UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SOTERA WIRELESS, INC.
Petitioner

v.

MASIMO CORPORATION
Patent Owner

Patent No. 9,795,300
Issue Date: February 26, 2019
Title: ARM MOUNTABLE PORTABLE PATIENT MONITOR

Inter Partes Review No. IPR2020-01015

DECLARATION OF GEORGE E. YANULIS IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 9,795,300

EX1003
Petitioner Sotera (300)

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I, George E. Yanulis, offer this declaration in support of the Petition for *Inter Partes* Review of U.S. Patent No. 9,795,300 ("the '300 patent"). I am over the age of 18, competent to make this declaration, and have personal knowledge of the facts set forth below. If called to testify, I could and would testify honestly, under oath, to the matters set forth herein.

I. INTRODUCTION

1. I am a technical expert in the field of biomedical engineering.

2. I have over 35 years of experience in biomedical engineering and designing medical devices. Particularly, I have direct experience within the field of wearable medical monitors that measure physiological parameters and transmit those measured parameters wirelessly to another device. My experience was related specifically to electrocardiograms, cardiac echo imaging, and cardiac pressure/volume analysis, which are closely related to pulse oximetry/oxygen saturation. Through my experience, I have learned how to integrate medical monitoring technology into the medical profession. Specifically, I am extremely familiar and knowledgeable in the research and design of ablation catheters for the treatment of atrial flutter and atrial fibrillation. All-in-all, my experience directly relates to the '300 Patent and the technology described therein.

3. I am not an attorney, and I have not been asked to offer any legal opinions. I have been informed and understand the law to be applied for

determining invalidity, which I explain in places below. I have applied the law told to me in developing my technical opinions in this Declaration.

II. BACKGROUND AND QUALIFICATIONS

A. Education and Work Experience

4. I am a Medical Device Design and Development/Research Engineer. I received my Bachelor of Arts in Pre-medicine degree in 1977 from Syracuse University, which included a minor in Chemistry. Originally, I planned to go to medical school, but I found that my interests aligned more closely to medical devices than practicing medicine. So, I pivoted to biomedical engineering, and I received a Master's degree in Biomedical Engineering from the University of Virginia in 1981. I closely studied medical devices while in graduate school at Virginia, including using preamplifiers to record evoked cortical signals to better understand the etiology of Epilepsy.

5. For approximately the next two decades, my professional experience included serving in the armed services as a 1st Lieutenant and Clinical Engineer for the Air Force (stationed at the Malcolm Grow Medical Center, Andrews Air Force Base), working as a Logistics Engineer for RCA, and conducting research within the education industry (at Syracuse, Alabama-Birmingham, Drexel, and the University of Pennsylvania). I was a Clinical Engineering Consultant involved with the Y2K Program at the Hospitals of the University of Pennsylvania from

1999-2000. Importantly, I continued as a research assistant at the University of Pittsburgh, but in 2002, I decided to pursue a doctorate. Even though I was leaving, my mentor at Pitt awarded me a Master of Science in Bioengineering for my research work rather than leave without a degree. I studied medical devices at Pitt, but also implantable devices, such as using elastomeric polymers to design artificial diaphragm muscles.

6. Still continuing my education, I received a Doctor of Engineering (D.Eng.) from Cleveland State University in 2008. For my Doctorate, I focused on Applied Biomedical Engineering. It was during my Doctorate that I developed a specialty in cardiovascular medical devices and treatments, with a focus on treating atrial fibrillation. At Cleveland State, we studied electrical stimulation (i.e., coupled pacing applied near the end of the T-wave, which represents the repolarization of the ventricles in electrocardiography to prevent rapid ventricle conduction during atrial fibrillation (AF)), and whether the benefits of coupled pacing could be used during persistent AF.

7. Since obtaining my D.Eng., I have taught the next generation of bright minds. From 2009-2013, I was an adjunct professor at the College of Staten Island teaching Engineering and Physics, and since 2015, I have been an Adjunct Professor at Temple University teaching Bioengineering.

8. However, my focus has been on clinical assessment of medical devices and monitoring systems. For example, I am currently involved in the research and development of a heart rate monitoring system based on my earlier bench studies conducted related to my Doctoral research at the Cleveland Clinic (2005-2008) and now with Medical Device Consulting, LLC (2016-Present). I have consulted on heart bypass systems (2017-2018), and I served as a consultant on several cardiac pacemaker device related cases, which involved monitoring heart rate, pulse rate, and ECG. I was involved in reviewing critical monitoring systems as both a member and peer reviewer of submitted manuscripts of the association for the advancement of Medical Instrumentation (2012-present). At Cleveland State, I was involved in the review of critical care monitoring systems used for heart failure therapy patients both from 2005-2008, as part of my Ph.D. and since 2014, as part of my research and the development of a heart monitoring system. Further still, from 2015-2017, I was also involved in mentoring Temple bio-engineering students in the design of critical care monitoring systems for both a cardiac systems course and biomedical instrumentation design course. Finally, I was involved in reviewing clinical care monitoring systems as a clinical engineer with the USAF from 1987-1989.

9. I also have continued to study cardiovascular devices and other medical devices as a consultant. Particularly, I collaborated with Data Science

Corporation to design a device that used a time elapsed interval between two consecutive R-waves of the QRS heart signal (R-R interval) to potentially use on heart failure therapy patients. I have assisted with 250 Cardiac Pacemaker Device Implants on dogs to develop pacing algorithms for heart failure therapy patients. Also, I have performed over 500 ECG signal detection sessions and cardiac pressure-volume analysis on dogs. Further still, I have intensely studied Heart Failure Cardiac Pressure/Flow Sensor Monitoring Systems.

10. Specifically related to pulse oximetry monitoring systems, I conducted pulse oximetry research at the University of South Florida from 1996-1997 under the direction of John E. Scharf, MD, who is an anesthesiologist associated with the James A. Haley Veterans Hospital, Tampa, Florida. Also, my Research and Development on the prototype development of a heart rate monitoring system for Medical Device Consulting, LLC includes a means for monitoring both oxygen saturation and pulse rate with over-the-counter portable sensing devices (2016-present).

11. Lastly, I have written six peer-reviewed articles in this area and other areas of medical device development. My publications from the last 10 years are listed in my CV (EX1004).

12. Thus, my background demonstrates an expertise and strong understanding of medical devices and how they can improve the health of patients.

B. Engagement

13. I have been retained as an independent expert consultant by Sotera Wireless, Inc. ("Petitioner") in connection with a petition for *inter partes* review of U.S. Patent No. 9,795,300 ("the '300 Patent," EX1001).

14. Specifically, I was asked to investigate and opine on the technology claimed in, and the patentability or unpatentability of certain claims of the '300 Patent. Specifically, I was asked to opine on the validity of claims 1-20 (the "Challenged Claims") of the '300 Patent.

15. Although I am being compensated for my services in this matter at my standard consulting rate of $540 per hour, my compensation is not contingent upon the opinions I render or the outcome of this proceeding. I have no financial interest in any of the parties, and I have no other interest in this proceeding.

16. This report is based on information currently available to me. I reserve the right to amend or supplement my analysis in this report and/or to respond to any additional submissions prepared by or on behalf of the Patent Owner. I also reserve the right to amend or supplement my opinions based on further discovery and information provided in the case.

17. I reserve the right to create any additional summaries, tutorials, demonstrations, charts, drawings, tables, and/or animations that may be appropriate to supplement and demonstrate my opinions as necessary.

18. All of the opinions stated in this report are based on my own personal knowledge and professional judgment.

III. MATERIALS CONSIDERED

19. I have considered the following list of materials in formulating my opinions in this matter:

Ex #	Exhibit
1001	U.S. Patent No. 9,795,300 ("the '300 patent")
1002	Prosecution History of the '300 Patent
1005	U.S. Patent No. 6,840,904 to Goldberg ("Goldberg")
1006	PCT Publication No. WO 00/42911 to Kiani et al. ("Kiani")
1007	EP0880936A2 to Akai ("Akai")
1008	U.S. Patent No. 5,919,141 to Money ("Money")
1009	PCT Publication No. WO 96/15594 to Taylor ("Taylor")
1010	U.S. Patent No. 5,793,413 to Hylton ("Hylton")
1011	'300 Patent File History Excerpt, Application as filed, April 27, 2017
1012	'300 Patent File History Excerpt, Preliminary Amendment, April 28, 2017
1013	U.S. Patent No. 6,241,684 to Amano ("Amano")
1014	'300 Patent File History Excerpt, Pre-Interview First Office Action, issued July 3, 2017
1015	'300 Patent File History Excerpt, Notice of Allowance, issued Sept. 14, 2017
1016	International Publication No. WO00/44274
1017	Japanese Publication No. JP0558122A, with English Machine Translation
1018	U.S. Patent No. 4,338,950
1019	U.S. Patent No. 4,450,843

1020	U.S. Patent No. 4,807,639
1021	U.S. Patent No. 5,539,706
1022	Masimo's Adversary Complaint, United States Bankruptcy Court for the Southern District of California, *In re: Sotera Wireless, Inc.*, No. 16-05968-LT11, filed October 7, 2016
1023	U.S. Patent No. 6,850,788 (Parent to '300 Patent)
1024	U.S. Patent No. 7,844,314 (Parent to '300 Patent)
1025	U.S. Patent No. 7,844,315 (Parent to '300 Patent)
1026	U.S. Patent No. 8,548,548 (Parent to '300 Patent)
1027	U.S. Patent No. 9,113,831 (Parent to '300 Patent)
1028	U.S. Patent No. 9,113,832 (Parent to '300 Patent)
1029	Masimo's Complaint for Patent Infringement against Sotera (ECF No. 1), filed June 12, 2019
1030	Service of Summons and Complaint upon Sotera (ECF No. 5) June 13, 2019
1031	U.S. Patent No. 10,213,108 ("the '108 Patent")

IV. OVERVIEW OF THE PATENT AT ISSUE

20. I have read and considered the '300 patent, filed April 27, 2017, as well as its prosecution history. I have been told that the '300 Patent has a priority date of March 25, 2002.

21. It is my understanding that the claims of the '300 Patent relate to a wearable, portable physiological monitor that communicates with multiple sensors and wirelessly transfers sensor data to another device. EX1001, Abstract. However, the claims include additional features other than the general idea of untethering patient sensors from a conventional bedside monitor. EX1001, 13:13-49. From the

perspective of a PHOSITA, these additional features merely describe the wearable housing's configuration, such as where one particular port is located on the housing, and its relationship to a pulse oximeter's wire. *Id.* However, many prior art references teach this exact configuration, even if the prosecution history's primary reference (U.S. Pat. No. 6,241,684 ("Amano") (EX1013)) did not precisely illustrate this basic and conventional housing configuration. *See* EX1005, FIG. 2; EX1006, FIGs 2 and 5; EX1007, FIG. 1; WO00/44274 (EX1016), FIG. 1a; JP0558122A (EX1017), FIG. 8; U.S. Patent No. 4,338,950 (EX1018), FIG. 1; U.S. Patent No. 4,450,843 (EX1019), FIG. 1; U.S. Patent No. 4,807,639 (EX1020), FIG. 1; U.S. Patent No. 5,539,706 (EX1021), FIG. 15b.

22. Notably, the patent specification focuses on the combined wireless transmitter/receiver system that allows a conventional pulse oximeter to communicate with a conventional bedside monitor even though the conventional pulse oximeter is not connected to the conventional bedside monitor via a traditional wire. EX1001, 4:54-64. The '300 patent specification focuses on this transmitter/receiver system. *Id.* Indeed, nine figures of the '300 patent focus solely on the unclaimed receiver module that plugs into a conventional bedside monitor. EX1001, FIGs. 3, 5A-C, 7, 9, 11, 12, and 14, 5:1-16. Also, I note that each of the first seven parent patents all have claims directed to the receiver/transmitter system. EX1023, 12:49-14:65; EX1024, 12:43-14:39; EX1025, 11:60-14:11;

EX1026, 12:45-14:21; EX1027, 12:49-14:48; EX1028, 12:48-13:26; EX1031, 13:9-16:54. The '300 patent, however, does not have any limitations directed toward the receiver unit. EX1001, claims 1-20. From the perspective of a PHOSITA, the claimed housing configuration was not intended to be the source of novelty by the inventors back in 2002. EX1001, 4:49-5:26. This is not surprising because monitor design, its connection to a patient's body, and vital sign monitoring devices are basic. The monitor must attach to the patient somewhere. The monitor must include ports so vital sign monitors can be connected as needed in accordance with the needs of the patient. There must be a screen to view the status of vital signs.

23. In fact, almost nothing from the written description supports the claim amendment that resulted in an allowance. (e.g., "is substantially perpendicular to the side of the housing"). As far as I can tell, the only "support" for such claim limitations comes from that which was illustrated by FIGs. 3 and 4A.

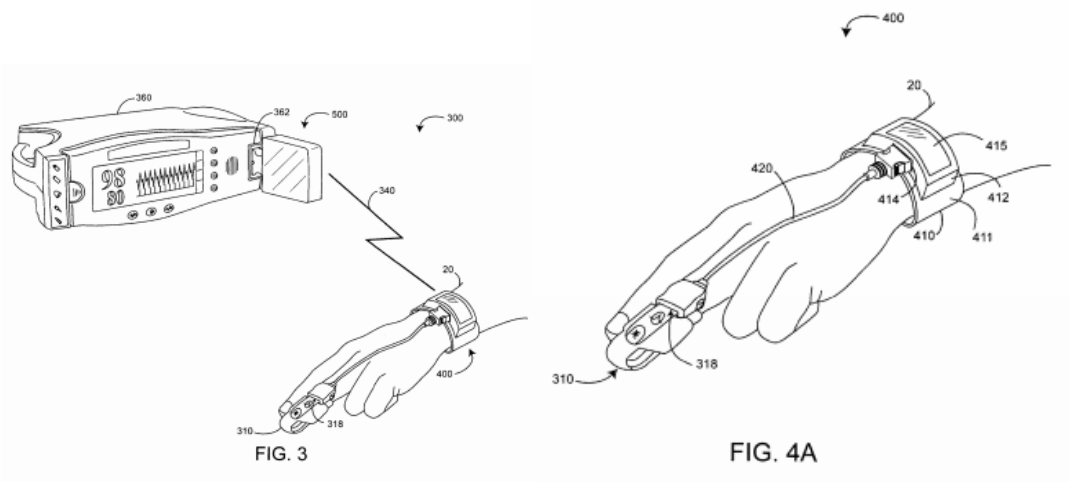


FIG. 3 FIG. 4A

24. The claims also include other features, which the Examiner found to be conventional or taught by the prior art. EX1014, pp. 2-6. Particularly, the Examiner did not find anything novel or non-obvious about a wearable device configured to interface with three sensors (because it's not). EX1001, 11:56-12:35; EX1014, pp. 4-6. One skilled in the art would appreciate that the monitor should include enough ports to adequately monitor several vital signs of a patient.

V. LEVEL OF ORDINARY SKILL IN THE ART

A. Legal Principles

1. A Person Having Ordinary Skill in the Art

25. I have been informed that patents are considered from the perspective of a person having ordinary skill in the art, and that this is a hypothetical person who is presumed to know the relevant prior art.

26. I have been informed that the following five factors inform the analysis for determining the level of ordinary skill in the art: (1) type of problems encountered in the art; (2) prior art solutions to those problems; (3) rapidity with which innovations are made; (4) sophistication of the technology; and (5) educational level of active workers in the field. *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). I apply these factors in the section below in providing my opinion as to the level of one having ordinary skill in the art.

