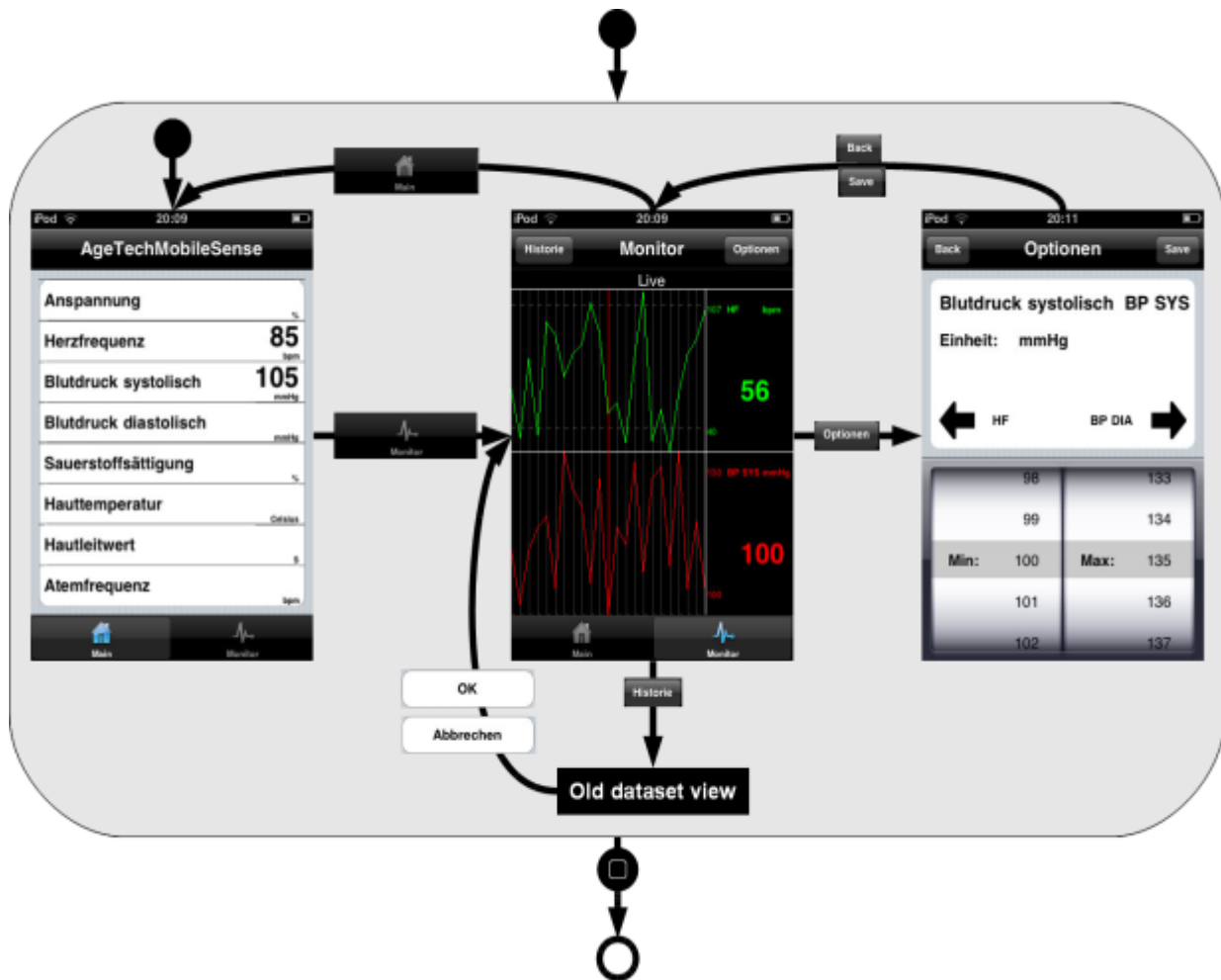


Fig. 3 Pin assignment of the mote-smartphone connector.

APPLE-1007, Figure 3.

D'Angelo further describes a user interface displayed by the smartphone that includes multiple views for displaying measured physiological parameters including numerical values for each variable along with "upper and lower limits" for the variables, a "graph view" which shows multiple rows associated with various variables, and an "options view" that allows the user to set upper and lower limits for each variable using a picker wheel. APPLE-1007, 1530-31.



APPLE-1007, FIG. 5. The graph view allows users to view minimum and maximum recorded values and “scroll through current and older values.” APPLE-1007, 1530-31. The measured values include SpO₂. *Id.*, 1529.

2. Combination of Mendelson and D’Angelo

Multiple reasons would have prompted a POSITA to apply D’Angelo to Mendelson to implement Mendelson’s PDA/display device as a smartphone, to configure Mendelson’s Receiver Module to draw power from the PDA/smartphone, and to include the various physiological data user interface

displays described by D'Angelo. APPLE-1003, ¶¶121-129. First, a POSITA would have recognized that by 2012, smartphones had become rather ubiquitous throughout the United States and other countries and possessed many, if not all, PDA functions and therefore it would have been beneficial to implement the PDA/display device of Mendelson as a smartphone to allow the LabVIEW functionality described by Mendelson to be implemented on a device already in the possession of many users. APPLE-1003, ¶122. Such a modification would have eliminated the need for users of the system to carry a PDA separate from a smartphone that many users already owned at the time, thereby saving on the cost of purchasing and maintaining multiple smart devices. *Id.* Such an implementation also would have increased usership of such a system as many people already owned smartphones by 2012 and therefore would have lowered the barrier to entry of utilizing such a system. *Id.*

Second, a POSITA would have recognized that implementing Mendelson's PDA/display device as a smartphone (as suggested by D'Angelo) would have allowed for recorded and processed physiological data to be more readily communicated to remote facilities such as through upload to a server. APPLE-1003, ¶123; APPLE-1007, 1528-1530. Mendelson discloses that its system is intended for remote monitoring of users and providing cellular communication capabilities in the PDA/monitoring device (by implementing the PDA as a

smartphone) would have increased the ability of the system to transmit such information to remote healthcare providers using existing cellular technology.

APPLE-1003, ¶123; APPLE-1011, 1-4.

Third, modifying Mendelson's system such that the Receiver Module draws power from the PDA/smartphone (as suggested by D'Angelo) would have allowed the PDA/smartphone "to read out the" measured physiological data "even when its battery is empty." APPLE-1007, 1530; APPLE-1003, ¶124. Such functionality would have, thus, provided crucial backup functionality for collecting important physiological data, including SpO₂ readings, even after the Receiver Module of Mendelson has lost power. APPLE-1003, ¶124.

Fourth, including the multiple measured physiological data views disclosed by D'Angelo in Mendelson's system would have improved the overall functionality and user experience of the resulting system. APPLE-1003, ¶125. D'Angelo discloses additional graphical views for collected physiological information, including SpO₂ readings, that would have helped users to more readily understand the recorded information, including by "scroll[ing] through current and older values." APPLE-1007, 1529-31; APPLE-1003, ¶125.

Fifth, providing the user interface controls described by D'Angelo in Mendelson's system would have allowed the user to easily set alarm limits for physiological parameters, including SpO₂. APPLE-1007, 1531; APPLE-1003,

¶126. Mendelson recognizes the importance of alerting the user or a care giver when SpO₂ values are outside of threshold values and D'Angelo allows those values to be set for each specific user according to their specific situation. APPLE-1011, 2-3; APPLE-1007, 1531; APPLE-1003, ¶126.

Sixth, A POSITA would have recognized that D'Angelo's user input controls for displaying various different controls and data views would have increased the utility of the resulting system. APPLE-1003, ¶127. Mendelson discloses that the LabVIEW software executing on the PDA/smartphone controls the system, and D'Angelo provides additional details for changing between different user interface views to control aspects of the system including by setting alarm limits and viewing the recorded physiological information in different formats including graphically, numerically (in charts), and as scrollable waveforms. APPLE-1007, 1530-1531; APPLE-1003, ¶127. A POSITA would have recognized that such additional functionality and flexibility in the GUI would have increased the overall utility of the system.

Finally, such a modification also would have been merely the application of a known technique to a known system ready for improvement to yield predictable results and therefore a POSITA would have had a reasonable expectation of success in such a modification. APPLE-1003, ¶¶128-129; *KSR*, 550 U.S. at 417.

3. Application of Mendelson-D'Angelo to claims

[1pre] A mobile pulse oximetry system for informing a user of mobile measurement of oxygen saturation (“SpO2”), the mobile pulse oximetry system comprising:

Mendelson discloses a system for monitoring “arterial oxygen saturation (SpO2), heart rate (HR), body acceleration, and posture information” that includes a Sensor Module, a Receiver Module, and a PDA (implemented as a smartphone in the resulting combination). APPLE-1011, 1-3; APPLE-1007, 1528-29; APPLE-1003, ¶¶130-135. Mendelson’s pulse oximetry system is designed for mobile measurement of oxygen saturation. *Supra*, [13pre]; APPLE-1011, 1-4; APPLE-1003, ¶¶130-135, 47-52.

[1a] an SpO2 measurement system including:

Mendelson discloses an SpO₂ measurement system including the Sensor Module and Receiver Module. *Supra*, [13a]-[13d]; APPLE-1011, 1-4; APPLE-1003, ¶¶136, 53-64.

[1b] an optical sensor configured to output one or more signals responsive to light from a light source attenuated by tissue of the user at a measurement site, said one or more signals responsive to an oxygen saturation of said tissue; and

Supra, [13a].

[1c] a processing board in data communication with the optical sensor and a mobile computing device including a display and cellular communication, wherein the processing board is configured to:

Mendelson discloses the processing board in data communication with the

optical sensor and a mobile computing device including a display. *Supra*, [13b]; APPLE-1011, 2-3; APPLE-1003, ¶¶138-139, 57-62. D'Angelo provides that Mendelson's PDA is implemented as a smartphone, such as an iPhone, in the resulting system for the reasons discussed in Section IV.D.2, *supra*. APPLE-1007, 1528-29. A POSITA would have recognized that iPhones and other smart phones during the relevant time frame communicated using cellular communication. APPLE-1003, ¶¶139, 118-119, 121-123, 135; *see e.g.*, APPLE-1005, [0010], [0018], [0108]; APPLE-1008, [0016]-[0018], [0047]; APPLE-1010, [0136].

[1d]-[1e] receive said one or more signals from the optical sensor; process said one or more signals to generate SpO2 measurement values; and

Supra, [13c]-[13d].

[1f] output the SpO2 measurement values to the mobile computing device; and

Supra, [13e]

[1g] one or more hardware processors of the mobile computing device configured to execute an application, the application configured to execute commands to:

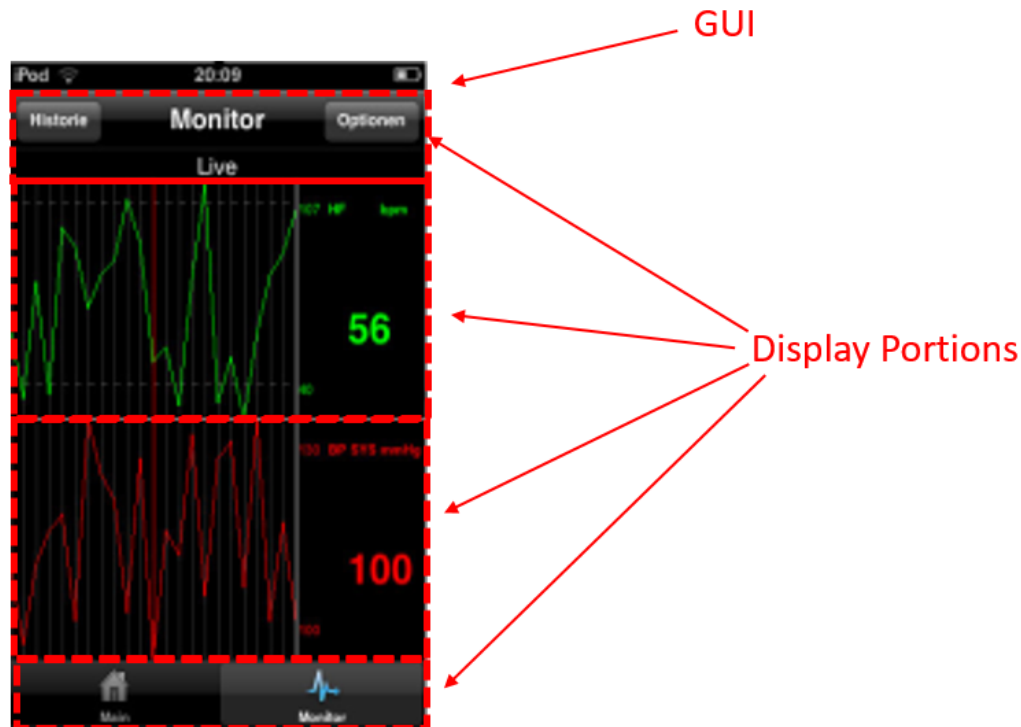
A POSITA would have recognized that the PDA disclosed by Mendelson and the smartphone (iPhone) disclosed by D'Angelo include one or more hardware processors for executing software/applications. APPLE-1003, ¶142; APPLE-1007, 1528-29 (describing "processing" by the mobile phone). In the predictable combination, the smartphone (iPhone) disclosed by D'Angelo executes the LabVIEW application disclosed by Mendelson. *Supra*, [13f]; APPLE-1011, 3;

APPLE-1003, ¶¶142, 66.

[1h] generate a graphical user interface having a plurality of display portions;

Mendelson's GUI includes a plurality of display portions. *Supra*, [13g].

Alternatively, D'Angelo shows a graphical user interface having a plurality of display portions that would have been beneficially implemented as one of the display screens in the resulting combination for the reasons discussed in Section IV.D.2, *supra*. APPLE-1003, ¶¶143-144.



APPLE-1007, 1531.

[1i] display, in at least one portion of the plurality of display portions, a representation of a physiological parameter of a plurality of physiological parameters comprising at least the SpO2 measurement values; and;

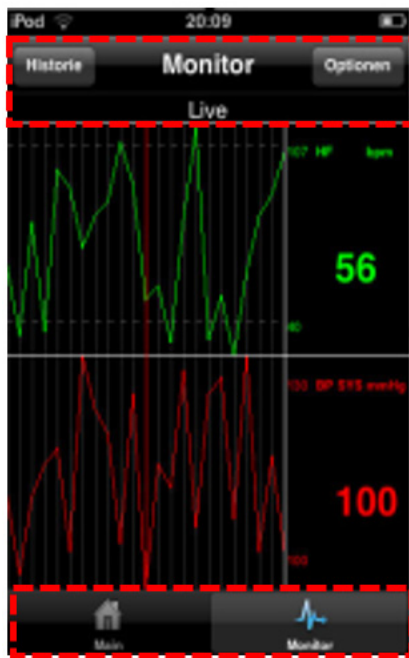
Mendelson provides this element. *Supra*, [13h]. APPLE-1003, ¶69.

Alternatively, D'Angelo discloses that its "Graph view" (reproduced above) includes graphs of "variables for which values are available" as received from the physiological sensors. APPLE-1007, 1530. As shown in FIG. 5 (above), multiple scrolling graphs along the left of the GUI show multiple measured physiological parameters while for each "the value is shown as a number along with the corresponding unit and current maximum and minimal value measured" for the parameter. APPLE-1007, 1530-31; APPLE-1003, ¶¶145-147, 120. Mendelson discloses that this plurality of physiological parameters comprises SpO₂ values. APPLE-1011, 1-4; APPLE-1007, 1529.

[1j] display, in a different portion of the plurality of display portions, a plurality of user inputs configured to allow the user to interact with at least one of the plurality of display portions or the application;

Mendelson provides this element. *Supra*, [13i]. APPLE-1003, ¶¶70-73, 148.

Alternatively, D'Angelo's "Graph view" includes several display portions that allow the user to interact with the display portions and the application.



Display Portion with user inputs allowing access application options or historic information (old dataset view)

Display Portion with user inputs for accessing application main menu or switching to other views

APPLE-1007, 1530-31; APPLE-1003, ¶¶149-150. For example, the GUI includes a first portion with user inputs allowing access to application options or historic information and a second portion with user inputs for accessing a “Main view” or other views. APPLE-1007, 1530-31; APPLE-1003, ¶¶149-150. D’Angelo also describes receiving user input on the touchscreen so that “the user can scroll through current and older values.” APPLE-1007, 1531. A POSITA would have recognized that these are all interactions with the application. APPLE-1003, ¶150.

[1k] wherein the processing of the one or more signals to generate SpO2 measurement values is performed only on the processing board, thereby freeing up memory available to the mobile computing device; and

Mendelson discloses that the data captured by the Sensor Module is “processed by the Receiver Module.” APPLE-1011, 2; APPLLE-1003, ¶151. The Receiver Module’s “embedded microcontroller...synchronously converts the

corresponding PD output to R and IR PPG signals. Dedicated software is used to filter the signals and *compute SpO₂ and HR based on the relative amplitude and frequency* content of the reflected PPG signals.” APPLE-1011, 2. A POSITA would have recognized that processing the signals to generate SpO₂ measurement values at the Receiver Module would have freed up memory and processing capacity of the mobile device (Mendelson’s PDA implemented as a smartphone as taught by D’Angelo) for use by other processes. APPLE-1003, ¶151; APPLE-1013, 8:10-22.

[11] wherein the processing board is configured to draw power for operation from the mobile computing device.

D’Angelo discloses “a connection between the smartphone’s *power output pin* and the management device’s *charging pin*, allowing to read out the management device with the smartphone even when its battery is empty.” APPLE-1007, 1530.