B. Opinion as to the Level of a Person Having Ordinary Skill in the Art of the ’300 Patent

27. I have knowledge relevant to what a person having ordinary skill in the art at the time of the invention would understand and do. In 2002, at the priority date of the ’300 patent, I had 20 years of experience in this field and was a person having ordinary skill in the art.

28. In my opinion, and applying the factors set forth above in paragraph 26, a person of ordinary skill in the art at the time of the filing of the ’300 patent would be: a person having at least a B.S. degree in electrical or biomedical engineering or a related field, with at least two (2) years’ experience designing patient monitoring systems. If the person has a higher level of education, such as a Masters’ degree, less work experience could be acceptable, and vice versa. My opinion is based on the following analysis:

29. Generally, the ’300 Patent’s specification is related to wearable, medical technology transmitting data wirelessly. But the claims’ scope focuses on the housing’s configuration, not on the electrical technology that facilitates communication with medical sensors or wireless data transmission. The ’300 patent includes some claim limitations directed to wireless transmission functionality, but the ’300 patent admits those functions to be conventional. EX1001, 7:22-24. Generally, when designing wearable technology, PHOSITAs mainly attempted to improve patient comfort when the device is being worn.

However, the best way to improve patient comfort would be to minimize the size of the wearable device and the number of sensors attached to the patient. None of the claims are directed to this problem. Instead, the claims are directed to a conventional wired port's location on a housing. However, the location of a port and a wire does not minimize the size of a wearable device; it simply manages wiring, in a very basic way. Thus, the claims are directed mostly to wire management, which is a problem common to all wired devices and a problem encountered even by those without any skill in the art. Of course, ports are a basic way to connect and disconnect an electronic device.

30. There were numerous prior art solutions directed to wire management for medical devices. In fact, three of the prior art references used as Grounds herein illustrate systems that shorten wire lengths and choose the most direct path between a wearable housing and a medical sensor. E.g., EX1005, FIG. 2; EX1006, FIG. 2; EX1007, FIG. 1. And, of course, using the least amount of wire is an obvious design choice.

31. Finally, biomedical engineers frequently have graduate degrees, but those graduate degrees generally focus on advanced biology and physiology, not basic mechanical engineering concepts, like how to shorten a wire. As such, I do not believe that a graduate degree is necessary to design the medical device

claimed by the ’300 patent. In fact, how medical sensors measure physiological parameters was taught by the ’300 patent as prior art. EX1001, 1:40-2:18.

32. Therefore, in view of all these factors, I believe that a PHOSITA would have at least a B.S. degree in electrical or biomedical engineering or a related field, with at least two (2) years’ experience designing patient monitoring systems. If the person has a higher level of education, such as a masters’ degree, less work experience could be acceptable, and vice versa.

VI. CLAIM CONSTRUCTION

A. Legal Principles

33. I have been informed that in a proceeding for *inter partes* review, claim terms in an unexpired patent are to be given their plain and ordinary meaning, as understood by a person having ordinary skill in the art, in view of the patents’ specification. *See* 37 C.F.R. §42.100(b); 83 FR 51340; *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc).

B. Opinion of Claim Construction

34. I believe that all claim terms, for the purposes of *inter partes* review, can be given their plain and ordinary meaning.

35. It is my understanding that the parties disagree as to the construction of some claim terms of the ’300 patent. Particularly, the parties do not agree whether a “side” is flat, even though the claims specifically recite that the extending direction of the cable running to the pulse oximetry sensor is

perpendicular to the entire first side. If the first side were not flat, then the cable would not extend perpendicular to the first side (just a portion or part of the side). So, a side should be considered planar or flat, but that is the plain and ordinary meaning.

36. Generally, the disputes as to claim interpretation are irrelevant to the validity of the ’300 patent because it is my opinion that the ’300 patent is invalid as obvious under either party’s proposed construction. As such, the Board need not construe the claims and may give each and every term its plain and ordinary meaning because the claims are invalid under the plain and ordinary meaning.

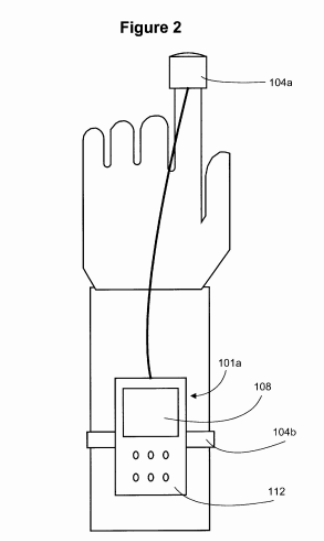
VII. SUMMARY OF THE PRIOR ART

A. Goldberg

37. Goldberg broadly discloses a wearable patient monitoring device. EX1005, Abstract. According to Goldberg, a portable device 100 receives data from three or more sensors, displays the sensor data, and wirelessly transmits sensor data or measurements to a remote computer. EX1005, 1:29-44, 2:27-29, 4:20-30, 4:50-56, 5:3-8, 2:37-42, 2:47-55. Thus, the system of Goldberg functions exactly as the ’300 patent.

38. In addition to functionality, Goldberg’s housing is configured exactly as claimed by the ’300 Patent. Goldberg includes a wire between a pulse oximeter

104a and the housing 112 that extends along a path substantially perpendicular to the side of the housing 112 facing the illustrated hand. EX1005, FIG. 2.



39. Therefore, in my opinion, Goldberg is exactly like the '300 patent because Goldberg teaches a portable, wearable, wireless patient monitoring system collecting data from sensors and transmitting those sensor values to a remote computer system. EX1005, 1:29-44, 2:27-29, 4:20-30, 4:50-56, 5:3-8.

B. Kiani

40. Kiani is another one of Masimo's patents and generally discloses a portable pulse oximetry sensor that communicates with conventional bedside monitors. EX1006, Abstract. In most ways, Kiani is exactly like the '300 patent, but Kiani describes a wired connection between the portable pulse oximeter and the conventional bedside monitor. EX1006, 5:33-6:2.

41. Importantly, Kiani discloses the conventional pulse oximetry technology and conventional portable device technology. Kiani explicitly teaches what Goldberg and Akai assumed to be understood by those skilled in the art, such as: (1) that wired pulse oximetry sensors typically include ports for ease of connection and disconnection, (2) that portable devices include batteries to provide needed power to the portable device, and (3) that wired connections can be removable, indeed are desirably removable in a medical application like that involved here. EX1006, 3:21-23, 5:21-22, FIG. 5.

C. Money

42. Again, Money teaches a portable, wearable, patient monitoring device communicating with a plurality of sensors (including pulse oximetry, blood pressure, ECG, respiration rate, and temperature sensors), and Money's patient monitoring device communicates with both analog and digital medical sensors simultaneously. EX1008, 5:48-51, 7:4-8, 7:16-20, 7:58-62, 12:4-7, 13:24-32. Like the '300 patent, Money teaches a portable patient monitoring system that communicates with a plurality of sensors, some of which can be analog and some of which can be digital. *Id.* Money teaches that the portable device 10 displays readings from all the connected sensors on a display 42 and wirelessly transmits those readings to a central monitoring station. EX1008, 5:10-13, 6:21-55. These are all the basic components in a wireless monitoring application.

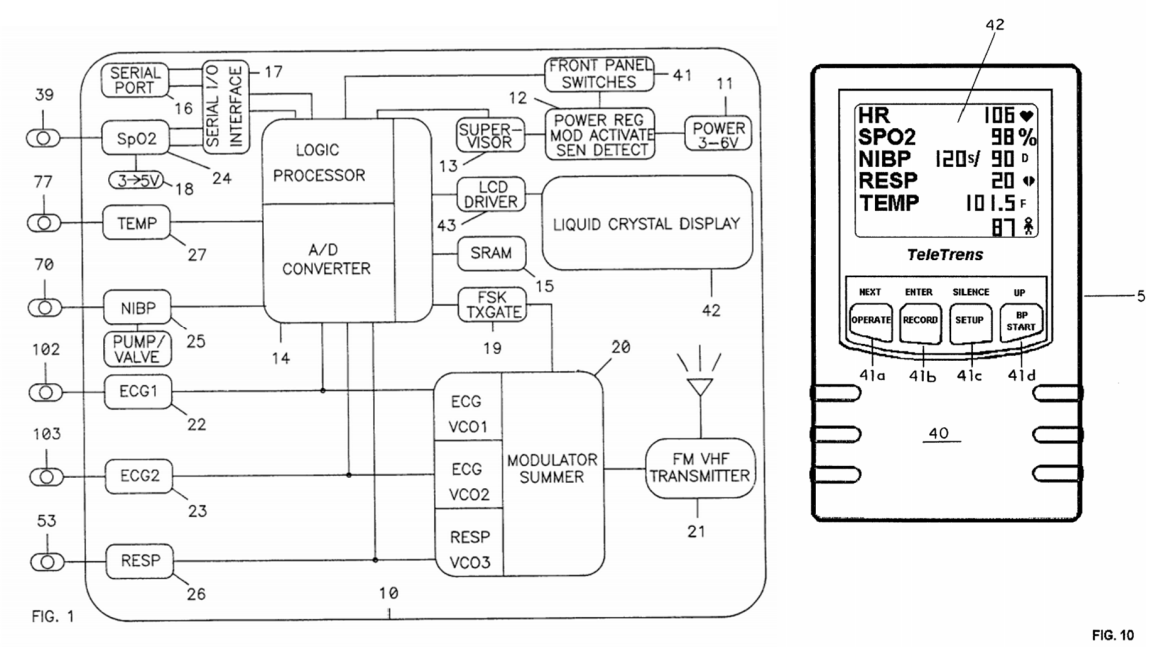


FIG. 1

FIG. 10

D. Akai

43. Like all the previous references, Akai teaches a wearable monitoring device communicating with a plurality of sensors and wirelessly transmitting sensor measurements to a remote computer. EX1007, Abstract. Also, importantly, Akai illustrates the same housing configuration as claimed by the ’300 patent, namely that the wire between the housing and the pulse oximetry sensor extends substantially perpendicular to the housing side that faces a patient’s hand. EX1007, FIG. 1. In other words, Akai teaches the basic principle of minimizing the amount of wire between the monitor and sensor, i.e., the shortest distance between two points is a straight line. EX1007, FIG. 1.

E. Taylor

44. Taylor teaches a system that communicates with a Mobitex wireless network. EX1009, 2:29-3:22. As expressly taught by Taylor, common wireless standards and protocols generally involved combining data into digital words or bitstreams, encoding that digital data into a baseband signal, and modulating that baseband signal to wirelessly transmit information. EX1009, 5:19-6:5, 6:7-18, 6:31-7:3, 7:8-10, 7:31-8:15.

F. Hylton

45. Hylton teaches how multiplexers work. EX1010, 14:24-26, 18:32-35. The teachings of Hylton would have been understood to a PHOSITA. Multiplexers receive multiple signals and output one signal; that's just how multiplexers work. *Id*. This fact is beyond dispute, and every PHOSITA would understand this – its taught in introductory electrical engineering courses. Hylton removes any doubt.

VIII. OPINION ON GROUNDS OF UNPATENTABILITY

A. Legal Principles

46. I have been told that under 35 U.S.C. § 103(a), "[a] patent may not be obtained though the invention is not identically disclosed or described as set forth in Section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains."

47. When considering the issues of obviousness, I have been told that I am to do the following:

(a) determine the scope and content of the prior art;

(b) ascertain the differences between the prior art and the claims at issue;

(c) resolve the level of ordinary skill in the pertinent art; and

(d) consider evidence of secondary indicia of non-obviousness (if available).

48. I have been told that the relevant time for considering whether a claim would have been obvious to a PHOSITA is the time of alleged invention.

49. I have been told that a reference may be modified or combined with other references or with the PHOSITA's own knowledge if the person would have found the modification or combination obvious. A PHOSITA is presumed to know all relevant prior art, and the obviousness analysis may consider the inferences and creative steps that a PHOSITA would employ.

50. In determining whether a prior-art reference could have been combined with another prior-art reference or other information known to a person having ordinary skill in the art, I have been told that the following principles may be considered:

(a) a combination of familiar elements according to known methods is likely to be obvious if it yields predictable results;

(b) the substitution of one known element for another is likely to be obvious if it yields predictable results;

(c) the use of a known technique to improve similar items or methods in the same way is likely to be obvious if it yields predictable results;

(d) the application of a known technique to a prior art reference that is ready for improvement is likely obvious if it yields predictable results;

(e) any need or problem known in the field and addressed by the reference can provide a reason for combining the elements in the manner claimed;

(f) a person of ordinary skill often will be able to fit the teachings of multiple references together like a puzzle; and

(g) the proper analysis of obviousness requires a determination of whether a person of ordinary skill in the art would have a "reasonable expectation of success"—not "absolute predictability" of success—in achieving the claimed invention by combining prior art references.

51. I have been told that whether a prior art reference renders a patent claim unpatentable as obvious is determined from the perspective of a PHOSITA. Further, I have been told that while there is no requirement that the prior art contain an express suggestion to combine known elements to achieve the claimed invention, a suggestion to combine known elements to achieve the claimed

invention may come from the prior art as a whole or individually, as filtered through the knowledge of one skilled in the art. I have also been told that the inferences and creative steps a PHOSITA would employ are also relevant to the determination of obviousness.

52. I have been told that when a work is available in one field, design alternatives and other market forces can prompt variations of it, either in the same field or in another. If a PHOSITA can implement a predictable variation and would see the benefit of doing so, that variation is likely to be obvious. In many fields, there may be little discussion of obvious combinations, and in these fields market demand—not scientific literature—may drive design trends. When there is a design need or market pressure and there are a finite number of predictable solutions, a PHOSITA has good reason to pursue those known options.

53. I have been told that there is no rigid rule that a reference or combination of references must contain a "teaching, suggestion, or motivation" to combine references. But I also have been told that the "teaching, suggestion, or motivation" test can be a useful guide in establishing a rationale for combining elements of the prior art. This test poses the question whether there is an express or implied teaching, suggestion, or motivation to combine prior art elements in a way that yields the claimed invention and avoids impermissible hindsight analysis.

B. Ground 1: Claims 1-20 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of Goldberg, Kiani, and Money

54. In my opinion, claims 1-20 would have been obvious to a PHOSITA in view of Goldberg along with Kiani and Money. This is because I believe that a PHOSITA, having knowledge of these three sources, would have found it obvious to combine the references to create the technology at issue in this case. Goldberg, Kiani, and Money represent a snapshot of the medical field before the filing date of the '300 patent. Goldberg illustrates the movement of medical monitoring away from strictly bedside monitoring to a wireless setting, where patient vital signs are aggregated and monitored at a centralized computer. EX1005, 2:3-15, 5:9-24. Also, due to the miniaturization of electronic devices, continuing in the early aughts, medical monitors became small enough to wear, which allowed clinicians to monitor patient vitals in settings other than a hospital. EX1005, 2:16-26, FIG. 2; EX1006, 2:34-3:4; EX1008, 2:64-3:2. These three references further demonstrate the need for adaptability in monitoring different sets of vital signs depending on a patient or a patient's ailment. EX1006, 5:3-8. The use of wireless technology to eliminate the wires is not inventive. The remaining features of the claims are directed to basic components of a medical vital sign monitoring system and relate to basic design choices that are not only obvious design choices but are shown by prior art references as discussed herein.

1. Independent Claim 1

a. "A wearable, portable physiological monitor configured to wirelessly transmit real time information regarding a plurality physiological parameters, the portable monitor comprising:"

55. I have been informed by counsel that claim preambles are generally not limiting when the content of the claimed preamble is an "intended use." I have been informed by counsel that preambles are generally statements of intended use when the body of a claim fully sets forth all the limitations of the claimed invention, and the preamble merely states the purpose or intended use of the invention. Here the preamble merely states what the wearable, medical monitoring device is "configured to" do. Thus, in my opinion, this preamble is entirely a statement of use. Additionally, I note that all the limitations in the preamble are also included in the body of the claim, another factor that I am told indicates the preamble should not be given patentable weight.

56. Even so, if the preamble is limiting, Goldberg teaches the entire preamble. Specifically, Goldberg teaches a wearable, portable physiological monitor. EX1005, 4:57-67. Goldberg teaches and illustrates that the housing 112 straps to a person's forearm or wrist, thus both showing and describing the portable device as "wearable." *Id.*

57. Goldberg teaches that the portable device 100 communicates with at least three sensors. EX1005, 4:50-67. In one exemplary embodiment, Goldberg

teaches and illustrates a portable device connected to pulse oximetry, blood pressure, and electrolyte sensors. EX1003, 4:57-5:3. However, Goldberg teaches that the set of sensors connected to the portable device 100 can be mixed and matched as needed. EX1005, 4:50-56, 5:3-8. Thus, Goldberg very clearly teaches that the portable device 100 receives a plurality of physiological parameters from a plurality of physiological sensors. *Id.*

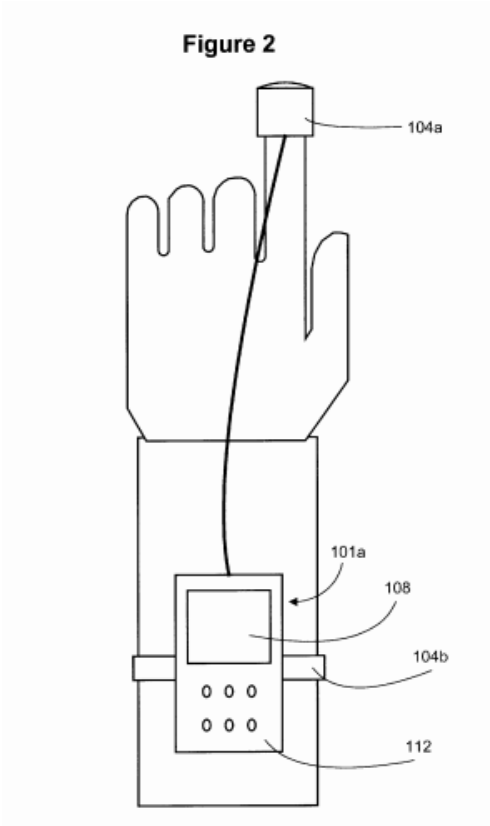
58. In addition to receiving those physiological parameters, Goldberg also teaches that the portable device wirelessly transmits those physiological parameters. EX1005, 4:19-23, 4:50-55, 5:9-24, FIGs. 6A-C. Goldberg makes clear, and a PHOSITA would understand, that the collected and transmitted data comprises real-time data. EX1005, 4:19-29, 4:41-49.

59. Indeed, it would be very pointless to monitor a patient and collect old or outdated data. A clinician acting on outdated data might make an incorrect diagnosis or provide a treatment that is no longer necessary due to an improvement in patient health. Thus, the data collected by Goldberg is obviously real-time data because that is the inherent function of a medical monitor – to monitor a patient's health. Patient monitors provide information so that a clinician or user can counteract data reflecting bad physiological conditions. Medical monitors are not intended to be historical medical logs.

60. Therefore, to the extent the preamble is limiting, Goldberg teaches every limitation in the preamble.

b. "a plurality of sensor ports positioned on a housing of the portable monitor and configured to provide respective wired interfaces with different respective physiological sensors of a plurality of physiological sensors, wherein:"

61. Goldberg teaches that the portable device 100 communicates with at least three sensors. EX1005, 4:50-67. More specifically, Goldberg teaches that the portable device 100a connects to, via wired connections, a pulse oximetry sensor 104a, a blood pressure sensor, and an electrolyte sensor. EX1005, 4:19-29, 4:50-5:8. Goldberg also teaches that the portable device can connect to more sensors, such as an ECG sensor, a temperature sensor, and others. EX1005, 4:50-56, 5:3-8. Although Goldberg does not expressly teach a port, a PHOSITA looking at FIG. 2 of Goldberg would assume that, at least, the wired connection between the pulse oximetry sensor 104a and the portable device 100a would occur via a first sensor port. A PHOSITA would also assume that the wired connection with the blood pressure sensor 104b occurs via a port. Indeed, a PHOSITA reading Goldberg would not assume that the inventor left it to the end-user to manipulate and solder delicate and dangerous electrical circuitry to form electrical connections.



62. A port is typically a female connection or socket of a wired connection. EX1001, 5:33-36, FIG. 4B. Also, a controller 102 is clearly inside the housing 112 of Goldberg, and the controller 102 receives signals from the pulse oximetry sensor 104b, so the signals transmit into the housing and to the controller through some connection (i.e., port). EX1005, 4:19-29. Thus, a PHOSITA reading Goldberg would assume that such a connection includes a port. More specifically, the male-female relationship of wired connections is a preferred method of electrical connection because it provides a more secure connection than merely contacting two electrical conductors. Ports are also preferable over hardwiring a sensor to a monitor because hardwiring a sensor to a monitor provides no

adaptability. A PHOSITA would know that patients suffer from a variety of conditions, and different sets of vital signs correspond to different conditions and diseases. For example, a patient's body temperature is not particularly important if the patient is suffering from hypertension, and so a clinician may choose to ignore body temperature while caring for a patient with hypertension. Indeed, clinicians demand control over their patients and what vital signs to monitor, so a PHOSITA designing a medical monitor would know that the end user (clinicians, nurses, physicians, physician assistants, etc.) would expect an adaptable and configurable patient monitor that allows a clinician to utilize different sets of sensors to monitor the vital signs that the clinician deems most important in caring for a patient and monitoring the patient's health. One way to provide this adaptability is to connect wired connections through ports, which provide an end user the ability to disconnect and connect a variety of sensors as needed. Thus, because Goldberg teaches an adaptable system, a PHOSITA would assume that the wired connections of this adaptable device 100 include ports. EX1005, 5:3-8.

63. Kiani demonstrates the ubiquity of ports. Kiani shows that sensor input ports 540, 550 positioned on an electrical device's housing were a known vehicle for wired communication. EX1006, 3:21-27, 8:31-9:2. Kiani expressly teaches something that a PHOSITA would assume reading Goldberg. However, if for some reason Goldberg didn't teach a port, which it clearly does, it would have

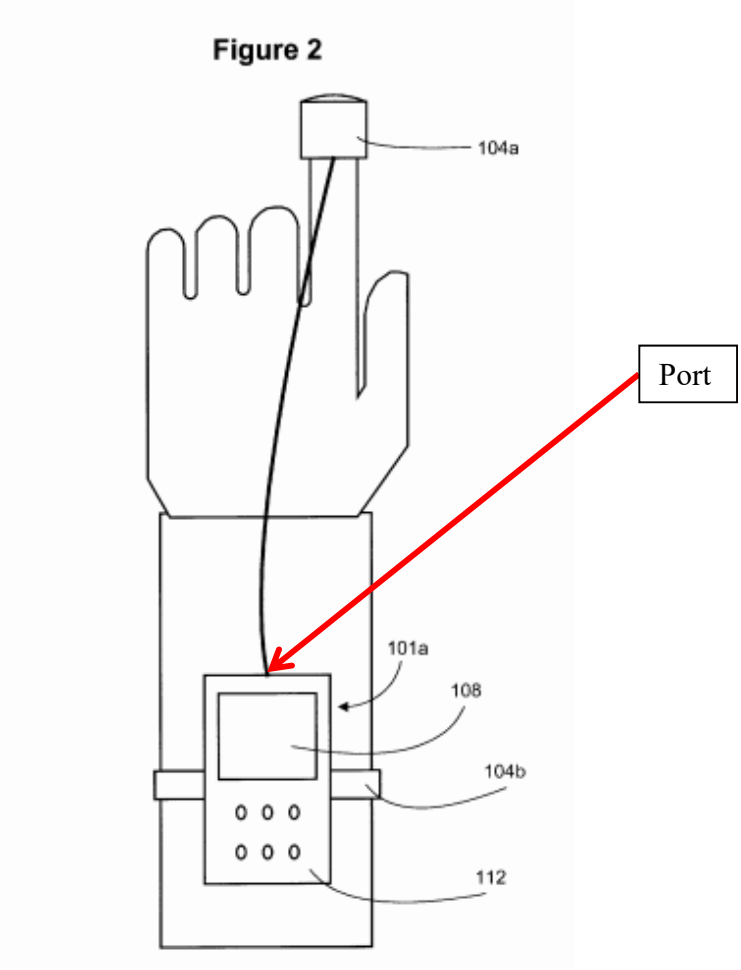
been obvious to combine Goldberg and Kiani to include a port on the housing as part of the wired connection between the pulse oximetry sensor 104a and the housing 112 of Goldberg. Like above, modifying Goldberg with Kiani would have been a combination of known concepts (wired electrical communication and wired electrical communication using ports) to yield predictable results (transmission of signals through wires and ports to the controller 102). EX1005, 4:19-29; EX1006, 3:21-27, 8:31-9:2. Particularly, including a port on Goldberg's housing (if it wasn't already there) would predictably enable wired communication with any sensor (e.g., the pulse oximeter 104a) while allowing easy removal and replacement of the sensor and providing a secure, wired connection between the sensor and the housing 112. EX1006, 2:34-3:4. More specifically, ports generally provide removable wired connections, so a medical worker would replace a sensor with a different sensor if a new physiological parameter is to be measured. *Id.*

c. "at least a first sensor port of the plurality of sensor ports is positioned on a side of the housing of the portable monitor such that, when the portable monitor is attached to an arm of a patient, a wired connection extending from the first sensor port to a first physiological sensor positioned on a digit of the patient follows a path to the digit of the patient that is substantially perpendicular to the side of the housing and avoids tangling of the wired connection;"

64. Goldberg teaches that a pulse oximetry sensor 104a connects to a controller 102 of the portable device 100a via a wire. EX1005, 4:19-29. Although

Goldberg does not expressly teach a port, a PHOSITA looking at FIG. 2 of Goldberg would assume that the wired connection between the pulse oximetry sensor 104a and the portable device 100a would occur via a first sensor port. Alternatively, it would have been obvious to include a first port on the housing 112 as part of the wired connection with the pulse oximetry sensor 104a in view of Kiani for the reasons discussed above in paragraph 63.

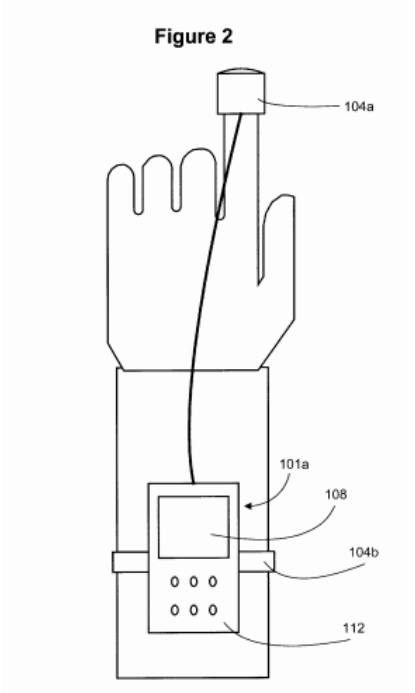
65. Furthermore, as shown in FIG. 2, the first sensor port of Goldberg exists on the top side (first side) of the housing, which is the side of the housing closest to and facing the hand when the person is wearing the portable device 100a. EX1005, FIG. 2. Thus, both the port and the side of the housing on which the port is positioned face the patient's hand while the patient wears the portable device 100a. Notably, a PHOSITA would understand in reviewing Figure 2 that a basic diagram is shown reflecting a housing, display, buttons, strap for the wrist, and a sensor wired to the housing. From this basic diagram, a PHOSITA would readily understand the basic design choices to reduce the diagram to a commercial product.



Id. (annotated).

66. Goldberg illustrates the wire between the pulse oximetry sensor 104a and the housing 112 as extending from the first sensor port along a path substantially perpendicular to the first side of the housing 112. EX1005, FIG. 2. Also, because the wire extends from the side facing the hand and closest to the hand, then the wired path from the housing 112 to the pulse oximetry sensor 104a is the shortest path from any side of the housing to the sensor 104. *Id*. Of course, using less wire is desirable for cost and the patient would, of course, not appreciate

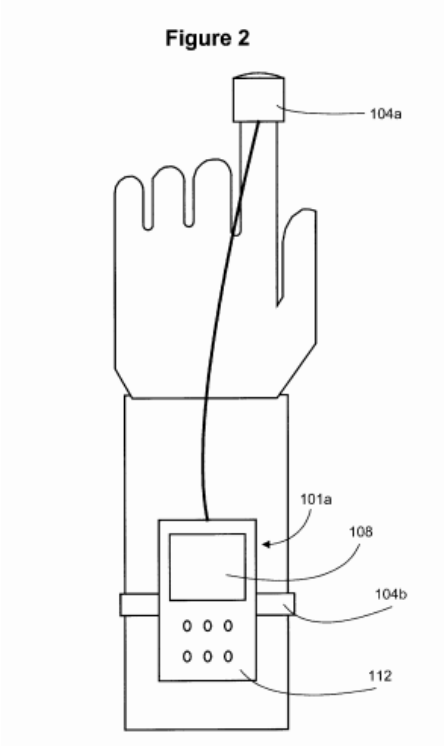
having more wire than necessary around the patient's body. Using the least amount of wire in this application implicates the age-old design principle that the shortest distance between two points is a straight line, which no doubt explains why the prior art discussed herein expressly shows this design. EX1005, FIG. 2.



67. Further still, the claim seems to suggest that the port is the reason for the extending direction of this wire. Such a suggestion runs contrary to both physics and common sense. The extending direction of the wire results from a force pulling the wire toward the pulse oximetry sensor 104, not from the configuration of the port itself. If the wire was not also tied to the pulse oximetry sensor, then the extending direction of the wire would simply fall as a result of the pull of gravity. So, a PHOSITA would understand this claim to be claiming the

wire's extending direction due to the relationship of the port's placement on a wearable device and where a pulse oximetry sensor attaches to a patient. In Goldberg, exactly as claimed and shown in the '300 patent, that wire extends along a direct line from the housing 112 strapped on a patient's wrist to the pulse oximetry sensor 104a positioned on the patient's finger. There is nothing different about Goldberg and claim 1 in terms of housing configuration.

68. Lastly, the wire between the pulse oximetry sensor 104a and the housing 112 would clearly avoid tangling because it is not long enough to tangle, as shown. EX1005, FIG. 2. Said differently, Goldberg illustrates the wire as taut, and a taut wire cannot tangle with itself. *Id.* As such, Goldberg teaches a wire that avoids tangling. Also, the direct path, along which the cable runs, between the side of the housing 112 positioned closest to the hand and the sensor 104a further avoids tangling as there is nothing that the wire could tangle with.



69. Therefore, Goldberg alone or Goldberg in view of Kiani renders this limitation obvious.

d. "one or more processing devices configured to,"

70. Goldberg teaches a controller 102 that receives and processes signals from the sensors 104. EX1005, 4:34-36. A PHOSITA would understand that a controller 102 is a processor. *Id.*

e. "receive, via the plurality of sensor ports, a plurality of signals from the plurality of physiological sensors, at least some of the plurality of signals including digital information, and at least some of the plurality of signals including analog information"

71. Goldberg teaches that the portable device 100 communicates with and receives at least three (a plurality) signals from at least three sensors. EX1005,

4:50-67. Although Goldberg does not expressly teach that the signals are received via a plurality of ports, a PHOSITA looking at FIG. 2 of Goldberg would assume that the wired connections between the sensors 104a, 104b and the portable device 100a would occur via sensor ports. Alternatively, it would have been obvious to include sensor ports on the housing 112 as part of the wired connections with the sensors 104a, 104b in view of Kiani for the reasons discussed above in paragraph 63.