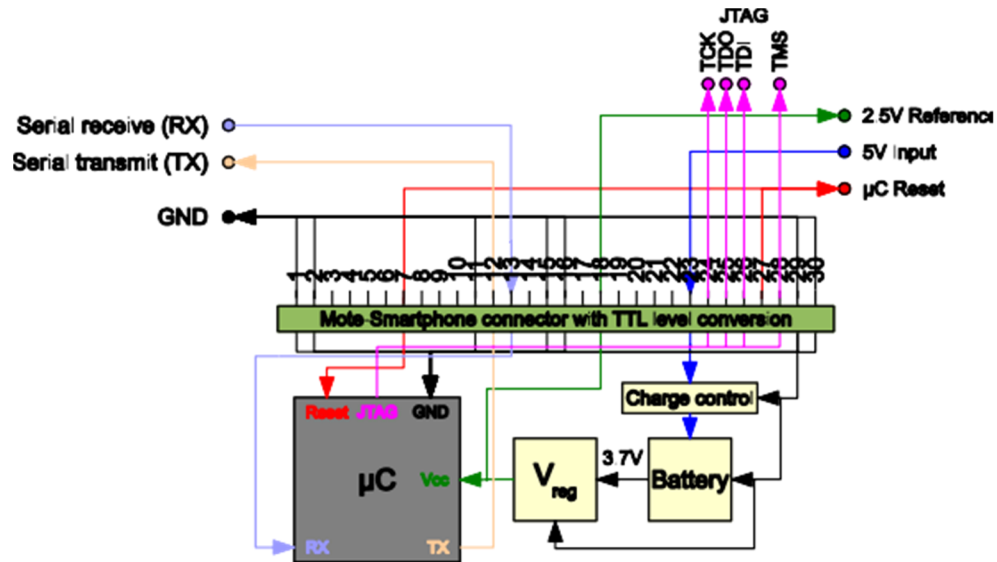


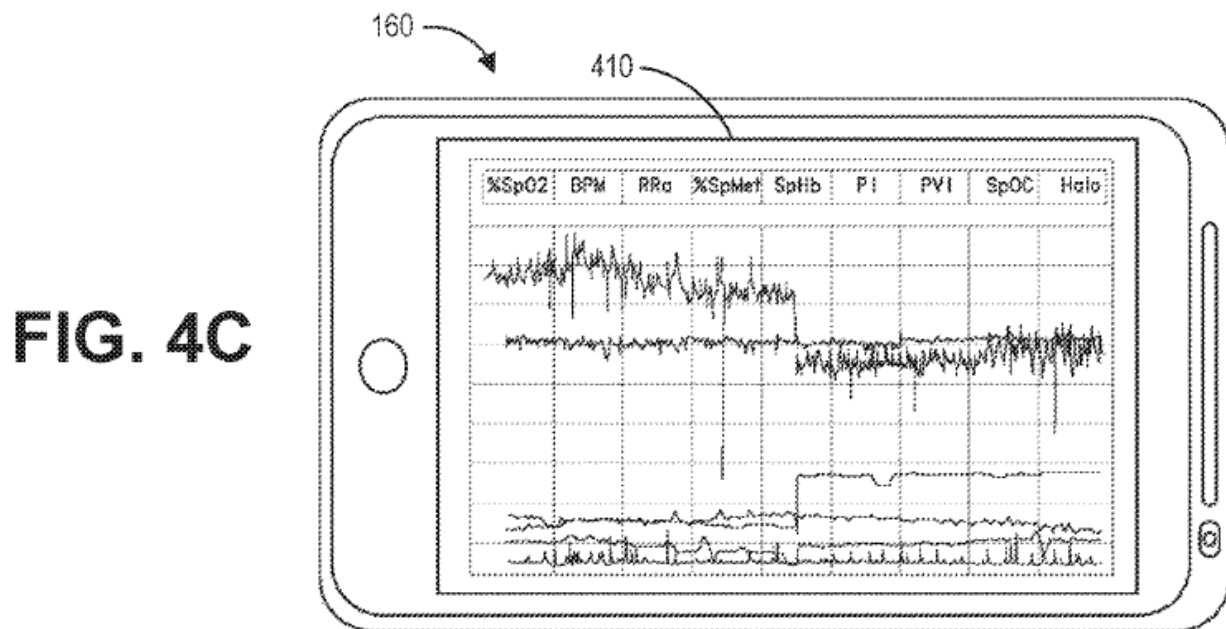
Fig. 3 Pin assignment of the mote-smartphone connector.

APPLE-1007, Figure 3.

D'Angelo's "management device" is equivalent to Mendelson's Receiver Module in that it is a computing device in communication with both physiological sensors and the smart display device that performs signal processing to determine physiological parameters. APPLE-1007, 1529-1530; APPLE-1011, 2-3; APPLE-1003, ¶¶152-154. Therefore, when applying this teaching of D'Angelo to Mendelson (for the reasons discussed in Section IV.D.2, *supra*), a POSITA would have implemented Mendelson's Receiver Module to be configured to draw power for operation from the mobile computing device. APPLE-1003, ¶¶152-154, 118, 124, 128.

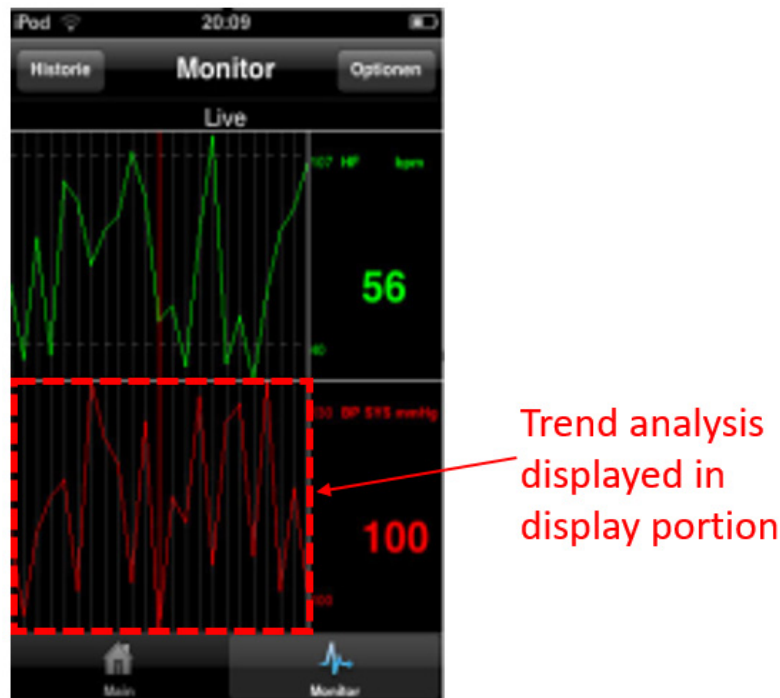
Claim [2] The mobile pulse oximetry system of claim 1, wherein the application is configured to execute commands to: perform a trend analysis on received SpO2 measurement values; and display results of the trend analysis in at least one portion of the plurality of display portions.

The '507 patent describes a “trend analysis” as one of several application functions, stating that this function allows users “to manipulate the data to visualize trends in the data.” APPLE-1001, 5:25-35, 5:50-52. The '507 patent specifies that “the user can choose to view trends in the data, as illustrated in FIG. 4C.”



APPLE-1001, 13:44-56, FIG. 4C. While the '507 patent describes changing the view (e.g., zooming in) and printing such trend information, there is no other disclosure of trend analysis in the '507 patent. APPLE-1003, ¶¶155-157. A POSITA would have therefore recognized that displaying a graph of SpO₂ information collected and plotted over time in one of the display portions satisfies this element. *Id.* D'Angelo provides this element by displaying a “Graph view”

that includes determined physiological parameters in an automatically scrolling graph that depicts changes in the measured value over time. APPLE-1007, 1530-31; APPLE-1003, ¶157.



APPLE-1007, Fig. 5. SpO₂ values are one of the values displayed as part of the graph view in the resulting combination. APPLE-1011, 1-4; APPLE-1007, 1529; APPLE-1003, ¶157.

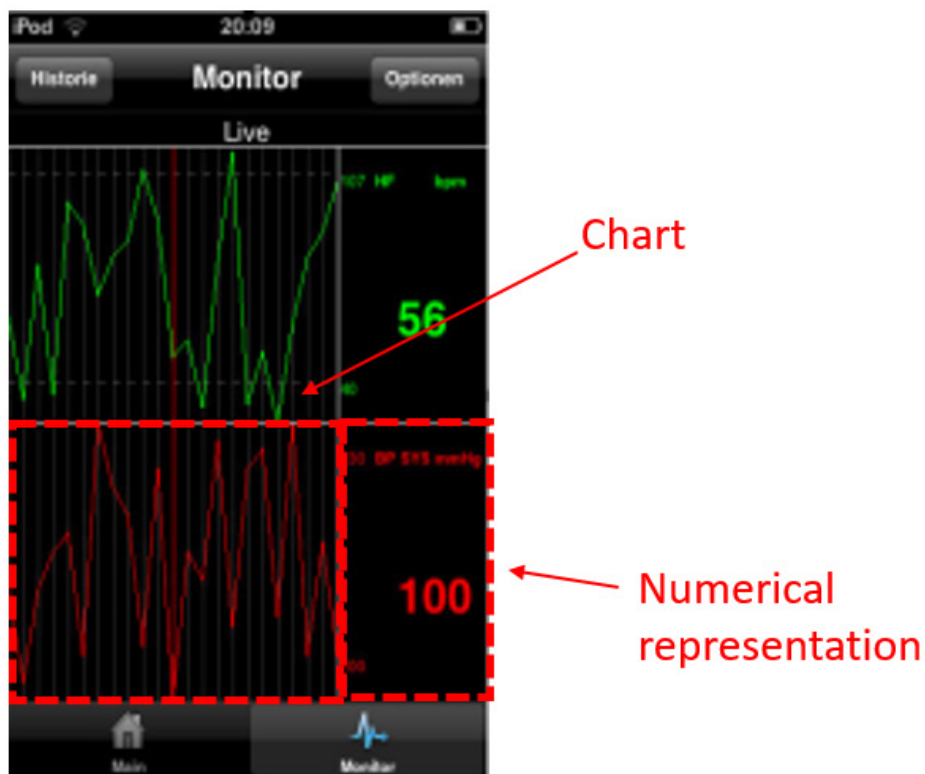
Claim [5] The mobile pulse oximetry system of claim 1, wherein the application is configured to execute commands to output one or more alarms associated with SpO₂ measurement values that are above or below threshold SpO₂ measurement values.

Supra, Grounds 1A1-1A2, Claim [15].

Claim [7] The mobile pulse oximetry system of claim 1, wherein the application is configured to execute commands to update the representation of the

physiological parameter to comprise one or more of a plurality of graphical representations of the SpO₂ measurement values, the plurality of graphical representations comprising at least one of bar graphs or charts.

As shown in FIG. 5 of D'Angelo, the measured physiological parameters, including SpO₂, are displayed in a plurality of graphical representations including a chart showing values plotted over time that updates over time such that “[n]ew values are added scrolling the graph automatically” and also as a numerical value in a second graphical representation. APPLE-1007, 1530-31.



APPLE-1007, FIG. 5; APPLE-1003, ¶159. SpO₂ is one of the displayed parameters. APPLE-1011, 1-4; APPLE-1007, 1529. This would have been performed by executing commands of the LabVIEW application in the resulting

combination. APPLE-1003, ¶159; APPLE-1011, 3.

Claim [9] The mobile pulse oximetry system of claim 1, wherein the mobile computing device comprises a smartphone.

D’Angelo discloses that in the predictable combination, the mobile device is a smartphone such as an iPhone. APPLE-1007, 1-2; APPLE-1003, ¶¶160, 118-119, 121-123, 128.