72. Goldberg teaches that one of the sensors is the pulse oximetry sensor 104a that transmits signals to the controller 102. EX1005, 4:20-24. Typically, light-based pulse oximetry sensors operate in the analog domain and transmit analog signals, and a PHOSITA would understand this. Kiani expressly explains this well-known fact. EX1006, 1:26-28. Here, Kiani explains that the pulse oximeter receiving circuitry includes an amplifier and a filter, which, as understood by a PHOSITA, are circuits only necessary for interpreting an analog signal. EX1006, 1:26-28. In fact, the '300 patent even says as much. EX1001, 6:59-62. So, Goldberg teaches a pulse oximetry sensor transmitting analog information, or it would have been obvious for the pulse oximeter 104a to transmit analog information in view of Kiani. Indeed, Goldberg teaches that the portable device 100 can communicate with any sensor, which would include both analog and digital sensors. EX1005, 5:6-8. Thus, Goldberg in view of Kiani teaches that at

least the pulse oximetry sensor 104a transmits sensor readings as analog information. EX1005, 4:20-24; EX1005, 1:26-28.

73. Furthermore, I fail to see how it matters whether the signals from sensors are received as either analog or digital. All of the '300 patent, Goldberg, and Kiani teach a processor for deriving parameter values from sensor signals. A PHOSITA would understand that processors operate in the digital domain. So, a received analog signal would be converted to a digital signal before being fed to a digital processor. *See* EX1008, 7:49-52. It's irrelevant whether a parameter value is analog or digital because it will eventually be converted into a digital signal regardless of what form it is received in.

74. Even if the pulse oximetry sensor 104a of Goldberg did operate in the digital domain, a PHOSITA need only include a digital-to-analog converter as part of the pulse oximetry sensor 104a to cause the signal to be *received* in the analog domain. Analog-to-digital and digital-to-analog converters are one of the most fundamental and basic building blocks of any modern circuit. The same can be said for any sensor communicating in the analog domain: a sensor need only include an analog-to-digital converter to cause the portable device to *receive* digital data. Circuitry for converting between the analog and digital domain have been known for decades.

75. Indeed, signals are either analog or digital. There are only two options, so it would have been obvious to transmit signals as either digital or analog signals. So, at the very least, it would have been obvious for the pulse oximeter to provide an analog signal because there are only two signal options.

76. Regardless, in the prosecution history, the Examiner seemed to believe that the prior art failed to teach a wearable patient monitoring system that receives analog data from a first sensor and digital data from a second sensor. EX1015, pp. 6-9. However, the prior art ***does*** teach a system configured to receive both analog signals and digital signals, as expected because there are devices that output analog signals and digital signals. EX1008, 5:48-51, 7:4-8, 7:16-20, 7:58-62, 12:4-7, 13:24-32. Those skilled in the art understand both types of signals and when it is desirable to use one or the other, or both. For example, Money teaches a system that receives analog signals from some sensors and digital signals from others. *Id*. Specifically, in the example taught by Money, Money receives digital signals from the pulse oximetry sensor cuff 39 through a RS232 serial port, and analog signals from other sensors. EX1008, 5:65-6:2, 6:11-20, 7:58-62, 12:4-7, 13:24-32.

77. Money teaches that the pulse oximetry sensor transmits packets of discrete data representing measured oxygen saturation, and a PHOSITA would understand that a packet is a digital construct. EX1008, 6:27-33, 13:24-32. In fact,

packets must be digital because analog signals cannot be packetized. Thus, by teaching that the monitor 10 receives data packets from the pulse oximetry sensor 39, Money teaches a system that receives digital data from one sensor and analog data from another. EX1008, 5:48-51, 7:4-8, 13:24-32. Furthermore, a PHOSITA would understand that RS232 is a standard and protocol for transmitting data digitally. EX1008, 6:11-20, 13:24-32.

78. Money also explains the circuitry and power used to communicate with both analog and digital sensors. EX1008, 7:4-20. So, Money fully teaches a portable, wearable patient monitoring device that receives analog data from one a sensor and digital data from another sensor. EX1008, 5:48-51, 7:4-8, 7:16-20, 7:58-62, 12:4-7, 13:24-32. Thus, Money represents what was supposedly missing from the prior art, according to the Examiner.

79. Therefore, Money teaches how to transmit digital data to a medical monitor (e.g. via RS232 using packets), how to transmit analog data to a medical monitor, and how to a single monitor can process both signal types. EX1008, 5:18-52, 6:11-20. 7:4-8.

80. Money further teaches that discrete data is better sent to the monitor 10 as a digital signal than continuous data, which is best represented by analog signals, because some continuous data can be lost in the digitization, filtering or the like of the continuous data. EX1008, 6:2-10. For example, an ECG generates a

waveform representing a heart rate and electrical pulses of the heart. This signal is best represented by an analog signal, lest some data be lost in the digital conversion, filtering or the like. Money recognizes this limitation, even suggesting that the RF transmitter transmits ECG data as an analog signal. EX1008, 6:2-10.

81. Therefore, a PHOSITA would recognize Money's teachings regarding an RS232 port receiving discrete, digital data would apply to any sensor measuring discrete data, not just the pulse oximetry cuff transducer 39 taught by Money. An exemplary discrete sensor would be a temperature sensor, which could easily transmit digital data via an RS232 port to the portable device 100 of Goldberg. EX1008, 10:59-11:5. Indeed, Money teaches that the temperature sensor readings get digitized eventually anyway. *Id.* Thus, Money teaches that generating a digital value measured by a sensor measuring a discrete physiological parameter value is simply a design choice as to *where* to digitize the data (inside or outside the monitor). EX1008, 10:59-11:5, FIG. 1, 7:49-52, 6:11-20, 11:51-53.

82. Inclusion of an RS232 port on Goldberg's system to receive digital data would provide additional benefits, as taught by Money. Namely, an RS232 port would provide a connection to an external terminal for debug purposes. EX1008, 6:10-20. This teaching provides additional motivation to a PHOSITA to include an RS232 port for receiving digital data. *Id.*

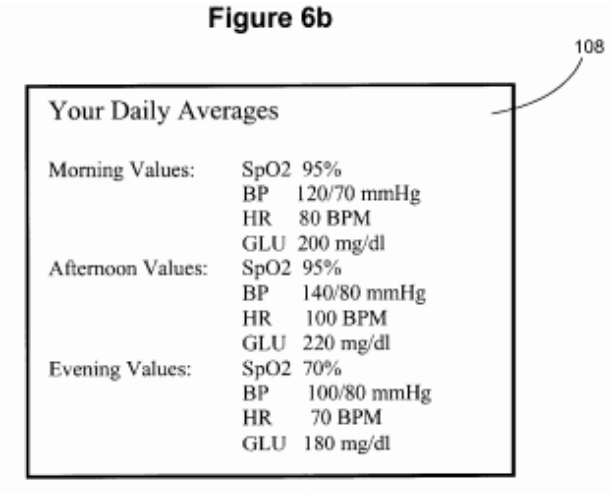
83. It would have been obvious to modify Goldberg with Money so that the system of Goldberg would function with more sensors and more sensor types. Goldberg teaches that it wishes to communicate with any conventional sensor. EX1005, 4:50-56. Some conventional sensors communicate digital data, and some conventional sensors communicate using analog data. EX1008, 5:48-51, 7:4-8, 7:16-20, 13:24-32. So, Goldberg provides the motivation to adopt the teachings of Money so that Goldberg's portable device would be able to communicate with any conventional sensors (both analog and digital). EX1005, 4:50-56. That said, all of Money's teachings regarding power requirements, RS232 protocol, and circuitry to communicate with both analog and digital sensors are extremely basic electrical engineering concepts that would be well-known to a PHOSITA. So, Goldberg likely included such circuitry but omitted the description of this circuitry because it was so basic and unnecessary to enable his invention.

84. The combination of Money and Goldberg would have predictably allowed for the portable device of Goldberg to communicate with both analog and digital sensors using a known technique that improves similar medical monitors in the same way. The circuitry described by Money provides exactly the necessary electrical infrastructure to allow for this compatibility with both analog and digital sensors. EX1008, 5:48-51, 7:4-8, 7:16-20, 7:58-62, 12:4-7, 13:24-32. Thus,

Goldberg in view of Kiani and Money fully teaches and renders obvious this claim limitation.

f. "cause to be displayed, on a display of the portable monitor, a plurality of physiological parameters values responsive to the plurality of signals"

85. Goldberg teaches that the controller 102 displays sensor measurements on the display 108. EX1005, 4:19-23, 4:30-36, 4:50-55, FIGs. 6A-C. Goldberg teaches that these physiological parameter values can include oxygen saturation and a plurality of additional parameter (e.g., blood pressure and glucose). EX1005, 4:19-29, 4:57-5:8, FIGs. 6A-C.



g. "combine information indicative of the plurality of signals into a single digital word or bit stream; and"

86. Goldberg teaches that the communication unit 110 wirelessly transmits sensor data and measurements, which can include oxygen saturation, glucose, blood pressure, and temperature (physiological measurements) to a remote

computer 302. EX1005, 4:50-55, 5:9-24. By the time of the invention, wireless transmission was well known, as Goldberg shows. *Id.*

87. This limitation and limitations 1(h), 1(i), and 1(j) all recite functions so utterly conventional that they could apply to just about any wireless transmission protocol. These limitations may sound technical, but a PHOSITA would instantly recognize them as conventional wireless data transmission functions. In fact, a bitstream is just an ordered group of bits (0s or 1s), and a digital word is merely a group of bits having a defined size (e.g., 32 bits or 64 bits). Thus, this claim language is just describing digital communication.

88. Many wireless transmission protocols use digital packetization. EX1005, 5:65-6:5. Creation of a packet can be considered a bitstream or a digital word; it just depends on the packet's structure. Again, these technical sounding words are describing the most basic elements of digital communication. The Examiner recognized this because he gave no weight to these claim limitations in the Notice of Allowance and correctly deemed them conventional in the pre-interview office action. EX1014, p. 4; EX1015, pp. 9-12. Thus, the Examiner saw right through the Patent Owner's games. *Id*.

89. While I really need not say any more on this matter, Goldberg clearly teaches how to combine data into a bitstream or digital word. Specifically, Goldberg teaches that all received parameter values from all connected sensors are

combined into digital packets for wireless transmission using any one of several well-known wireless standards, including Mobitex, ReFLEX, and GPRS, which is the old cellular standard, now replaced by LTE. EX1005, 5:62-6:5. Thus, because data from all connected sensors is transmitted as a digital packet, the portable device 100 combines all received data for wireless transmission as a packet (bit stream/digital word). EX1005, 4:41-49, 5:9-24, 5:62-6:5. Any packet-based transmission method would implicitly involve combining data into a bitstream and/or digital word. As I said above, this claim language simply means that digital data is grouped. Interestingly, none of the prior art patents attempted to obtain patentability by reciting basic wireless data transmission until after Masimo learned about Sotera's products in 2017.

h. "encode the single digital word or bit stream to generate a baseband signal; and"

90. Like Limitation 1(g), this limitation describes conventional data communication functions. Indeed, the '300 patent admits as much. EX1001, 7:22-24. Again, this limitation is conventional to basic wireless communication. A baseband signal is simply a signal encoded according to some method (there are many) for transmission. EX1001, 7:24-28.

91. Goldberg teaches that the communication unit creates digital packets for wireless transmission using any one of several well-known wireless standards,

including Mobitex, ReFLEX, and GPRS. EX1005, 5:62-6:5. All these methods involve encoding data, and a PHOSITA would instantly recognize this.

92. Regardless, Goldberg teaches that the wireless transmission involves digital packets, which a PHOSITA would recognize as an encoding process. EX1005, 4:43-49; 5:65-6:5. The packets for transmission would comprise a baseband signal. *Id.*

i. "a transmitter configured to:"

93. Goldberg teaches that the communication unit 110 wirelessly transmits real-time sensor data and measurements to a remote computer 302. EX1005, 4:50-55, 5:9-24. The communication unit 110 is a transmitter.

j. "modulate the baseband signal with a carrier to generate a transmit signal; and"

94. Goldberg teaches that parameter values are transmitted using any one of several well-known wireless standards, including Mobitex, ReFLEX, and GPRS. EX1005, 5:62-6:5. All these methods involve modulating data, and a PHOSITA would instantly recognize this. In fact, a PHOSITA would know that almost all wireless transmission modulates data. Thus, Goldberg also teaches this limitation.

k. "wirelessly transmit the transmit signal to a remote patient monitoring device configured to decode the signal and display, on a remote display, the plurality of physiological parameters values responsive to the plurality of signals."

95. Goldberg teaches that the communication unit 110 wirelessly transmits real-time sensor data and measurements as a transmit signal to a remote computer 302. EX1005, 5:9-21.

96. Goldberg further teaches that the remote computer is configured to decode the received data. EX1005, 6:6-14. Goldberg teaches that the remote computer receives and processes the data, thereby implicitly teaching that the remote computer decoded the wireless transmission in order to be able to understand the data received. Indeed, decoding a received signal is part of any wireless data transmission, lest the two electrical devices not understand each other.

97. Lastly, Goldberg teaches that the data is displayed to health care professionals, thereby teaching that the remote device displays the received data. EX1005, 6:29-31.

98. Therefore, it is my opinion that Goldberg in view of Kiani and Money teaches and renders obvious all the limitations of claim 1.

2. Dependent Claim 2:

a. "The portable monitor of claim 1, wherein the one or more processing devices are further configured to:

process, at least in part in the analog domain, at least a first signal of the plurality of signals to determine at least a first one or more of the plurality of physiological parameters values; and"

99. Goldberg teaches a controller (i.e., a processor) that processes data from sensors. EX1005, 4:34-36. It's frankly irrelevant whether the processor processes data in the analog domain or digital domain, but as I explained above in paragraphs 71-84, Goldberg in view of Money and Kiani teaches a portable device 100 that receives an analog signal from the pulse oximetry sensor and at least one digital signal from a discrete sensor. Even simpler, Goldberg teaches that it can communicate with any sensor, which a PHOSITA would understand to mean that the portable device 100 can process both analog and digital data because a PHOSITA would know that both analog and digital medical sensors exist. EX1005, 4:50-56, 5:3-8.

100. Nevertheless, Money teaches a processor that processes both analog and digital signals. EX1008, 5:48-51, 7:4-8, 7:16-20, 7:58-62, 12:4-7, 13:24-32. It would have been obvious to process both analog and digital data if the portable device 100 received both analog and digital data. EX1008, 7:4-8; EX1005, 4:50-56, 5:3-8. It would be pointless to receive analog and digital data if the medical monitor could only process the digital (or only analog) data. No PHOSITA would design a device that receives analog data without also processing or interpreting that received data. Additionally, all the reasons I discussed above in paragraphs 76-

84 regarding why it would have been obvious to combine the teachings of Goldberg and Money apply here as well.

101. Modifying Goldberg with Money so that that portable device 100 of Goldberg processed both analog and digital data would have been a use of a known technique to improve similar devices in the same way and predictably would have resulted in the portable device 100 of Goldberg processing both analog and digital data. EX1008, 7:4-8. Goldberg desires to communicate with any sensor (EX1005, 4:50-56, 5:3-8), so it would have been obvious to modify Goldberg so that Goldberg could communicate with both analog and digital sensors.

b. "process, at least in part in the digital domain, at least a second signal of the plurality of signals to determine at least a second one or more of the plurality of physiological parameters values."

102. Like I just said above in paragraphs 99-101, Goldberg in view of Money would process analog signals from some sensors and digital signals from other sensors.

3. Dependent Claim 3: "The portable monitor of claim 2, wherein the first signal is received via the first sensor port from the first physiological sensor."

103. Goldberg teaches that the portable device receives a signal from a pulse oximetry sensor 104a (first sensor). EX1005, 4:62-64. As I explained above in paragraphs 61-63, Goldberg either teaches a port, or it would have been obvious

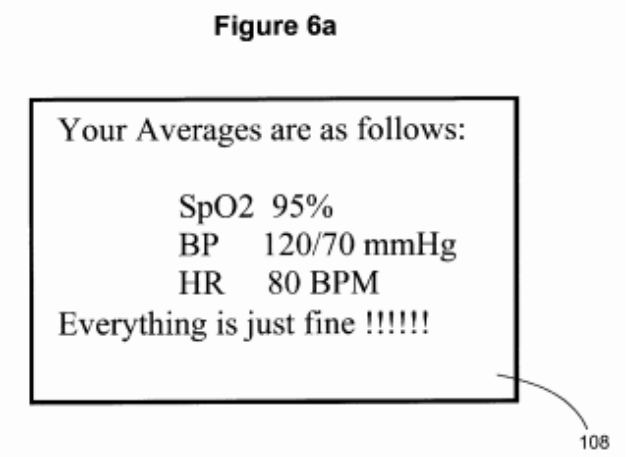
to include a port on the portable device 100 to communicate with the pulse oximetry sensor 104a in view of Kiani.

4. Dependent Claim 4: "The portable monitor of claim 3, wherein the first physiological sensor comprises a pulse oximetry sensor."

104. Goldberg teaches that the portable device communicates with a pulse oximetry sensor 104a (first sensor). EX1005, 4:62-64.

5. Dependent Claim 5: "The portable monitor of claim 4, wherein the first one or more of the plurality of physiological parameters values comprises at least oxygen saturation and pulse rate."

105. Goldberg teaches that the controller 102 processes signals from all connected sensors including the pulse oximetry sensor 104a. EX1005, 4:19-23, 4:50-55, FIGs. 6A-C.



106. A PHOSITA would understand that the heart rate value (HR) and the oxygen saturation (SpO2) both come from the pulse oximetry sensor 104a because a PHOSITA knows that pulse oximetry sensors measure both pulse rate and oxygen

saturation together. Kiani explicitly teaches this implicitly understood fact. Kiani explains that a pulse oximeter measures both pulse rate and oxygen saturation. EX1006, 6:7-10. A PHOSITA would assume that the pulse oximetry sensor 104a taught by Goldberg also measures both pulse rate and oxygen saturation because Goldberg teaches that values for both are displayed on the display 108. EX1005, FIGs. 6A-C.

107. Technically, a sensor doesn't determine both pulse rate and oxygen saturation. Instead, the pulse oximetry sensor transmits signals, and a processor can determine a pulse rate by noticing peaks in the signal emitted. As Goldberg explains, the portable device *computes* statistical data representing physiological values from the signals it receives from connected sensors. EX1005, 1:45-49. So, because Goldberg teaches that pulse rate and oxygen saturation are sensed, derived, and displayed, Goldberg teaches that the controller determines the pulse rate and the oxygen saturation from signals received from the pulse oximetry sensor. EX1005, 4:34-36, 4:50-56, FIGs. 6A-C. Of note, Goldberg seems to equate pulse rate and heart rate, but one skilled in the art would know that pulse oximetry sensors only calculate pulse rate by detecting pulses through blood vessels.

108. Even if the pulse oximetry sensor 104a of Goldberg wasn't able to measure both pulse rate and oxygen saturation, it would have been obvious to determine pulse rate from the pulse oximetry sensor in view of Kiani. Kiani

teaches that conventional pulse oximetry sensors detect pulse rate and oxygen saturation simultaneously. EX1006, 6:7-9. It would have been obvious to modify the pulse oximetry sensor 104a and controller 102 to detect both parameters based on signals from the pulse oximetry sensor 104a in view of Kiani to minimize the number of sensors attached to the patient. A PHOSITA would know that attaching numerous sensors to a patient increases patient discomfort and increases the chances that one of the sensors falls off or becomes disconnected.

109. Modifying Goldberg with Kiani substitutes one known sensor (Goldberg's pulse oximetry sensor 104a) for another (Kiani's pulse oximetry sensor) to predictably detect both oxygen saturation and pulse rate by the same sensor. EX1005, 4:60-64; EX1006, 6:7-9.

6. Dependent Claim 6

a. "The portable monitor of claim 2, wherein the one or more processing devices comprise: a multiplexer configured to combine the information indicative of the plurality of signals into the single digital word or bit stream; and"

110. A multiplexer is a fundamental building block of circuitry and has been for a very long time. In fact, a multiplexer was invented in the 1890s as part of the invention of the telegraph. Again, it's interesting that Masimo never bothered to obtain patentability by reciting basic, generic electrical components

before 2017. These basic limitations were added in desperate hopes of patenting something to assert against Sotera.

111. Like all electrical circuitry, multiplexers have a specific function and are included in a circuit to perform that exact function. Multiplexers receive multiple inputs and provide a single output. The single output is a combination of the multiple input signals, or more specifically, a selection of one of the multiple inputs forwarded to the output line. The functionality of a multiplexer is something taught in entry level electrical engineering courses.

112. This claim limitation claims the well-known functionality of a multiplexer. All multiplexers do what is claimed. Thus, this limitation is merely claiming a multiplexer.

113. Goldberg almost certainly includes a multiplexer. Even if it didn't, multiplexers were so well-known that inclusion of a multiplexer in any circuitry, whether in the medical field or not, would be obvious to any PHOSITA. Thus, Goldberg teaches a multiplexer or it would have been obvious to include a well-known multiplexer to perform the multiplexer functions claimed. The results would be predictable because, as I said, the claimed function is simply performing the function of a multiplexer.

114. Even if Goldberg didn't teach a multiplexer, Money does. EX1008. 10:12-35. Money teaches a "summer," which either is a multiplexer or is

equivalent to a multiplexer because Money teaches that the "summer" performs the well-known functions of a multiplexer (inputting multiple signals to output one signal that is a combination or selection of the inputs signals). *Id*. It would have been obvious to include a multiplexer in the portable device 100 of Goldberg so that the portable device 100 could combine data from multiple sources for transmission as a single wireless communication, which Goldberg teaches at a higher level than the granular circuitry necessary to perform this function. EX1005, 4:41-49, 5:9-17; EX1008, 6:8-10.

b. "an encoder configured to encode the single digital word or bit stream to generate the baseband signal."

115. Again, an encoder is fundamental electronic circuitry that would be known to a PHOSITA. The '300 patent admits as much. EX1001, 7:22-24.

116. Money teaches an encoder. EX1008, 3:24-29, 6:8-10. A PHOSITA would have recognized that encoders are useful for wireless data transmission, as taught by Money. *Id.* As such, it would have been obvious to include an encoder as part of wireless data transmission. *Id.*

7. Dependent Claim 7: "The portable monitor of claim 6, wherein the baseband signal comprises a single signal."

117. Money teaches a single baseband signal. EX1008, 6:8-10; 10:21-35. Money teaches that the single signal transmits all measured physiological parameters together, so it would have been obvious to generate a single baseband

signal. EX1008, 6:8-10; 10:21-35. Again, this claim is describing conventional wireless functionality.

8. Dependent Claim 8: "The portable monitor of claim 6, wherein the baseband signal comprises multiple related signal components including at least one of: in-phase signals or quadrature signals."

118. Money teaches that the wireless signal comprises multiple in-phase signal components. EX1008, 6:8-10. Specifically, Money teaches that encoded digital data is combined with analog data on an RF FM carrier wave. *Id.* Thus, Money teaches analog components in-phase with digital components. *Id.* Yet again, using multiple signal components is a very basic aspect of wireless data transmission.

9. Dependent Claim 9: "The portable monitor of claim 6, wherein the transmitter is further configured to transmit on multiple frequency channels."

119. Goldberg teaches that wireless transmission occurs via Mobitex, ReFLEX, or GPRS. EX1005, 5:67-6:5. A PHOSITA would instantly recognize that each of these standards uses multiple channels. Money teaches that data is transmitted using frequency modulation (FM), which a PHOSITA would also recognize as using multiple channels. EX1008, 3:24-29, 6:2-10, 10:13-21. Thus, the combination of Goldberg in view of Money renders obvious this limitation.

10. Dependent Claim 10: "The portable monitor of claim 1, wherein the plurality of sensor ports comprise at least: a second sensor port configured to receive a signal from an

EKG sensor arrangement; and a third sensor port configured to receive a signal from a blood pressure sensor arrangement."

120. Goldberg teaches that the portable device can communicate with an ECG sensor and a blood pressure sensor. EX1005, 4:64-67, 1:37-44, 4:50-56, 5:5-8, FIG. 2. Such communication with the ECG and blood pressure sensors would occur via ports in view of the teachings of Goldberg or Goldberg in view of Kiani as I explained in paragraphs 61-63.

11. Dependent Claim 11

a. "The portable monitor of claim 10 further comprising: a plurality of sensor interfaces configured to receive the plurality of signals and initially process the plurality of signals, wherein:"

121. Goldberg teaches that the portable device 100 communicates with a plurality of sensors of various types. EX1005, 4:34-36, 4:50-55, 4:57-5:8. A PHOSITA would assume that the portable device 100 includes sensor interfaces because a PHOSITA would understand that a sensor interface would be necessary to receive and understand signals transmitted by the connected sensors. A PHOSITA would understand that a sensor interface is simply circuitry that receives signals and transmits those signals to a processing device or logic, and it would include basic signal processing, like filtering, buffering, analog-to-digital conversion, etc., which is exactly how the '300 patent describes a sensor interface. EX1001, 6:44-47, 7:12-21. Said differently, a sensor interface is a generic and

basic circuitry component used when two different devices communicate. Also, a PHOSTIA would know that sensor interfaces differ depending on whether the interface is receiving an analog or a digital signal. As such, Goldberg implicitly teaches that the portable device includes sensor interfaces because Goldberg teaches that the portable device 100 can communicate with physiological sensors.

122. Money expressly explains the baseline understanding of a PHOSITA. Money teaches that each connection with a physiological sensor includes a sensor interface. EX1008, 3:14-24, 5:27-51. Money teaches a highly specific monitor that receives sensor signals via respective sensor interfaces. EX1008, Abstract, 5:38-51.

123. Even though Money merely represents the implicit teachings of Goldberg, Goldberg would be obviously modified by Money such that Goldberg would include a plurality of sensor interface circuits to respectively communicate with the physiological sensors. EX1005, 5:3-8; EX1008, 2:15-25. Goldberg wishes to communicate with "any" conventional sensor. EX1005, 5:3-8. Therefore, a PHOSITA would have been motivated to modify Goldberg based on the teachings of Money to include sensor interface circuits (if they weren't already there) to predictably communicate with any physiological sensor. Therefore, the combination of Goldberg and Money represents a combination of prior art elements according to known methods (wired communication with sensors and wired communication with sensors through sensor interfaces) to yield predictable

results (the portable device of Goldberg would predictably receive signals from various sensors).

124. Lastly, I note that a PHOSITA would not modify Goldberg's portable device 100 to include Money's pulse oximetry sensor interface 24 because Money's pulse oximetry sensor interface 24 receives digital data from the pulse oximetry sensor. EX1008, 13:24-32. In fact, Money's pulse oximetry sensor interface 24 expects to receive digital packets of data, and thus would not understand analog data transmitted by an analog sensor. *Id.* However, the finger-mounted pulse oximetry sensor 104a taught by Goldberg is not a pulse oximetry cuff that transmits discrete data. EX1005, 4:60-64. Instead, a PHOSITA would understand that the pulse oximetry sensor 104a is an analog sensor. EX1005, 4:60-64. Kiani teaches that finger-positioned pulse oximetry sensors generate an analog waveform (i.e., transmit analog data). EX1006, 1:15-21, 26-28. Thus, a PHOSITA would not modify Goldberg to include the pulse oximetry sensor interface 24 taught by Money, but instead would have been motivated to include an analog pulse oximetry sensor interface, such as the one taught by Kiani. EX1006, 1:15-28.

125. Money provides the motivation to include a respective sensor interface for each connected sensor. EX1008, 5:27-51. Then, Kiani teaches an analog pulse oximetry sensor interface for receiving data from a finger-positioned, analog, pulse oximetry sensor. EX1006, 1:15-28. It would have been obvious to

include a sensor interface that corresponds to the signal received (analog with analog; digital with digital), otherwise the sensor interface would be unable to understand the received signal.

b. "each of the plurality of sensor interfaces is associated with a respective sensor port of the plurality of sensor ports, and"

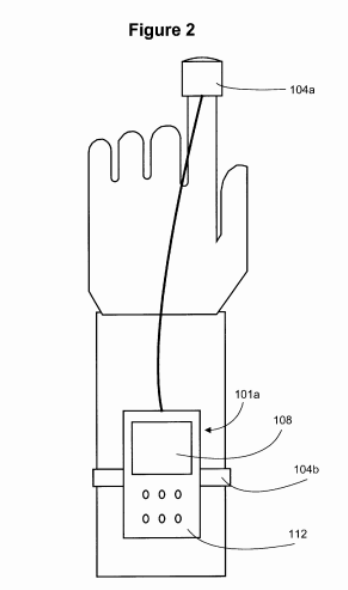
126. Money teaches that each sensor is connected to the monitor 10 via respective sensor interfaces. EX1008, Abstract, 5:38-51.

c. "each of the plurality of sensor interfaces is configured to receive a signal from a respective physiological sensor of the plurality of physiological sensors."

127. Money teaches that each sensor interface receives a respective signal from the respectively connected sensor. *Id.*

12. Dependent Claim 12: "The portable monitor of claim 1, wherein a face of the housing comprises a single user interface, and the face of the housing is viewable by a user when the portable monitor is attached to the arm of the patient."

128. Goldberg clearly teaches a display 108 positioned on the front side of the housing, which is viewable as seen in FIG. 2.



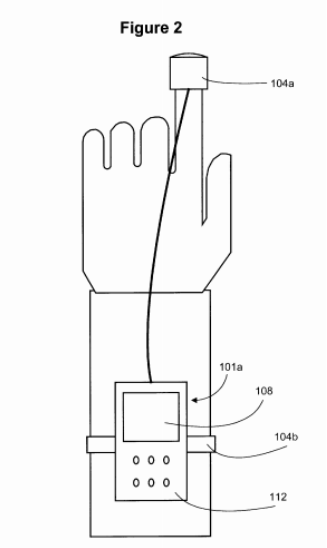
129. Also, Goldberg teaches a single display for displaying data to a user on the front side ("face") of the housing. EX1005, 4:30-34, 6:32-46. A PHOSITA would understand that the display 108 is a user interface, as dependent claim 13 also makes clear.