Claim [12] The mobile pulse oximetry system of claim 1, wherein the SpO2 measurement system is configured to wirelessly transmit the SpO2 measurement values to the mobile computing device.

Supra, Grounds 1A1-1A2, Claim [19].

Claim [13]

As discussed in Grounds 1A1-1A2, *supra*, Mendelson discloses (or at least renders obvious) all elements of claim 13. Alternatively, a POSITA would have predictably modified Mendelson’s system to include the additional physiological data user interface displays, including the “Graph view” described by D’Angelo for the reasons discussed in Section IV.D.2, *supra*. In this alternative, the Mendelson-D’Angelo combination provides Elements [13g]-[13i] for the reasons discussed at Ground 1D, Elements [1h]-[1j] while all other elements of claim 13 are provided (or at least rendered obvious) for the reasons discussed in Grounds 1A1-1A2, *supra*. APPLE-1003, ¶¶162-167, 143-150.

Claim [14]

Supra, Ground 1D, Claim [2].

Claim [15]

Supra, Grounds 1A1-1A2, Claim [15].

Claim [17]

Supra, Ground 1D, Claim [7].

Claim [18]

Supra, Grounds 1A1-1A2, Claim [18].

Claim [19]

Supra, Grounds 1A1-1A2, Claim [19].

**E. GROUND 1E: The Mendelson-D’Angelo-Ording
Combination Renders Obvious Claim 3**

1. Overview of Ording

Ording describes a portable electronic communication device 100 that can “perform one or more operations on a graphical object based on one or more user contracts and/or motions.” APPLE-1008, 1:44-45; APPLE-1003, ¶174. In one embodiment, the user’s index finger 108 and thumb 110 can be used to pinch/de-pinch an object 112, resulting in a change in the dimension of the object 112. APPLE-1008, 4:40-47. A user can also zoom out using a pinching gesture. *Id.*, 7:63-64, 8:2-3.

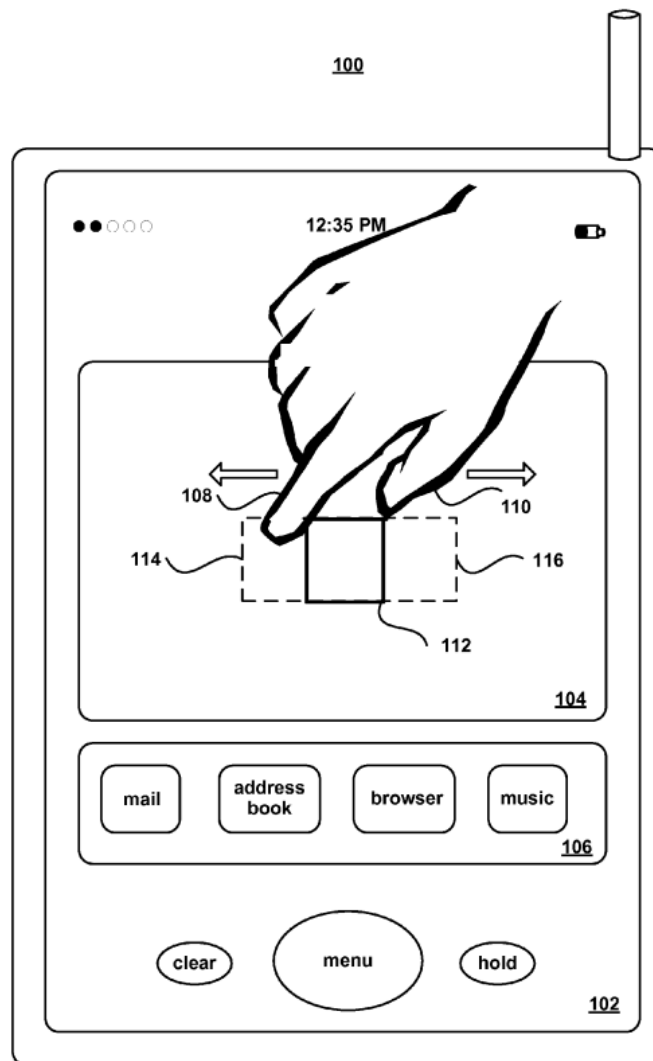


Figure 1

APPLE-1008, Figure 1.

2. Mendelson-D'Angelo-Ording Combination

A POSITA would have been prompted to modify the Mendelson-D'Angelo system based on Ording to allow users to manipulate and navigate the display of physiological parameter information through use of touchscreen gestures including

a pinch gesture to narrow or expand displayed results. APPLE-1003, ¶¶175-181. A POSITA would have recognized that the iPhone of the Mendelson-D'Angelo system includes a touchscreen interface and Ording provides additional details on how to use a touchscreen interface to manipulate displayed information and navigate GUIs. APPLE-1007, 1530; APPLE-1011, 3; APPLE-1008, 1:56-60, 4:14-47, 7:61-67, 8:2-3; APPLE-1003, ¶¶176-177. A POSITA would have recognized that allowing users to zoom in and out using the de-pinching and pinching motions described by Ording would have provided a quick and easy way for users to view the displayed physiological parameter information in a desired way (e.g., by looking at a zoomed in detailed portion of D'Angelo's graph, or zooming out to see a trend over a larger time period). APPLE-1003, ¶¶177-178. By the 2012 priority date of the '507 patent, touchscreen smart phones were in common use and therefore such UI functionality would have been straight forward and familiar to users. De-pinching and pinching to perform zoom in and out functions would have been an intuitive action for many users, thereby increasing ease of use of the resulting system. APPLE-1003, ¶179. Such a modification also would have been merely the application of a known technique to a known system ready for improvement to yield predictable results and therefore a POSITA would have had a reasonable expectation of success in such a modification. APPLE-1003, ¶¶180-181; *KSR*, 550 U.S. at 417.

Claim [3] The mobile pulse oximetry system of claim 2, wherein the display is touch-sensitive, and wherein the application is configured to execute commands to narrow or expand the displayed results of the trend analysis in response to the user using a pinch gesture.

D'Angelo discloses that the smartphone includes “a touch display” and further describes receiving touch input (“[t]aping and wiping”) that allows users to interact with the displayed physiological parameter information, including the graph of SpO₂ values over time. APPLE-1007, 1530-31; APPLE-1003, ¶¶182-183. As discussed above, a POSITA would have applied Ording to the Mendelson-D'Angelo combination to allow zooming in and out using de-pinching and pinching touch inputs. APPLE-1008, 4:14-47, 7:61-67, 8:2-3, 9:24-29. A POSITA would have applied Ording to Mendelson-D'Angelo for the reasons described above to allow for zooming in and out (narrow and expand) the displayed graph of SpO₂ values included in D'Angelo's Graph view using a pinch gesture in the resulting combination. APPLE-1003, ¶¶182-183.

F. GROUND 1F: The Mendelson-D'Angelo-Tran Combination Renders Obvious Claims 4-6, 8, 16, 18, 20

A POSITA would have applied Tran to the Mendelson-D'Angelo combination for the reasons discussed in Ground 1B, *supra*. APPLE-1003, ¶¶184-191.

Claim [4] The mobile pulse oximetry system of claim 1, wherein the application is configured to execute commands to set reminders to take future measurements.

Supra, Ground 1B, Claims [16], [20].

Claim [5]

Supra, Ground 1B, Claim [18].

Claim [6] The mobile pulse oximetry system of claim 1, wherein the application is configured to execute commands to output one or more reminders to use the optical sensor to take measurements of SpO2 measurement values at predetermined times or cycles.

Supra, Ground 1B, Claim [16].

Claim [8] The mobile pulse oximetry system of claim 1, wherein the application is configured to execute commands to output an alert, via a network to a designated physician or other care provider, regarding abnormal SpO2 readings.

Supra, Ground 1B, Claim [18].

Claim [16]

Supra, Ground 1B, Claim [16].

Claim [18]

Supra, Ground 1B, Claim [18].

Claim [20]

Supra, Ground 1B, Claim [20].

G. GROUND 1G: The Mendelson-D'Angelo-Kianl Combination Renders Obvious Claims 2, 7, 14, 17

A POSITA would have applied Kianl to the Mendelson-D'Angelo combination for the reasons discussed in Ground 1C, *supra*. APPLE-1003, ¶¶192-196. In addition to Mendelson-D'Angelo providing claims 2, 7, 14, 17, Kianl also

provides additional disclosures demonstrating how the references provide these claims.

Claim [2]

Supra, Ground 1C, Claim [14].

Claim [7]

Supra, Ground 1C, Claim [17].

Claim [14]

Supra, Ground 1C, Claim [14].

Claim [17]

Supra, Ground 1C, Claim [17].

H. GROUND 1H: The Mendelson-D’Angelo-Kianl-Ording Combination Renders Obvious Claim 3

A POSITA would have applied Ording to the Mendelson-D’Angelo-Kianl combination for the reasons discussed in Ground 1E, *supra*. Specifically, a POSITA would have applied Ording to the Mendelson-D’Angelo-Kianl combination to allow zooming in and out of Kianl’s trend analysis views displaying various views of SpO₂ information (as discussed in Ground 1C, *supra*) using a pinch gesture (as disclosed by Ording) to achieve the same benefits as discussed in Ground 1E, *supra*, with respect to D’Angelo’s Graph view. APPLE-1003, ¶¶197-198, 182-183, 175-181; APPLE-1008, 4:14-47, 7:61-67, 8:2-3, 9:24-

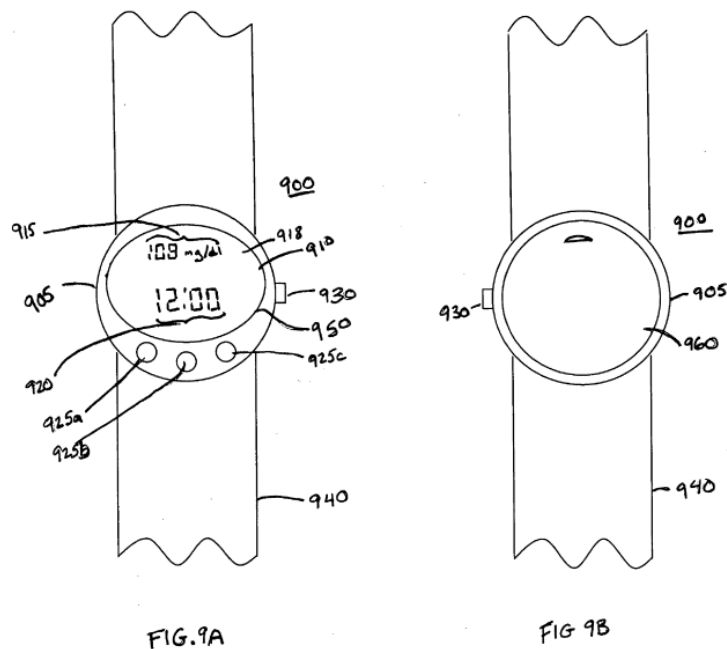
29. The Mendelson-D'Angelo-Kianl-Ording Combination provides claim 3.