> **13. Dependent Claim 13: "The portable monitor of claim 12, wherein the single user interface comprises the display."**

130. The user interface of Goldberg is the display 108. *Id.*

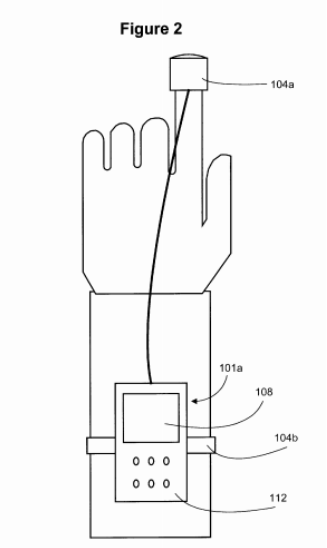
> **14. Dependent Claim 14: "The portable monitor of claim 13, wherein the display is positioned centrally on the face of the housing."**

131. The display 108 of Goldberg is positioned centrally on the front side of the housing 112.



15. Dependent Claim 15: "The portable monitor of claim 14, wherein the display positioned on the face of the housing is sized such that the display covers more than half of a length of a shortest dimension of the face of the housing."

132. Goldberg also illustrates the display sized and positioned on the face such that it covers most of the shortest dimension of the face of the housing. EX1005, FIG. 2.



16. Independent Claim 16

a. "A battery-powered wearable physiological monitoring device configured to communicate with multiple types of sensor arrangements via a plurality of sensor interfaces, the wearable physiological monitoring device comprising:"

133. To the extent the preamble is limiting, I fully discussed how Goldberg teaches a wearable physiological monitoring device configured to communicate with multiple types of sensor arrangements above in paragraphs 55-57. Additionally, I fully explained how Goldberg in view of Money would include a plurality of sensor interfaces for communicating with a plurality of connected sensors above in paragraphs 121-125. Finally, I will explain how Goldberg and Money teach battery powered monitors below in paragraphs 151-152.

b. "a plurality of sensor communication ports including:"

134. I fully discussed how Goldberg in view of Kiani teaches this limitation in paragraphs 61-63.

c. "a first sensor communication port configured to provide wired communication with a first type of physiological sensor arrangement, wherein the first sensor port is positioned on the device such that a wire extending from the first sensor communication port to the first type of physiological sensor arrangement extends from the device along an axis perpendicular to a face of the device upon which the first sensor port is positioned;"

135. I fully discussed how Goldberg in view of Kiani teaches this limitation in paragraphs 64-69.

d. "a second sensor communication port configured to provide wired communication with a second type of physiological sensor arrangement different from the first type of physiological sensor arrangement; and"

136. I fully discussed how Goldberg in view of Kiani teaches this limitation in paragraph 120.

e. "a third sensor communication port configured to provide wired communication with a third type of physiological sensor arrangement different from both the first and second types of physiological sensor arrangements"

137. I fully discussed how Goldberg in view of Kiani teaches this limitation in paragraph 120.

f. "a plurality of sensor interfaces including:"

138. I fully discussed how Goldberg in view of Kiani teaches this limitation in paragraphs 121-125.

g. "a first sensor interface configured to receive a first signal from a first sensor arrangement of the first type, the first signal including analog information;"

139. I fully discussed how Goldberg in view of Money teaches respective sensor interfaces in paragraphs 121-125. I also explained, in paragraph 124, how a PHOSITA would have been motivated to include Kiani's analog pulse oximetry sensor interface (first sensor interface), rather than Money's digital pulse oximetry sensor interface, because Goldberg teaches a finger-positioned, analog pulse oximetry sensor. EX1005, 4:60-64; EX1006, 1:15-28. Thus, Goldberg as modified by Kiani and Money teaches a first sensor interface configured to receive an analog signal from the pulse oximetry sensor 104a. *Id.*

h. "a second sensor interface configured to receive a second signal from a second sensor arrangement of the second type the second signal including digital information; and"

140. I fully discussed how it would have been obvious to include respective sensor interfaces in the portable device 100 of Goldberg in view of Money in paragraphs 121-125. I also explained in paragraphs 77-84 how it would have been obvious for Goldberg's portable device 100 to receive digital data from any discrete sensor, such as a temperature sensor, in view of the serial port taught by Money (and simultaneously receive analog signals from another sensor). Thus, Goldberg in view of Money teaches this limitation.

i. "a third sensor interface configured to receive a third signal from a third sensor arrangement of the third type;"

141. I fully discussed how it would have been obvious to include respective sensor interfaces in the portable device 100 of Goldberg in view of Money in paragraphs 121-125. Money teaches a third sensor interface – a blood pressure sensor interface 25 for receiving blood pressure signals from a blood pressure sensor. EX1008, 5:42-44. Therefore, Goldberg in view of Money teaches a third sensor interface for receiving signals from a third sensor.

j. "wherein the plurality of sensor interfaces are configured to output one or more signals indicative of physiological parameters sensed by the first, second, and third sensor arrangements;"

142. Kiani teaches that the pulse oximetry sensor interface 120 outputs a signal indicative of pulse oximetry. EX1006, 1:15-2:23. Meanwhile, Money teaches that all sensor interfaces output signals indicative of parameters measured by connected sensors. EX1008, 5:42-52, 8:20-27. Thus, any sensor interfaces included in Goldberg's portable device 100, as a result of modification with Kiani and Money, would output signals indicative of parameter measurements measured by connected physiological sensors. EX1006, 1:15-2:23; EX1008, 5:42-52, 8:20-27. That said, Goldberg implicitly teaches sensor interfaces by teaching that the portable device can receive, understand, and output signals from connected sensors. EX1005, 4:24-29.

k. "a display positioned on a face of the wearable physiological monitoring device configured to display information while the wearable physiological monitoring device is being worn by a patient;"

143. I fully explained above in paragraphs 85 and 128-130 that Goldberg teaches a display 112 positioned on a face of the portable device that displays parameter readings while the portable device is being worn by the patient.

l. "a processor configured to:"

144. I fully discussed how Goldberg teaches this limitation in paragraph 70.

m. "responsive to the one or more signals indicative of the physiological parameters, cause to be displayed, on the display, physiological parameter measurements;"

145. I fully discussed how Goldberg teaches this limitation in paragraph 85.

n. "combine information indicative of the one or more signals into a single digital word or bit stream; and;"

146. I fully discussed how Goldberg teaches this limitation in paragraphs 86-89.

o. "encode the single digital word or bit stream to generate a baseband signal;"

147. I fully discussed how Goldberg teaches this limitation in paragraphs 90-92.

p. "a transmitter configured to:"

148. I fully discussed how Goldberg teaches this limitation in paragraph 93.

q. "modulate the baseband signal with a carrier to generate a transmit signal; and"

149. I fully discussed how Goldberg teaches this limitation in paragraph 94.

r. "wirelessly transmit the transmit signal to a receiving patient monitoring device that is not wired to the wearable physiological monitoring device; and"

150. I fully discussed how Goldberg teaches this limitation in paragraphs 95-97.

s. "a battery configured to provide power to at least the processor, the display, the transmitter, and the first sensor arrangement via the first sensor communication port such that the wearable physiological monitoring device is portable and wearable by a patient."

151. Goldberg teaches a portable, wireless monitoring device 100. EX1005, Abstract, 4:13-16, 4:57-60. A PHOSITA would understand that any portable, electronic device includes a battery. Without a battery, an electronic device would be tethered to a wall outlet, and thereby, not be portable. Thus, Goldberg implicitly teaches a battery to power all electronic subcomponents of the portable device 100, including the display, the controller, and the pulse oximetry sensor 104. The use of batteries to power portable devices dates back decades.

152. Kiani specifically teaches that batteries power portable, electronic devices and the portable, electronic device's subcomponents (e.g., displays, processors, and connected sensors). EX1006, 5:21-22, 9:11-13. It would have been obvious to include a battery within the portable device 100 of Goldberg to ensure that it was actually portable. Therefore, Goldberg in view of Kiani teaches a battery-powered medical monitoring device.

17. Dependent Claim 17:

a. "The wearable physiological monitoring device of claim 16, wherein: at least one of the first, second, or third sensor interfaces is configured to process signals at least in part in the analog domain; and"

153. Kiani teaches that the pulse oximetry sensor interface processes signals in the analog domain. EX1006, 1:21-27. I explained this more fully in paragraph 139. Thus, Goldberg in view of Kiani would include a pulse oximetry sensor interface processing a signal from the pulse oximetry sensor in the analog domain.

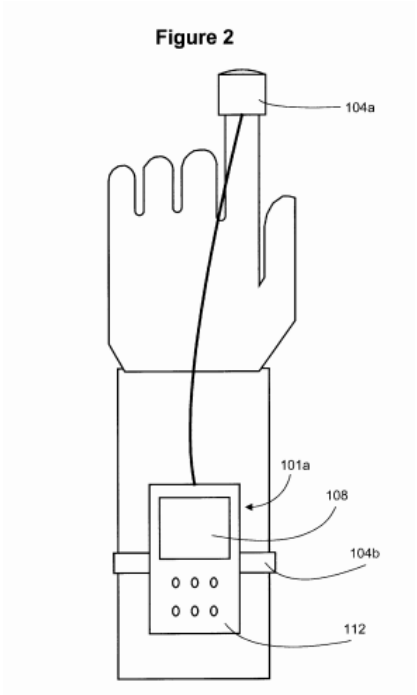
b. "at least at different one of the first, second, or third sensor interfaces is configured to process signals at least in part in the digital domain."

154. Money teaches a sensor interface that receives digital packets, thereby teaching a sensor interface processing data in the digital domain. EX1008, 5:38-41, 6:11-20, 13:24-32. For example, this sensor interface could receive data from any discrete sensor, such as the temperature sensor, as I more fully explained above in

paragraphs 77-84. Thus, Goldberg as modified by Money would include a different sensor interface (e.g., temperature sensor interface) that processes signals in the digital domain. EX1008, 5:38-41, 6:11-20, 13:24-32.

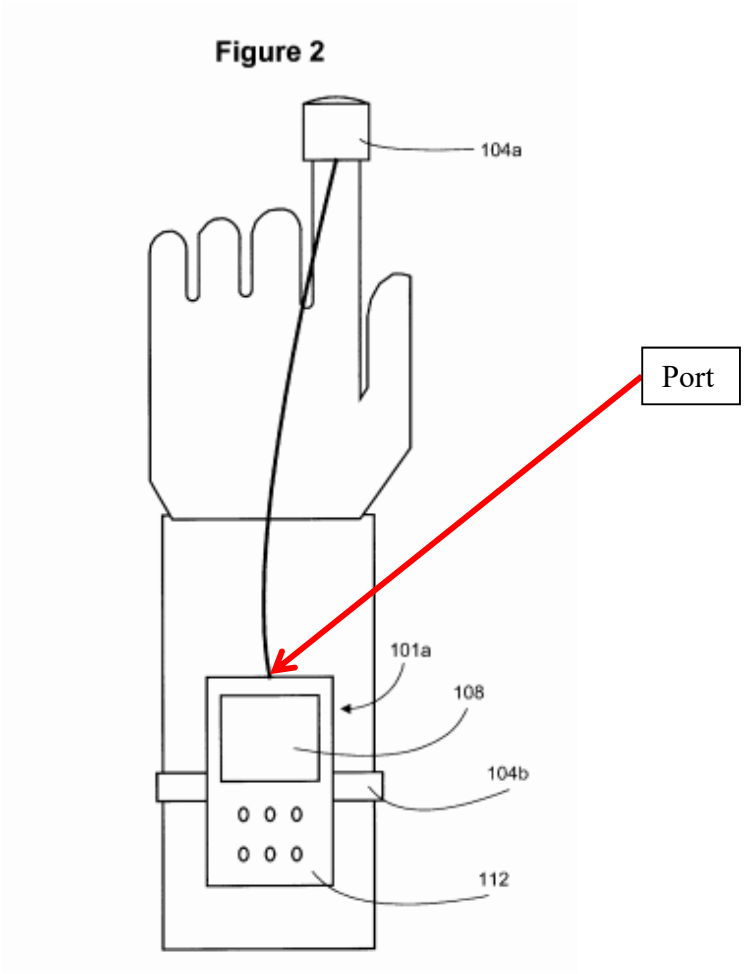
18. Dependent Claim 18: "The wearable physiological monitoring device of claim 17, wherein the first sensor arrangement comprises a pulse oximetry sensor configured to be attached to a digit of a patient."

155. Goldberg teaches that the pulse oximetry sensor 104a attaches to a patient's finger. EX1005, 4:60-62, FIG. 2. Thus, Goldberg alone teaches this claim.



19. Dependent Claim 19: "The wearable physiological monitoring device of claim 18, wherein the first sensor port is positioned on a side of the wearable physiological monitoring device that faces a hand of a patient when the wearable physiological monitoring device is attached to an arm of the hand of the patient."

156. As shown in FIG. 2, the first sensor port of Goldberg exists on the top side (first side) of the housing, which is the side of the housing closest to and facing the hand when the person is wearing the portable device 100a. EX1005, FIG. 2. Thus, both the port and the side of the housing on which the port is positioned face the patient's hand while the patient wears the portable device 100a. Notably, a PHOSITA would understand in reviewing Figure 2 that a basic diagram is shown reflecting a housing, display, buttons, strap for the wrist, and a sensor wired to the housing. From this basic diagram, a PHOSITA would readily understand the basic design choices to reduce the diagram to a commercial product.



Id. (annotated).

157. As I said above in paragraphs 61-63, a PHOSITA looking at FIG. 2 of Goldberg would assume that the wired connections with sensors would occur via sensor ports, or it would have been obvious to use ports in view of Kiani. Therefore, Goldberg alone or Goldberg in view of Kiani renders this limitation obvious.

20. Dependent Claim 20: "The wearable physiological monitoring device of claim 19, wherein the face of the wearable physiological monitoring device comprises a single

user interface, and the single user interface comprises the display."

158. I fully discussed how Goldberg teaches this claim in paragraphs 128-130.

C. Ground 2: Claims 1-20 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of Money, Kiani, and Akai

159. In my opinion, claims 1-20 would have been obvious to a PHOSITA in view of Money along with Kiani and Akai. This is because I believe that a PHOSITA, having knowledge of these three sources, would have found it obvious to combine the references to create the technology at issue in this case. Money, Akai, and Kiani also represent a snapshot of the medical field before the filing date of the '300 Patent. Money illustrates the movement of medical monitoring away from strictly bedside monitoring to a wireless setting, where patient vital signs are aggregated and monitored at a centralized computer. EX1008, 2:64-3:2. Also, due to the miniaturization of electronic devices, continuing in the early aughts, medical monitors became small enough to wear, which allowed clinicians to monitor patient vitals in settings other than a hospital. EX1008, 2:9-14, 2:64-3:2; EX1006, 2:34-3:4. These references further demonstrate the need for adaptability in monitoring different sets of vital signs depending on a patient or a patient's ailment. EX1008, Abstract; EX1007, 11:12-22; EX1006, 5:3-8.

1. Independent Claim 1

a. "A wearable, portable physiological monitor configured to wirelessly transmit real time information regarding a plurality physiological parameters, the portable monitor comprising:"

160. As I explained above in paragraph 55, the preamble is entirely a statement of use.

161. Even if the preamble was limiting, Money teaches the entire preamble. Specifically, Money teaches a wearable, portable monitor 10. EX1008, 5:3-10.

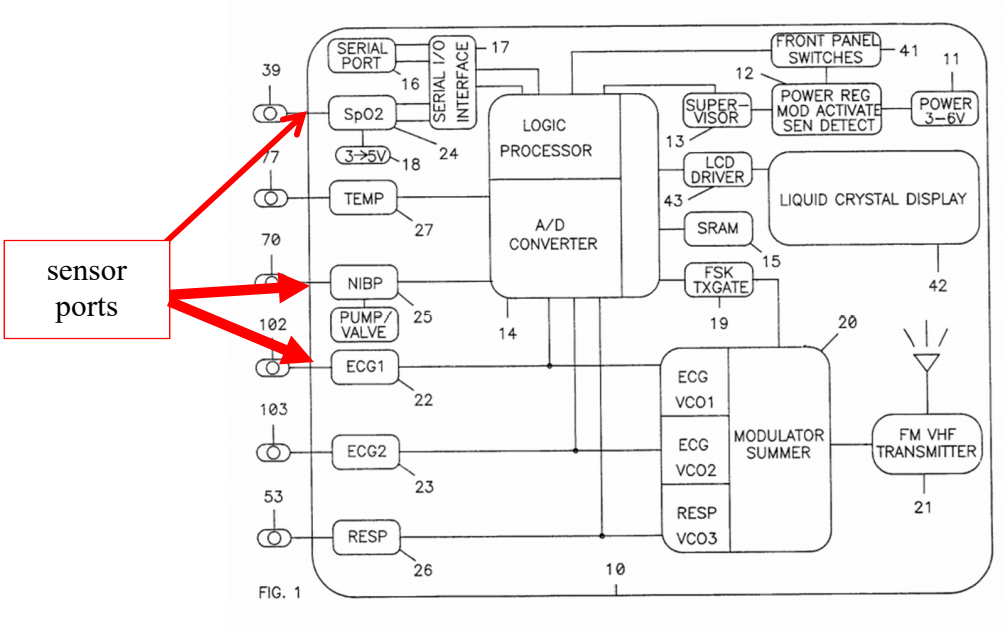
162. Money teaches that the monitor 10 connects to numerous sensors through wired connections. EX1008, 5:23-28, FIG. 1. Thus, Money teaches a wearable, portable physiological monitor configured to receive a plurality of physiological parameters. *Id.*

163. In addition to receiving those physiological parameters, Money also teaches that the monitor 10 wirelessly transmits those physiological parameters. EX1008, Abstract, 3:24-26, 5:10-13, 5:23-28, 6:8-10, 10:12-35, 14:42-45. Money clearly teaches the collection, display, and transmission of real-time data from connected, physiological sensors. EX1008, 3:24-26, 5:10-13, 5:23-28, 6:8-10, 10:12-35, 14:42-45.

164. Therefore, to the extent the preamble is limiting, Money teaches every limitation in the preamble.

b. "a plurality of sensor ports positioned on a housing of the portable monitor and configured to provide respective wired interfaces with different respective physiological sensors of a plurality of physiological sensors, wherein:"

165. Money teaches that five sensors (a plurality) connect to a processor 14 via respective wires. EX1008, FIG. 1. Although Money does not expressly teach ports for all sensors, a PHOSITA looking at FIG. 1 of Money would assume that the wired connections between the sensors and the monitor 10 would occur via a plurality of sensor ports.

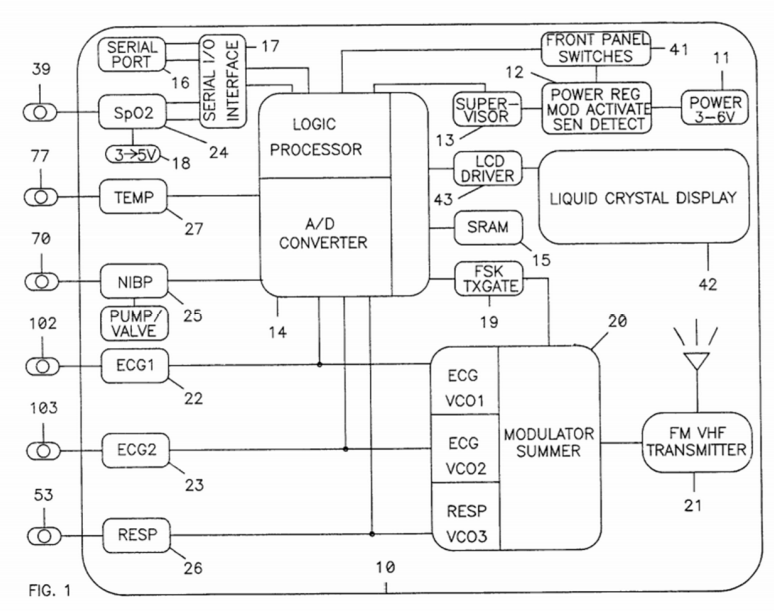


166. Additionally, Money teaches that the five sensors include pulse oximetry sensor 39, blood pressure sensor 70, temperature sensor 77, respiration rate sensor 53, and ECG sensor 102/103. EX1008, 5:23-51, FIG. 1. Money proves that which was well-known to a PHOSITA at the time of the invention: patient

monitors frequently connected to multiple sensors to monitor multiple vital signs simultaneously. *Id.*

167. As shown, the sensor ports are positioned on the housing 10. EX1008, FIG. 1, 17A, 17B (labeled "connectors"). Adding further evidence of a port, Money teaches that the processor 14 is clearly inside the housing 10, and the processor 14 receives signals from the five sensors, so the signals transmit into the housing and to the processor through some connection (i.e., ports). EX1008, 5:20-28, FIG. 1. Thus, a PHOSITA reading Money would assume that such each connection includes a port (i.e., a plurality of sensors ports).

168. Thus, Money teaches a plurality of sensor ports positioned on the housing and configured to provide respective wired connections with different sensors. EX1008, 5:23-51, FIGs. 1, 17A, 17B.



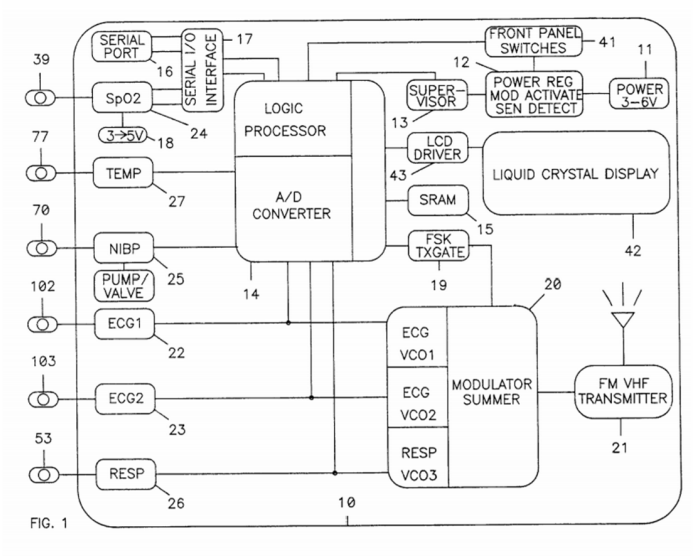
169. A port is typically a female connection or socket of a wired connection and is also preferable over hardwiring a sensor to a monitor. EX1001, 5:33-36, FIG. 4B. *See* paragraphs 62-63. Also, no user expects to manipulate delicate, internal circuitry when forming electrical connections between two electronic devices.

170. Kiani demonstrates the ubiquity of ports. Kiani shows that sensor input ports 550 were a known vehicle for wired communication. EX1006, 3:21-27, 8:31-9:2. Again, Kiani expressly teaches something that a PHOSITA would assume reading Money. However, if for some reason Money didn't teach a port, which it clearly does, it would have been obvious to combine Money and Kiani to include a port on the housing as part of the wired connection between the sensors and the housing 10 of Money. Modifying Money with Kiani would have been a combination of known concepts (wired electrical communication and wired electrical communication using ports) to yield predictable results. EX1008, 5:20-28, FIG. 1; EX1006, 3:21-27, 8:31-9:2. Particularly, including ports on Money's housing (if they weren't already there) would predictably enable wired communication with the sensors while allowing easy removal and replacement of the sensors while also providing a secure, wired connection between the sensors and the housing 10. EX1006, 2:34-3:4. More specifically, ports generally provide

removable wired connections, so a medical worker would replace any sensor with a different sensor if a new physiological parameter is to be measured. *Id.*

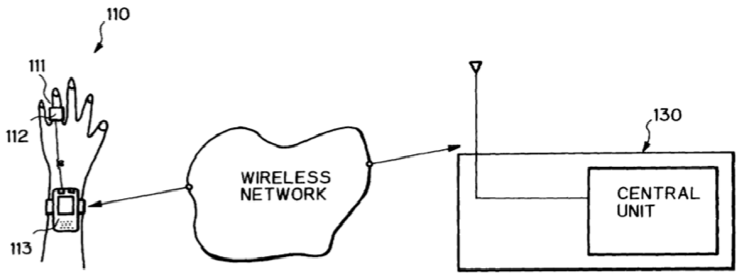
c. "at least a first sensor port of the plurality of sensor ports is positioned on a side of the housing of the portable monitor such that, when the portable monitor is attached to an arm of a patient, a wired connection extending from the first sensor port to a first physiological sensor positioned on a digit of the patient follows a path to the digit of the patient that is substantially perpendicular to the side of the housing and avoids tangling of the wired connection;"

171. Money teaches that the pulse oximetry sensor 39 transmits electrical signals representing oxygen saturation to the processor 14 via a wired connection. EX1008, 5:23-28, 5:42-44. Such a wired connection would include a port for the reasons I explained in paragraphs 165-170 above. However, Money does not expressly teach how the monitor 10 is worn on a patient, or where the wires extend from the monitor 10 when worn by a patient. Money seems to teach that all sensor ports are positioned on the same side of the housing. EX1008, FIGs. 17A-B. Thus, it's entirely possible that Money's port positioning meets this claim limitation, but because Money never illustrates the monitor 10 while worn on a patient, I cannot definitively say.



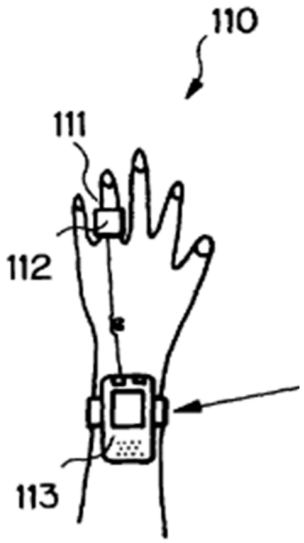
172. Nevertheless, Akai positions its wire between a pulse oximetry sensor 112 and a housing 113 at the closest possible location to the patient's hand when the patient wears the portable device 100. EX1007, 5:14-19, FIG. 1.

Fig. 1



Specifically, as shown in FIG. 1, the first sensor port of Akai exists on the top side of the housing, which is the side of the housing closest to and facing the person's hand when the person is wearing the portable device 110. EX1007, FIG. 1. Because the wire and port are positioned in this way, the amount of wire necessary

to connect the finger-worn, pulse oximetry sensor 112 taught by Akai, is minimized, and the sensor port between the pulse oximetry sensor 112 and the housing 113 of Akai is positioned on a side of the housing such that, when the housing 113 is attached to a patient's arm, the wire between the pulse oximetry sensor 112 positioned on the patient's finger 111 follows a path substantially perpendicular to the side of the housing facing the patient's hand. EX1007, FIG. 1. For the same reasons I discussed above in paragraphs 165-170, a PHOSITA would assume that this wired connection between the pulse oximetry sensor 112 and the housing 113 would include a port or it would have been obvious to include a port as part of this wired connection. Akai illustrates the wire between the pulse oximetry sensor 112 and the housing 113/213 as extending from the first sensor port along a path substantially perpendicular to the first side of the housing 113/213. EX1007, FIG. 1.



173. It would have been obvious to modify Money's housing in view of Akai primarily because it would have been obvious to substitute a pulse oximetry cuff transducer 39, as taught by Money, with a light-based, pulse oximetry sensor 112 that is positioned on a patient's finger, as taught by Akai. Pulse oximetry cuff transducers are largely obsolete in modern medicine and were largely obsolete even in 2002 (the priority date of the '300 patent). Pulse oximetry cuff transducers, like the one taught in Money, are bulky and uncomfortable when worn by a patient. In contrast, the light-based, pulse oximetry sensors of Akai are completely non-invasive, far smaller, and thereby, more comfortable when worn by a patient. EX1007, 8:26-33, 11:19-21. I have been informed by counsel that a simple substitution of one known, equivalent element with another to obtain predictable results demonstrates obviousness. Here, it would have been obvious to replace the pulse oximetry cuff 39 of Money with the equivalent, light-based, pulse oximetry sensor 112 of Akai to predictably measure oxygen saturation non-invasively using light. EX1007, 8:26-33, 11:19-21.

174. After substituting the pulse oximetry cuff with a non-invasive, light-based sensor that attaches to a patient's finger, a PHOSITA would have been further motivated to augment Money's housing in view of Akai so that the housing attached to a patient's wrist, and the port corresponding to the pulse oximetry sensor faced the patient's hand, thereby providing a direct line for the wired

connection between housing and the pulse oximetry sensor. Money doesn't teach where the wearable monitor 10 is worn by a patient, but it would have been obvious to position the wearable monitor 10 on a patient's wrist after modified by Akai because the pulse oximetry measurement site would be moved to the patient's finger. The reason the wrist is highly desirable is it makes it easy for the patient to show the monitor to the physician, and the patient can also view the monitor. *See* EX1007, 5:51-55, 7:44-46, FIG. 1. Akai also illustrates an efficient position of a wire between a housing 113 and a pulse oximetry sensor 112 positioned on a patient's finger. EX1007, FIG. 1. Such a reconfiguration of the sensor ports is a logical modification in view of the obvious change to the pulse oximetry sensor, which would move the pulse oximetry measurement site from a patient's arm to a patient's finger. Providing a direct line between a wire's socket and a sensor reduces wire length, avoids tangling, and improves a patient's quality of life and comfort while wearing Money's patient monitoring device 10. EX1008, 3:3-5, 5:23-28; EX1007 5:7-9, FIG. 1.

175. Thus, it would have been obvious to modify Money's housing configuration to better accommodate the light-based pulse oximetry sensor 112 of Akai.

176. Lastly, the claim seems to suggest that the port is the reason for the extending direction of this wire. Such a suggestion runs contrary to both physics

and common sense. The extending direction of the wire results from a force pulling the wire toward the pulse oximetry sensor 112, not from the configuration of the port itself. If the wire was not also tied to the pulse oximetry sensor, then the extending direction of the wire would simply fall as a result of the pull of gravity. So, a PHOSITA would understand this claim to be claiming the wire's extending direction due to the relationship of the port's placement on a wearable device and where a pulse oximetry sensor attaches to a patient. In Akai, exactly as claimed and shown in the '300 patent, that wire extends along a direct line from the housing 113 strapped on a patient's wrist to the pulse oximetry sensor 112 positioned on the patient's finger. There is nothing different about Akai and claim 1 in terms of housing configuration.

d. "one or more processing devices configured to,"

177. Money teaches a processor 14 that receives and processes signals from the sensors 104. EX1008, 5:23-28, 7:53-57.

e. "receive, via the plurality of sensor ports, a plurality of signals from the plurality of physiological sensors, at least some of the plurality of signals including digital information, and at least some of the plurality of signals including analog information"

178. Money's monitor 10 receives data from five sensors, including pulse oximetry sensor 39, blood pressure sensor 70, temperature sensor 77, respiration rate sensor 53, and ECG sensor 102/103, via wired connections. EX1008, 5:23-51,

FIG. 1. Such a wired connection would include a port for the reasons I explained in paragraphs 165-170 above.