APPLE-1003, ¶¶198, 182-183.

I. GROUND 1I: The Mendelson-D'Angelo-Goldsmith Combination Renders Obvious Claims 10-11

1. Overview of Goldsmith

Goldsmith discloses a medical watch controller device 900. APPLE-1009, ¶¶[0085], [0095], [0098], [0104], [0010], claim 6, FIGS. 9A, 9B; APPLE-1003, ¶¶200-202. As illustrated below in Goldsmith's FIGS. 9A and 9B, device 900 can be "used with any number of...diagnostic devices" and sensors to obtain various physiological measurements, such as user oxygen level. APPLE-1009, ¶¶[0037], [0038]. The controller device 900 includes a wrist band 940 that enables it to be worn "like a watch." *Id.*, ¶¶[0082]-[0085], [0095], claims 25, 26, 27.



APPLE-1009, Figure 9A, 9B.

In more detail, Goldsmith's device 900 includes a display 910 for displaying data "received from a sensor transmitter on the patient's skin," from "any number of therapy/diagnostic devices," and/or from user input. *Id.*, ¶¶[0082], [0087], [0095], [0102]. Goldsmith's device can, for example, conveniently monitor and display "concentration, levels, or quantities of...oxygen." *Id.*, ¶¶[0014], [0037], [0038].

2. Mendelson-D'Angelo-Goldsmith Combination

A POSITA would have applied Goldsmith to the Mendelson-D'Angelo combination to implement the cellular capable display device of the Mendelson-D'Angelo combination (Mendelson's PDA implemented as a cellular device based on D'Angelo) as a watch, such as a wristwatch. APPLE-1009, [0010], [0082]-[0085], [0095], [0098], [0104]; APPLE-1003, ¶¶203-209. Implementing the display device as "a wrist-worn device, such as a watch" or "a watch that can be carried on other parts of the body or clothing, such as the ankle, neck (e.g., on a chain), pocket, or ankle" would have increased the portability of the display device. APPLE-1009, [0010]; APPLE-1003, ¶204. Such a configuration would have freed up the user's hands for other tasks as they would no longer need to hold the display device in one hand. APPLE-1003, ¶205. Such a configuration would

also increase ease of use as the user would not need to retrieve the display device from a pocket, backpack, or bag to view the display physiological parameters. APPLE-1003, ¶206; APPLE-1009, [0085]. Additionally, smart watches were becoming in wide-spread use by 2012 and therefore such functionality would have provided additional functionality to devices already owned by users. APPLE-1003, ¶207; APPLE-1009, [0085].

A POSITA would have had a reasonable expectation of success in such a modification. APPLE-1003, ¶¶208-209. Goldsmith describes that its controller device (which can implemented as a wristwatch) displays data “received from a sensor transmitter on the patient’s skin,” and “any number of therapy/diagnostic devices,” and/or from user input. APPLE-1009, [0082]-[0087], [0095], [0102]. This includes monitoring and displaying “concentration, levels, or quantities of...oxygen.” *Id.*, [0014], [0037], [0038]. Goldsmith’s controller further includes “a touchscreen display.” *Id.*, [0086]. Goldsmith also describes “giving the controller device cellular telephone or pager capabilities.” *Id.*, [0016], [0068]. A POSITA would have therefore recognized that Goldsmith is fully compatible with the above described Mendelson-D’Angelo combination and would have had a reasonable expectation of success in applying Goldsmith to Mendelson-D’Angelo. APPLE-1003, ¶¶208-209. Furthermore, a POSITA would have recognized that implementing the wristwatch display device described by Goldsmith to provide a

power output pin for the Receiver Module/management device would have achieved the same benefits of allowing read out even when the Receiver Module device battery is empty as described in Ground 1D, *supra*. APPLE-1003, ¶209; APPLE-1007, 1530. Applying Goldsmith to Mendelson-D’Angelo also would have been merely the application of a known technique to a known system ready for improvement to yield predictable results and therefore a POSITA would have had a reasonable expectation of success in such a modification. APPLE-1003, ¶¶208-209; *KSR*, 550 U.S. at 417.

Claim [10] The mobile pulse oximetry system of claim 1, wherein the mobile computing device comprises a wearable computing device.

Claim [11] The mobile pulse oximetry system of claim 1, wherein the mobile computing device comprises a wristwatch.

Goldsmith discloses that the mobile computing device (the display device) in the Mendelson-D’Angelo-Goldsmith combination is a wearable wristwatch computing device. APPLE-1009, [0010] (“...a wrist-worn device, such as a watch”), [0082]-[0085], [0095], [0098], [0104], FIGs. 9A-9B; APPLE-1003, ¶¶210-211.

J. GROUND 2A: The Mendelson-Moon Combination Renders Obvious Claims 13, 15 and 18-19

Grounds 2A-2I closely track respective Grounds 1A1-1I. However, to the extent that the preambles of claims 1 and 13 are interpreted such that the term

“mobile measurement of oxygen saturation (‘SpO₂’)” is interpreted to require active reduction and/or correction of motion artifacts caused by user motion, Moon has been added to each of the combinations of Grounds 1A1-1I to provide this additional disclosure and form Grounds 2A-2I. APPLE-1003, ¶¶212-213. Other than the addition of Moon to the respective combinations to demonstrate how the combinations disclose the preambles to independent claims 1 and 13, all other analysis of the respective combinations remains the same as Grounds 1A1-1I.

1. Overview of Moon

Similar to Mendelson, Moon describes “a body-worn monitor that continuously measures pulse oximetry and other vital signs, along with motion, posture, and activity level.” APPLE-1010, [0013]; APPLE-1003, ¶¶214-217.

While the primary embodiments of Moon describe a finger-worn sensor, Moon describes that the body-worn sensor can be worn at other locations “such as the ear, forehead, and bridge of the nose.” APPLE-1010, [0138]. The “body-worn monitoring system” includes “motion-detecting sensors” to track various aspects of the patient’s motion. *Id.*, [0015]. This detected motion can “be processed and used to exclude certain noise-corrupted artifacts from the SpO₂ calculation.” *Id.* This “can greatly enhance the accuracy” of measurements taken by the system. *Id.*

Moon’s SpO₂ sensor system “features a first sensor with two radiation sources that emit optical radiation at first and second wavelengths, and a photodetector

configured to detect the radiation after it passes through a portion of the patient.”

Id., [0018]. The system uses both the signals from the photodetector and signals from a motion sensor to determine SpO₂ and other “physiological propert[ies] of the patient’s blood.” *Id.* In further examples, Moon describes filtering the PPG and PTT waveforms using detected motion of the patient to more accurately determine SpO₂. *Id.*, [0025], [0073]-[0074], [0089]-[0092]. These techniques allow for “motion [to] be detected and accounted for during pulse oximetry measurements to minimize the occurrence of false alarms and, additionally, make accurate readings in the presence of motion.” *Id.*, [0082], [0089] (“...determine accurate SpO₂ and cNIBP values even when motion-related noise is present.”), [0102]-[0103].

Moon’s sensor includes secure straps 2, 4 and a flexible cable 5 to “Minimize[] motion relative to the measurement site.” APPLE-1010, [0060].

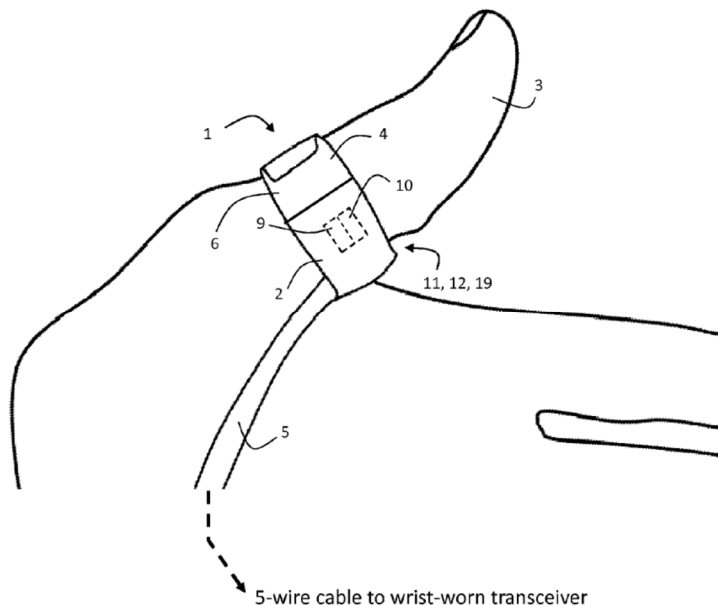


Fig. 1

APPLE-1010, FIG. 1. Moon further discusses using digital communication between the system components to further reduce signal noise caused by motion. *Id.*, [0130].

2. Combination of Mendelson and Moon

Multiple reasons would have prompted a POSITA to apply Moon to Mendelson to reduce the effects of motion on vital sign readings, including SpO₂ and to filter out noise caused by user motion from such readings. APPLE-1003, ¶¶218-225. First, as Moon teaches, in user worn pulse oximetry systems, “[a]ctivities such as walking, finger tapping, falling, and convulsing can result in a number of artifacts that distort both the AC and DC components of waveforms measured with the oximeter’s optical system.” APPLE-1010, [0011]; APPLE-1003, ¶219. Such motion can generate motion artifacts in sensed signals which “can cause the pulse oximeter to generate inaccurate values and false alarms.” *Id.*, [0011], [0078]. Mendelson’s pulse oximetry system is intended for use by users in motion such as “soldiers during training exercises or combat.” APPLE-1011, 1, 4. Mendelson also discloses that its system does “not hinder a person’s mobility” and is configured to measure user’s activity levels in addition to SpO₂. *Id.*, 1-3. A POSITA therefore would have recognized the benefit of applying Moon to Mendelson to both reduce the effects of motion on the measured signals and to filter noise caused by such motion to “greatly enhance the accuracy” of the

detected vital signs. APPLE-1010, [0015], [0065]-[0066] (“...maximizes accuracy of the SpO₂ calculation”), [0070], [0072], [0083], [0088]-[0089]; APPLE-1003, ¶218. Thus in the resulting system “the body-worn monitor can determine accurate SpO₂ and cNIBP values even when motion-related noise is present.” APPLE-1010, [0089].

Second, as described by Moon, pulse oximeters that only function “when a patient is sedentary...are impractical for ambulatory patients...making it difficult to provide true continuous monitoring.” APPLE-1010, [0012]. A POSITA would have recognized that, because Mendelson’s system is intended for users in motion, applying Moon’s teachings to Mendelson to account for noise caused by user motion would have allowed for “true continuous monitoring.” APPLE-1003, ¶220, APPLE-1011, 1-4; APPLE-1010, [0025], [0073]-[0074], [0082], [0089]-[0092], [0102]-[0103].

Third, applying Moon’s techniques for reducing motion artifacts and accounting for signal noise due to motion would “minimize the occurrence of false alarms and, additionally, make accurate readings in the presence of motion.” APPLE-1010, [0082], [0015] (“...greatly enhance the accuracy of alarms/alerts”), [0076]; APPLE-1003, ¶221. Mendelson discloses issuing an alert when “physiological values out of their normal range” and therefore increasing the

accuracy of alerts would have improved the resulting system. APPLE-1011, 2-3; APPLE-1003, ¶221.

Fourth, Mendelson expressly contemplates using “improved electronic filtering of noisy PPG signals.” APPLE-1011, 2. Mendelson also explains that PPG signals are used to determine SpO₂. *Id.*, 1-2. Therefore a POSITA would have looked to other references that disclose techniques for improving the accuracy of the PPG signal by filtering noise. APPLE-1003, ¶222. Moon provides just such a teaching for filtering noise from PPG signals caused by motion of the user. APPLE-1003, ¶222; APPLE-1010, [0102]. A POSITA therefore would have beneficially applied Moon to Mendelson because Moon provides additional details on how to filter noise as contemplated by Mendelson. APPLE-1003, ¶222.

Finally, such a modification would have been merely the application of a known technique to a known system ready for improvement to yield predictable results and therefore a POSITA would have had a reasonable expectation of success in such a modification. APPLE-1003, ¶¶223-225; *KSR*, 550 U.S. at 417.

3. Application of Mendelson-Moon to Claims

Claim [13]

As discussed in Grounds 1A1-1A2, *supra*, Mendelson provides (or at least renders obvious) all elements of claim 13. However, to the extent that the preamble of claim 13 is interpreted such that the term “mobile measurement of

oxygen saturation ('SpO₂')” is interpreted to require active reduction and/or correction of motion artifacts caused by user motion, the Mendelson-Moon combination provides the preamble [13pre]. APPLE-1003, ¶¶226-235. For example, Moon discloses that in the predictable combination, the pulse oximetry system includes “motion-detecting sensors” to track various aspects of the patient’s motion. *Id.*, [0015]. This detected motion can “be processed and used to exclude certain noise-corrupted artifacts from the SpO₂ calculation” to “greatly enhance the accuracy” of vital sign measurements. *Id.*; APPLE-1003, ¶227.

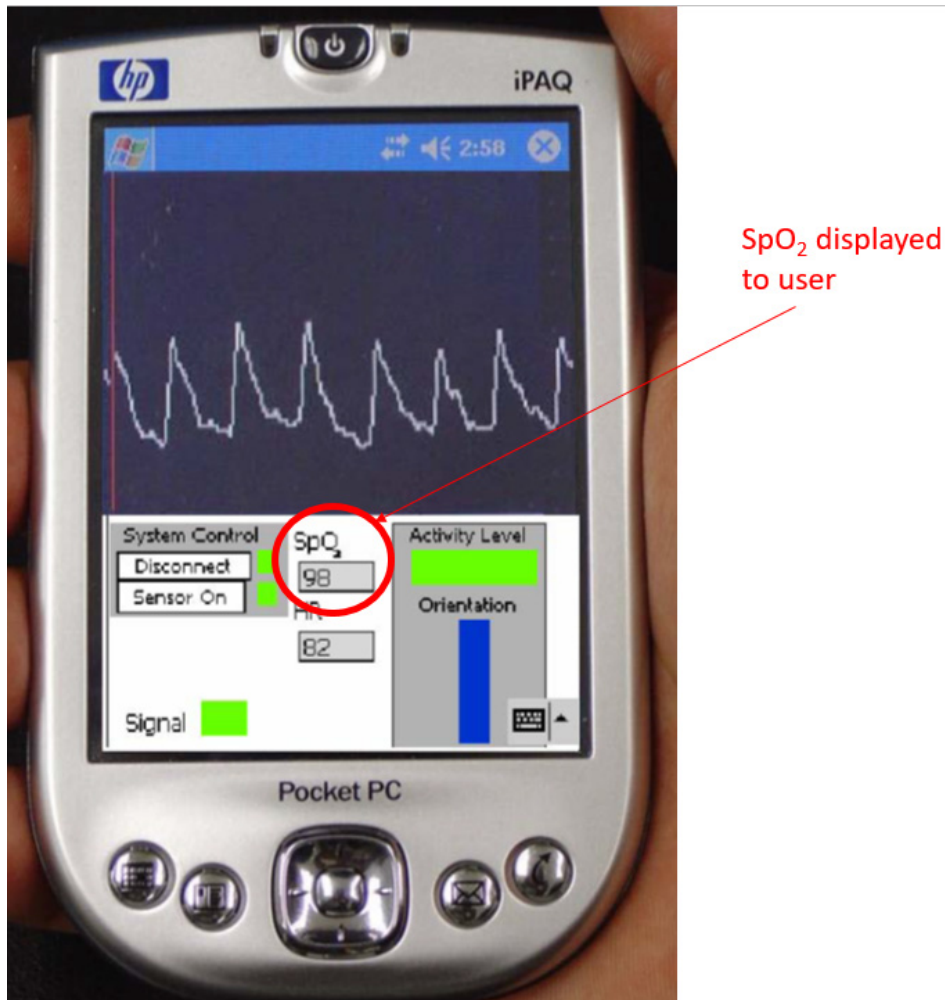
Both Moon and Mendelson utilize an SpO₂ sensor that includes a photodetector to detect emitted light after it passes through a portion of the patient. APPLE-1011, 1, 4; APPLE-1010, [0018]. Moon teaches that in the resulting combination, Mendelson’s Receiver Module, which processes the signals to generate the SpO₂ values, is configured to use both the signals from the photodetector and signals from a motion sensor to determine SpO₂ and other “physiological propert[ies] of the patient’s blood.” APPLE-1011, [0018]. Moon goes on to describe filtering the PPG and PTT waveforms using detected motion of the patient to more accurately determine SpO₂. *Id.*, [0025], [0073]-[0074], [0089]-[0092]. These techniques allow for “motion [to] be detected and accounted for during pulse oximetry measurements to minimize the occurrence of false alarms and, additionally, make accurate readings in the presence of motion.” *Id.*, [0082].

In one example, Moon disclose using “a ‘matched filter’ to process both the RED/IR(PPG) waveforms to maximize signal-to-noise ratios of the pulses therein” to allow the system to “determine accurate SpO₂ and cNIBP values even when motion-related noise is present.” *Id.*, [0088]-[0089] (describing a weighted average signal processing technique when “profound motion is present” that “would likely yield a SpO₂ value with suitable accuracy”), *see also* [0075]; APPLE-1003, ¶¶228-229.

In another example, a “wrist-worn accelerometer” measures user motion and collected data is “analyzed to estimate the effects of specific motions and activities on the ECG and PPG waveforms, and then deconvolute these factors using known mathematical techniques to *effectively remove any motion-related artifacts.*” APPLE-1010, [0102]. These “deconvoluted ECG and PPG waveforms can then be used to calculate vital signs.” *Id.* For example, PPG waveforms are “used to determine SpO₂.” *Id.*, [0121]; APPPLE-1011, 1-2; APPLE-1003, ¶230.

As previously discussed at Grounds 1A1-1A2, preamble [13pre], *supra*, Mendelson discloses that the resulting system is intended for monitoring SpO₂ of active users including “soldiers during training exercises or combat.” APPLE-1011, 1, 4; APPLE-1003, ¶¶231-232. Mendelson also discloses that vital sign readings, including SpO₂, are communicated to a mobile device, such as a PDA, for display to the user. APPLE-1011, 2-3 (“SpO₂ and HR values are displayed [in]

separate indicator windows.”); APPLE-1003, ¶¶233-234.



APPLE-1011, 3.

Mendelson demonstrates that the Mendelson-Moon combination provides (or at least renders obvious) all other elements of claims 13, 15, and 18-19 for the reasons discussed in Ground 1A1-1A2, *supra*. APPLE-1003, ¶¶235-236.

K. GROUND 2B-I: The Modifications to the Mendelson-Moon Combination Render Obvious The Remaining Claims

A POSITA would have been prompted to apply the teachings of Tran, Kianl, D’Angelo, Ording, and Goldsmith to the Mendelson-Moon combination in the same manner and for the same reasons as discussed in Grounds 1B-1I to achieve the combinations identified for Grounds 2B-2I identified in Section II.B, *supra*, and would have had a reasonable expectation of success in doing so. APPLE-1003, ¶¶237-244. With respect to Ground 2D, the Mendelson-Moon-D’Angelo combination provides the preamble for claim 1 ([1pre]) for the same reasons discussed in Ground 2A with respect to preamble [13pre]. APPLE-1003, ¶239. All other elements of the claims identified with respect to Grounds 2B-2I are disclosed by the respective combinations for the reasons discussed in respective grounds 1B-1I. APPLE-1003, ¶¶237-244.

IV. DISCRETIONARY CONSIDERATIONS

A. 314(a) – *Fintiv*

Consistent with Congressional intent, the goals of *Fintiv*, and the Interim Guidance issued by Director Vidal on June 21, 2022 (“*Director’s Guidance*”), Petitioner respectfully asks the Board to reach the merits of the challenges raised in this Petition. *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11, 6 (PTAB Mar. 20, 2020) (precedential) (“*Fintiv*”); APPLE-1061, 6-7, 9. As demonstrated below,

a holistic analysis of the *Fintiv* framework favors institution.³

Even were that not the case, the Petition presents compelling challenges premised on Dr. Kenny’s robustly corroborated testimony, which if unrebutted at trial, would compel a conclusion that the Challenged Claims are unpatentable by a preponderance of the evidence. For at least that additional reason, “the PTAB should not discretionarily deny institution under *Fintiv*.” APPLE-1061 (*Director’s Guidance*), 3-5, 9; IPR2022-01242 Pap. 23 at 3, 5-6 (PTAB Feb. 27, 2023) (precedential) (“*Commscope*”).

1. Factor 1: Neither Party has yet Requested a Stay

Factor 1 does not favor denial. Neither party has indicated a lack of intent to request a stay of the related litigation with respect to the ’507 patent, and the Board has indicated that it “will not attempt to predict” how a district court might adjudicate a future motion to stay, if/when filed. *See Fintiv*, 12; *Sand Revolution II, LLC v. Cont’l Intermodal Group – Trucking LLC*, IPR2019-01393, Pap. 24, 7 (June 16, 2020)(“*Sand Revolution*”)(informative); *Sotera Wireless Inc. v. Masimo*

³ Apart from Petitioners’ showing that *Fintiv* favors institution, the *Fintiv* framework should not be followed because it is legally invalid. The framework (1) exceeds the Director’s authority, (2) is arbitrary and capricious, and (3) was adopted without notice-and-comment rulemaking.

Corp., IPR2020-01019 Pap. 12, 14 (PTAB Dec. 1, 2020)(“*Sotera*”)(precedential).

2. Factor 2: The Board and Parties can Only Speculate as to the Trial Date, and Statistics Disfavor Denial

As the Director recognizes, “scheduled trial dates are unreliable and often change.” *Director’s Guidance*, 8. Thus, the “PTAB will weigh this factor against exercising discretion to deny institution...if the median time-to-trial is...after the projected statutory deadline for the PTAB’s [FWD].” *Id.*, 9. Indeed, the Delaware District Court, which presides over the related litigation and which is one of the country’s busiest patent courts, recently granted a joint motion to amend the case schedule that moved the case management conference back by approximately two months, but has not yet set an estimated trial date. *See* APPLE-1065, 3 (indicating a “New Deadline” for “Trial” of “TBD”).

Based on the October 20, 2022 filing date of Apple’s original complaint, an average time-to-trial of 37.8 months, and the 18-month IPR schedule, the Board is expected to issue its FWD in June or July, 2025, nearly six months ahead of the statistically indicated December, 2025 district court trial date. APPLE-1060, 14.

For at least this reason, Factor 2 disfavors denial. *Director’s Guidance*, 9; *see also Masimo Corp. v. Apple Inc.*, IPR2023-00634 Pap. 1, 108 (Feb. 27, 2023)(Petition)(arguing against denial based “published statistics indicat[ing] that

the median time to trial for a civil action in the District of Delaware is almost three years”).

More, in this case, several factors contribute to uncertainty with respect to the yet-scheduled trial date, including, for example, whether a single trial will be conducted to address all 6 of Apple’s asserted utility patents, all 4 of Apple’s asserted design patents, and all 5 of Masimo’s counter-asserted utility patents (including the ’507 patent). *See*, generally, APPLE-1062-1065, APPLE-1069. For example, it remains unclear whether the 5 Masimo patents that are subject to stay until conclusion of the related ITC matter, including all appeals, will eventually be tried together with the 5 additional Masimo patents that are not subject to stay, or if separate trials addressing those two sets of patents might instead be conducted in sequence. *See* APPLE-1069, 1.

For at least these reasons, Factor 2 disfavors denial.⁴ *See Director’s Guidance*, 9.

⁴ Moreover, Apple has been diligent. Patent Owner filed its D. Del. counterclaims asserting 10 patents, including the ’507 Patent, in the context of ongoing complex litigation, initiated by Masimo on January 9, 2020 by its C. D. Cal. complaint, that has thus far involved 37 patents and, in addition to the PTAB, forums including C.D.

3. Factor 3: Petitioner's Diligence and Investment in IPR Disfavors Denial

Factor 3 disfavors denial. Apple's substantial investment in petitions addressing the 10 patents asserted by Patent Owner in District Court Litigation (including the 5 patents reasserted from ITC litigation) should counterbalance—and frankly outweigh—the resources invested in the co-pending District Court Litigation. It would be unjust to consider resources expended in District Court (equally by both parties), without considering Apple resources expended to prepare petitions that would be irretrievably lost without consideration on the merits.

For example, as explained below with respect to Factor 4, to ensure that an IPR proceeding instituted on the basis of this Petition will be a true alternative to

Cal., ITC, D. Del., and the Fed. Cir. In addition to today's filings, Apple has demonstrated at least a reasonable likelihood of success in proving unpatentability of 22 of these patents at the PTAB, and has indeed been found to have demonstrated unpatentability of claims in 18 of the corresponding 20 FWDs that have issued thus far. For at least that additional reason, Factor 2 favors institution. *See Apple Inc. v. Seven Networks, LLC*, IPR2020-00156, Pap. 10, 9 & n.8 (June 15, 2020)(“*Seven Networks*”)(factor 2 should be analyzed on a sliding scale based on petitioner diligence and relative trial dates).

district court litigation that might otherwise address overlapping issues, Apple stipulates that, if the Board institutes this IPR, Apple will not, for the instituted claims, seek resolution in the co-pending Delaware District Court proceeding of any ground of invalidity that utilizes any of the prior art asserted in this petition, i.e., Mendelson, Tran, Kianl, D'Angelo, Ording, Moon, or Goldsmith. APPLE-1066. Consistent with Apple's stipulation, Apple's district court expert invalidity report does not include any of the prior art asserted in this petition.

Hence, discretionary denial of the instant petition would prevent Apple from being heard, not only by the PTAB, but also by the District Court, both with respect to the compellingly meritorious grounds presented within this petition, and also with respect to any ground of invalidity utilizing any of the prior art asserted in this petition. *Id.*

In this way, Apple's stipulation is broader in several dimensions than a *Sotera* stipulation, at least according to Masimo. For instance, despite offering a *Sotera* stipulation in support of its petitions, after institution, Masimo advances in district court invalidity grounds the same references that it applied within its instituted IPR petitions.⁵

⁵ For example, the Board instituted Masimo's *Sotera*-backed petition challenging

For at least these reasons, *Fintiv* factor 3 disfavors denial. *See Seven Networks*, 11-12; *Sotera*, 16-17; *Snap, Inc. v. SRK Technology LLC*, IPR2020-00820, Pap. 15, 11-13 (Oct. 21, 2020)(“*Snap*”)(precedential).

4. Factor 4: The Petition’s Grounds are Materially Different from Any that Might be Raised in Litigation

Factor 4 strongly disfavors denial. First, Patent Owner asserts only ’507 Patent claims 13, 14, 16, 17, 19, and 20; this Petition challenges all 20 ’507 Patent claims. Accordingly, a vast majority of the Challenged Claims will be left

Apple’s D. Del.-asserted ’257 patent, and Masimo has since revealed that it relies for its district court invalidity grounds on the same Markel and Mills references applied in that petition, further combined with product art. *Masimo Corp. v. Apple Inc.*, IPR2023-00745 Pap. 1, 12-13, 85 (Mar. 22, 2023); APPLE-1067, 1.

Similarly, Masimo relies in district court on the same Chae reference applied in its now-instituted and *Sotera*-backed ’352 patent petition, further combined with product art. *Masimo Corp. v. Apple Inc.*, IPR2023-00664 Pap. 1, 33, 94 (Mar. 6, 2023); APPLE-1067, 1. Finally, Masimo relies in district court on the same Kotanagi reference applied in its now-instituted and *Sotera*-backed ’783 patent petition, further combined with product art. *Masimo Corp. v. Apple Inc.*, IPR2023-00634 Pap. 1, 6, 109 (Feb. 27, 2023); APPLE-1067, 1.

unaddressed in District Court Litigation. *See Seven Networks*, 21.

Second, to eliminate any doubt as to the absence of meaningful overlap between the District Court Litigation and IPR, Apple stipulates that, if the Board institutes this IPR, Apple will not, for the instituted claims, seek resolution in the co-pending District Court proceeding of any ground of invalidity that utilizes any of Mendelson, Tran, Kianl, D'Angelo, Ording, Moon, or Goldsmith. APPLE-1066.

By this stipulation, Factor 4 strongly disfavors denial, at least because Apple's stipulation guarantees that the prior art relied on in this IPR will not be relitigated/otherwise litigated in the co-pending District Court proceeding. *See Apple Inc. v. AliveCor, Inc.*, IPR2021-00972 Pap. 10, 13-16 (PTAB Dec. 8 2021)(“*AliveCor*”); APPLE-1068 (demonstrating that Apple's district court expert invalidity report does not leverage Mendelson, Tran, Kianl, D'Angelo, Ording, Moon, or Goldsmith).

Notably, Apple's stipulation is substantially more robust than a *Sand Revolution* stipulation, by which a petitioner pledges not to pursue the same grounds of invalidity in district court litigation, while leaving open the possibility of the same references applied within a petition being reasserted by the same petitioner in different district court invalidity grounds. *See Sand Revolution* at 11-12. For at least that reason, Apple respectfully submits that ***Apple's stipulation***,

which *guarantees that there will be no overlap* between the prior art relied on in this IPR and the prior art relied on in the District Court proceeding, should be accorded substantially more weight than a *Sand Revolution* stipulation. *Cf. Sand Revolution* at 12.

Further, and as noted above with respect to Factor 3, Apple's stipulation is also broader than a *Sotera* stipulation, at least insofar as it is apparently Masimo's position that a *Sotera* stipulation leaves open the possibility of the same references applied within an instituted IPR petition being reasserted by the same petitioner in district court invalidity grounds that could not reasonably have been raised in that petition. *See Sotera*, 13-14, 19; 35 U.S.C § 315(e)(2). More specifically, Masimo's Delaware District Court invalidity positions with respect to Apple's '257, '352, and '783 patents rely on many of the same references already applied within Masimo's *Sotera*-backed and earlier-instituted IPR petitions, further combined with product art that is not eligible for PTAB consideration. *See APPLE-1067*, 1; *IPR2023-00745 Pap. 1*, 12-13, 85; *IPR2023-00664 Pap. 1*, 33, 94; *IPR2023-00634 Pap. 1*, 6, 109.

Whether the District of Delaware will allow Masimo to proceed in this manner remains to be seen, but recent decisions treating language of the § 315(e)(2) estoppel provision that is co-extensive with *Sotera* suggest that it might. *See Sotera*, 19; 35 U.S.C § 315(e)(2). For example, a recent D. Del. decision held

that so long as printed publications are used in combination with product or system art such that the “combination is substantively different from the grounds that were raised or reasonably could have been raised” in the IPR, IPR estoppel does not apply. *Ioengine, LLC v. PayPal Holdings, Inc.* 607 F. Supp. 3d 464, 513 (D. Del. Jun. 15, 2022) (Bryson); *see also Chemours Co. FC, LLC v. Daikin Indus. Ltd.*, No. 1:17-cv-01612, 2022 WL 2643517, at *1 (D. Del. Jul. 8, 2022) (Noreika) (holding that IPR estoppel does not apply to prior art products, even if cumulative to references asserted in IPR).

In stark contrast with Masimo’s *Sotera* stipulations and Masimo’s reliance on overlapping references applied in IPR and the District Court Litigation, Apple’s stipulation extinguishes the possibility of ***any overlap*** in prior art between this IPR and grounds resolved in counterpart D. Del. proceedings, thereby ensuring that IPR is a true alternative to the District Court Litigation with respect to that art.

Moreover, Masimo asserts only a small subset of the claims challenged in this IPR (5 of 25). Further, official statistics indicate that the Board will issue its FWD months in advance of the District Court trial. APPLE-1060, 14.

At least because ***the invalidity grounds to be resolved in the District Court Litigation involve no overlap in prior art and only a small subset of the Challenged Claims***, Factor 4 strongly disfavors denial. *See AliveCor*, 16; *Seven Networks*, 21.

5. Factor 5: The PTAB Parties are Not Different Than District Court Parties

Factor 5 should, at worst, be neutral. The Litigation involves the same parties. However, the *Fintiv* decision says nothing about weighing Factor 5 in favor of denial when the petitioner and the defendant in the parallel proceeding are the same; with respect to Factor 5, *Fintiv* instead notes that “if a petitioner is unrelated” the Board has weighed that “fact against exercising discretion to deny institution.” *Fintiv*, 13-14; *see also Cisco Systems, Inc. v. Ramot at Tel Aviv University Ltd.*, IPR2020-00122, Pap. 15, 10 (Crumbley, dissenting).

Neither the grounds of unpatentability advanced by the instant Petition nor the prior art itself will be addressed in the District Court Litigation, as the invalidity contentions omit the petitioned prior art. APPLE-1068. Presented with a similar situation, the Board in *Snap* resolved “the fifth *Fintiv* factor as neutral or, at most, weighing slightly in favor of exercising discretion to deny institution”. *Snap*, 16.

6. Factor 6: The Merits of this Petition Compel Institution

Factor 6 strongly disfavors denial. Here, the strength of the merits alone outweighs any potential inefficiencies, regardless of whether the timing of the District Court Litigation is thought relevant (it is not, as demonstrated with respect to Factors 1-5). *Fintiv*, 14-15 (noting under Factor 6 that “if the merits of a ground

raised in the petition seem particularly strong...institution of a trial may serve...overall system efficiency and integrity”).

With Factors 2, 3, 4, and 6 disfavoring denial, and with remaining Factors 1 and 5 otherwise neutral, discretion should not be exercised to deny institution (and thus, substantive consideration on the merits). *Fintiv*, 19 (declining to deny institution based on a “holistic” balancing of “all of the *Fintiv* factors”).

Moreover, Director Vidal has further explained that “where the PTAB determines that the information presented at the institution stage presents a compelling unpatentability challenge, that determination alone demonstrates that the PTAB should not discretionarily deny institution under *Fintiv*.” *Director’s Guidance*, 4-5. More specifically, the PTAB will not discretionarily deny institution if “the Petition presents challenges ‘in which the evidence, if unrebutted in trial, would plainly lead to a conclusion that one or more claims are unpatentable by a preponderance of the evidence.’” *Commscope*, 3 (quoting *Director’s Guidance*, 4); *Director’s Guidance*, 3-5, 9.

The merits of this Petition are compelling. As the instant Petition demonstrates, evidence including the applied references and Dr. Kenny’s robustly corroborated testimony, if unrebutted in trial, would plainly lead to a conclusion that one or more claims are unpatentable by a preponderance of the evidence.

Both because a holistic analysis of the *Fintiv* factors disfavors denial, and

because the merits of the instant Petition are compelling, Apple respectfully submits that the Board should not discretionarily deny institution under *Fintiv*.⁶ *Fintiv*, 19; Director's Guidance, 3-5, 9; Commscope, 3.

B. The Petition's New Prior Art and Arguments Warrant Institution—35 U.S.C. § 325(d)

This Petition presents new prior art and arguments for which there is no indication in the file history that the Office ever previously considered in connection with the '507 patent. While Kianl (APPLE-1006) appears on the face of the '507 patent, it was never substantively addressed by the examiner during prosecution. APPLE-1002, 107-120, 30-41. Furthermore, Kianl is relied upon in this petition only for certain dependent claims and was never considered in combination with primary reference Mendelson, which was not before the Examiner during prosecution.

The '507 patent's prosecution did not involve negotiation between the applicant and the Examiner regarding the teachings of the prior art applied in the

⁶ Apart from Petitioners' showing that *Fintiv* favors institution, the *Fintiv* framework should not be followed because it is legally invalid. The framework (1) exceeds the Director's authority, (2) is arbitrary and capricious, and (3) was adopted without notice-and-comment rulemaking.

instant Petition, exercise of the Board's discretion under § 325(d) is unwarranted.

See IPR2019-01469, Paper 6 (PTAB Feb. 13, 2020) (precedential) (citing IPR2017-01586 Pap. 8 (PTAB Dec. 15 2017) (precedential)).

V. PAYMENT OF FEES – 37 C.F.R. § 42.103

Petitioner authorizes the Patent and Trademark Office to charge any fees to Deposit Account No. 06-1050.

VI. CONCLUSION

Petitioner requests IPR and cancellation of the Challenged Claims.

VII. MANDATORY NOTICES UNDER 37 C.F.R § 42.8(a)(1)

A. Real Party-In-Interest Under 37 C.F.R. § 42.8(b)(1)

Apple Inc. is the petitioner and real party-in-interest.

B. Related Matters Under 37 C.F.R. § 42.8(b)(2)

Petitioner is not aware of any disclaimers, reexamination certificates or petitions for inter partes review for the '507 Patent. The '507 patent is the subject of civil action, *Apple Inc. v. Masimo Corporation et al.*, Case No. 1-22-cv-01378, District of Delaware (DDE), filed October 20, 2022, in which Patent Owner filed a counterclaim of infringement of the '507 patent on December 12, 2022.

C. Lead And Back-Up Counsel Under 37 C.F.R. § 42.8(b)(3)

Petitioner provides the following designation of counsel.

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D. Service Information

Please address all correspondence and service to the address listed above.

Petitioner consents to electronic service by email at IPR50095-0135IP2@fr.com.

Respectfully submitted,

Dated: December 12, 2023

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CERTIFICATION UNDER 37 CFR § 42.24

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petition for *Inter Partes* Review totals 13,867 words, which is less than the 14,000 allowed under 37 CFR § 42.24.

Dated: December 12, 2023

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CERTIFICATE OF SERVICE

Pursuant to 37 CFR §§ 42.6(e)(4)(i) *et seq.* and 42.105(b), the undersigned certifies that on December 12, 2023, a complete and entire copy of this Petition for *Inter Partes* Review and all supporting exhibits were provided via Federal Express, to the Patent Owner by serving the correspondence address of record as follows:

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