179. Money teaches a system that receives analog signals from some sensors and digital signals from others. EX1008, 5:48-51, 7:4-8, 7:16-20, 7:58-62, 12:4-7, 13:24-32. Thus, Money teaches a system that receives a plurality of signals from a plurality of sensors, including both analog and digital signals. *Id.*

180. Specifically, in the example taught by Money, Money receives digital signals from the pulse oximetry sensor cuff 39 through a RS232 serial port and analog signals from the other sensors. EX1008, :26-33, 11:19-21, 7:58-62, 12:4-7, 13:24-32. Particularly, Money teaches that the pulse oximetry sensor transmits packets of data, and a PHOSITA would understand that a packet is a digital construct. EX1008, 13:24-32. Thus, by teaching that the monitor 10 receives data packets from the pulse oximetry sensor 39, Money teaches a system that receives digital data from one sensor and analog data from another. EX1008, 5:48-51, 7:4-8, 13:24-32. (It should be noted that the pulse oximetry cuff transducer 39, taught by Money, is a sensor that transmits only discrete data – an oxygen saturation percentage – which is a different sensor than the sensor 112 taught by Akai). As such, Money teaches a system capable of receiving digital data from some sensors (e.g., sensors connected to an RS232 port) and analog signals from other sensors.

181. That said, as I explained above in paragraphs 171-173, it would have been obvious to substitute the pulse oximetry cuff transducer 39 of Money with the non-invasive, light-based sensor 112 taught by Akai. Akai teaches that the pulse oximetry sensor 112 transmits an analog signal, which is subsequently converted into a digital signal by an analog-to-digital converter. EX1007, 5:30-34. Money teaches a monitor 10 configured to receive analog signals from analog sensors, and Akai teaches an analog SpO_2 sensor. EX1007, 5:30-34; EX1008, 7:4-8. Combined, the monitor 10 of Money would be modified, and is readily configured, to receive an analog signal from the pulse oximetry sensor. *Id.*

182. Once modified by Akai, the monitor 10 of Money would receive a continuous, analog signal from the analog SpO_2 sensor. EX1007, 5:30-34. In response, a PHOSITA would have been motivated to modify the pulse oximetry signal receiving circuitry 24 in view of Akai to receive and interpret the analog signal because the pulse oximetry signal receiving circuitry 24 is configured to receive *digital* data. EX1007, 5:30-34; EX1008, 7:58-62, 12:4-7, 13:24-32. More specifically, a PHOSITA would not be motivated to receive analog signals from a continuous, analog SpO_2 sensor via the digital RS232 port and serial interface because converting the continuous signal from the SpO_2 sensor into a digital signal according to RS232 might cause data loss. EX1008, 6:11-20, 7:58-62, 13:24-32.

183. Instead, a PHOSITA would have obviously been motivated to modify the pulse oximetry receiving circuitry 24 so that the monitor 10 receives the continuous, analog signals from the analog SpO_2 sensor 112 of Akai. EX1007, 5:30-34. Akai teaches the appropriate analog receiving circuitry to receive analog signals from an analog SpO_2 sensor. *Id*. As such, it would have been obvious to modify the digital signal receiving circuitry 24 with analog signal receiving circuitry so that the monitor 10 could interpret a received analog signal from the analog pulse oximeter 112 of Akai. Therefore, as modified by Akai, a PHOSITA would have modified the pulse oximetry receiving circuitry 24 to receive an analog signal, in view of Akai, to predictably result in a monitor 10 that can receive and understand analog signals from an analog SpO_2 sensor. EX1007, 5:30-34; EX1008, 7:58-62, 12:4-7, 13:24-32.

184. Substituting the pulse oximetry cuff transducer 39 of Money with the analog-outputting SpO_2 sensor 112 of Akai would have additional implications on the monitor 10. Without connecting a pulse oximetry sensor to the RS232 port, the RS232 port would not receive data from any sensor unless Money was further modified. But, a PHOSITA would have been motivated to further modify the monitor 10 of Money to continue to receive sensor data via the RS232 serial port so that the RS232 port continued to serve its dual purposes (debug and receiving digital data from a sensor). EX1008, 5:4-8, FIG. 17A-B, 7:4-22. Also, a PHOSITA

would have been motivated to continue receiving sensor data via the RS232 because of limited space on the monitor 10 or Money's power requirements. EX1008, 5:4-8, FIG. 17A-B, 7:4-22.

185. While Money teaches that the pulse oximetry sensor is the sensor transmitting digital data, it would have been obvious to receive a digital signal indicative of any discrete parameter (e.g., temperature) so that the monitor could receive data according to the RS232 serial port. EX1008, 7:4-8, 6:11-20, 7:58-62, 13:24-32. Use of a standardized port, such as RS232, provides easier to purchase equipment, like cabling to connect sensors to the monitor 10. The most obvious solution to ensure continued dual use of the RS232 port would be modifying the temperature sensor 77 to output digital data through the RS232 port.

186. Modifying the temperature sensor 77 to transmit digital data is particularly obvious because the temperature sensor 77 only measures a discrete value (exactly like oxygen saturation), as opposed to providing a waveform (like those provided by the ECG sensors). EX1008, 5:65-6:10 (noting that ECG and respiration waveforms should not be digitized). Indeed, digitizing a waveform runs the risk of losing important health data. *Id*. (That said, some ECG data can be represented digitally, such as a patient's heart rate. EX1008, 6:49-53). Also, Money teaches that the temperature interface converts analog signals into digital signals to display a digital value for the patient's temperature. EX1008, 11:2-5. Thus, Money

teaches that the temperature sensor parameters are represented digitally eventually, it's just a design decision as to where those values get digitized (inside the monitor 10 or outside). EX1008, 10:59-11:5, FIG. 1, 7:49-52.

187. A PHOSITA would recognize that discrete, temperature data would be efficiently transmitted digitally, using digital packets via the RS232 protocol and received by the serial port, just as the discrete pulse oximetry data. EX1008, 6:11-20, 10:59-11:5. Such a modification would have been a use of a known technique (using an RS232 port to receive digital data from a sensor) to improve similar devices (Money's monitor 10) in the same way (Money's RS232 port would continue to serve a dual function even after being upgraded with a modern SpO_2 sensor).

188. The motivation to move this temperature digitization circuitry either inside or outside of the monitor 10 is simply a design choice because this basic circuitry would predictably function the same way regardless of its location in the electronic circuit (inside or outside the monitor). But more specifically, a PHOSITA would have been motivated to cause the temperature sensor 77 to output digital data so that the monitor 10 of Money would communicate with a modern, light-based, analog, pulse oximetry sensor, as explained above in paragraphs 171-173, and still use the RS232 serial port for receiving data from a sensor (and maintain the debug versatility provided by the RS232 serial port). In other words, a

PHOSITA would not want to add more ports than necessary to the monitor 10 of Money, and would be motivated to use all available ports, including the RS232 port that would be unoccupied when modified by Akai's SpO_2 sensor.

189. Thus, Money teaches a system receiving analog data from some sensors and digital data from others. EX1008, 5:48-51, 7:4-8, 7:16-20, 7:58-62, 12:4-7, 13:24-32. As modified by Akai, the monitor of Money would predictably receive analog signals from a non-invasive SpO_2 sensor, and digital signals from the temperature sensor 77 via the serial interface/RS232 port.

f. "cause to be displayed, on a display of the portable monitor, a plurality of physiological parameters values responsive to the plurality of signals"

190. Money teaches that the processor 14 displays oxygen saturation, pulse rate, temperature, respiration rate, blood pressure, and ECG on the display 42. EX1008, 5:23-28, 6:21-37, 7:53-57, FIG. 10.

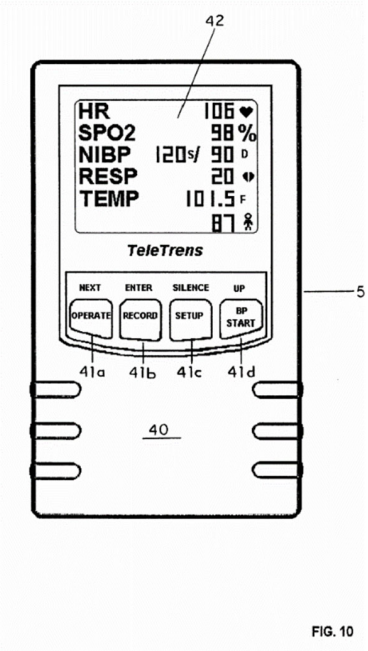


FIG. 10

g. "combine information indicative of the plurality of signals into a single digital word or bit stream; and"

191. As I explained above in paragraph 87, this limitation generically describes a function common to almost all if not all wireless communication.

192. Nevertheless, Money teaches that three sensor readings (pulse oximetry, blood pressure, and temperature) are digitized into a bitstream before being transmitted via the RF transmitter 21. EX1008, 5:61-6:10; 10:13-35. The creation of this set of digital data would be understood by a PHOSITA to be a combined set of information, from multiple sensors, into a group of digital data (i.e., a bitstream). *Id.*

h. "encode the single digital word or bit stream to generate a baseband signal; and"

193. As I explained above in paragraph 90, this limitation generically describes a function common to almost all if not all wireless communication. The Patent Owner even admits that he did not invent encoding digital data into a baseband signal. EX1001, 7:22-24.

194. Nevertheless, Money teaches that digital data (bitstream) is encoded, using FSK modulation, into a baseband signal. EX1008, 3:24-29. A PHOSITA would understand that encoding using FSK modulation results in a baseband signal. *Id.* Keyed modulation is exactly how the '300 patent describes baseband signal generation. EX1001, 7:24-30. Thus, Money teaches generation of a baseband signal by encoding a bitstream. EX1008, 3:24-29.

i. "a transmitter configured to:"

195. Money teaches an RF transmitter 21. EX1008, Abstract, 3:24-29, 5:10-13, 5:23-28, 6:8-10, 10:12-35, 14:42-45.

j. "modulate the baseband signal with a carrier to generate a transmit signal; and"

196. Money teaches that the baseband signal is further modulated, according to frequency modulation (FM), by the RF transmitter 21, onto an FM RF carrier wave. EX1008, 6:2-10, 10:13-21. Thus, Money's baseband signal is modulated with a carrier to generate a transmit signal sent to the central monitoring station. *Id.*

k. "wirelessly transmit the transmit signal to a remote patient monitoring device configured to decode the signal and display, on a remote display, the plurality of physiological parameters values responsive to the plurality of signals."

197. Money teaches that an RF transmitter 21 wirelessly transmits all measured parameters, which can include oxygen saturation, blood pressure, temperature, respiration rate, and ECG (physiological measurements), to a central monitoring station. EX1008, Abstract, 3:24-26, 5:10-13, 5:23-28, 6:8-10, 10:12-35, 14:42-45.

198. Money does not provide specifics as to the central monitoring station, but it's safe to assume that the central monitoring station can decode and display the data it receives. It would be entirely pointless to transmit data to a machine that cannot decode the information it receives. Indeed, the entire point of wireless communication is so that devices *communicate*. Also, the point of collecting medical data almost always results in data being displayed to clinicians so that clinicians can make medical diagnoses and treatments. Thus, again, it's safe to assume that clinicians view the collected data at the central monitoring station.

199. Nevertheless, Akai unequivocally teaches that the central terminal decodes and displays collected data, which was received via a wireless transmission, to doctor workstations. EX1007, 9:37-39, 9:45-50. There's nothing

unique about decoding and displaying collected data – that is a natural offshoot as humans cannot understand binary data.

200. Therefore, it is my opinion that Money in view of Kiani and Akai teaches and renders obvious the limitations of claim 1.

2. Dependent Claim 2:

a. "The portable monitor of claim 1, wherein the one or more processing devices are further configured to: process, at least in part in the analog domain, at least a first signal of the plurality of signals to determine at least a first one or more of the plurality of physiological parameters values; and"

201. Money teaches that the medical monitor 10 processes some signals in the analog domain. EX1008, 5:48-51, 7:4-8, 7:16-20, 7:58-62, 12:4-7, 13:24-32. Therefore, Money teaches this limitation.

b. "process, at least in part in the digital domain, at least a second signal of the plurality of signals to determine at least a second one or more of the plurality of physiological parameters values."

202. Money teaches that the medical monitor 10 processes other signals in the digital domain. EX1008, 5:48-51, 7:4-8, 7:16-20, 7:58-62, 12:4-7, 13:24-32. Therefore, Money teaches this limitation.

3. Dependent Claim 3: "The portable monitor of claim 2, wherein the first signal is received via the first sensor port from the first physiological sensor."

203. Money teaches that the medical monitor can receive a first signal (e.g., pulse oximetry signal) from a first physiological sensor (e.g., SpO_2 sensor). EX1008, 5:38-41.

204. As I explained above in paragraphs 165-170, Money either implicitly teaches a first port for receiving the first signal, or it would have been obvious to receive the first signal via a first port in view of Kiani. Also, as modified by Akai, the first signal would be an analog signal received from a non-invasive, analog, SpO_2 sensor. *See* paragraphs 171-175.

4. Dependent Claim 4: "The portable monitor of claim 3, wherein the first physiological sensor comprises a pulse oximetry sensor."

205. Money teaches that the medical monitor can receive a first signal (e.g., pulse oximetry signal) from a first physiological sensor (e.g., SpO_2 sensor). EX1008, 5:38-41.

5. Dependent Claim 5: "The portable monitor of claim 4, wherein the first one or more of the plurality of physiological parameters values comprises at least oxygen saturation and pulse rate."

206. Money teaches that the processor 14 processes signals from all connected sensors including the pulse oximetry sensor 104a. EX1008, 5:23-28,

7:49-52. Money teaches that the processor 14 determines both pulse rate and oxygen saturation. EX1008, 5:23-28, 5:61-65.

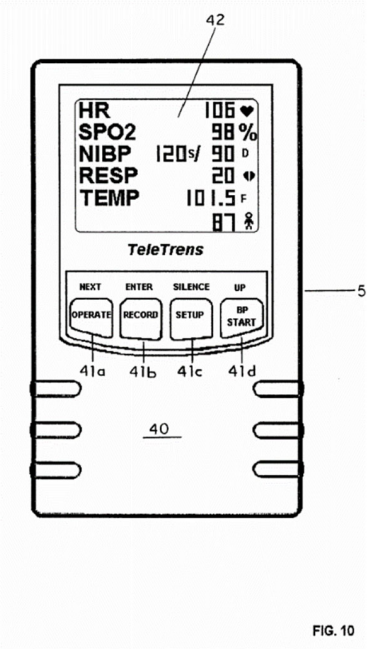


FIG. 10

207. It would have been obvious to determine pulse rate from pulse oximetry sensors in view of Kiani. Kiani explains that analog pulse oximeters, like the SpO_2 sensor 112 taught by Akai, measure both pulse rate and oxygen saturation. EX1006, 6:7-9. It would have been obvious to modify the pulse oximetry sensor 112 (from Akai) connected to the monitor 10 of Money to detect both parameters in view of Kiani to minimize the number of sensors attached to the patient. A PHOSITA would know that attaching numerous sensors to a patient increases patient discomfort and increases the chances that one of the sensors falls off or becomes disconnected.

208. Modifying Money/Akai with Kiani substitutes one known sensor (Akai's pulse oximetry sensor 112) for another (Kiani's pulse oximetry sensor) to predictably detect both oxygen saturation and pulse rate by the same sensor. EX1007, 8:26-33, 11:19-21; EX1006, 6:7-9.

6. Dependent Claim 6

a. "The portable monitor of claim 2, wherein the one or more processing devices comprise: a multiplexer configured to combine the information indicative of the plurality of signals into the single digital word or bit stream; and"

209. A multiplexer is a fundamental building block of circuitry and has been for a very long time. *See* paragraphs 110-112.

210. Money teaches a "summer," which either is a multiplexer or is equivalent to a multiplexer because Money teaches that the "summer" performs the well-known functions of a multiplexer (inputting multiple signals to output one signal that is a combination or selection of the inputs signals). EX1008. 10:12-35.

b. "an encoder configured to encode the single digital word or bit stream to generate the baseband signal."

211. Again, an encoder is fundamental electronic circuitry that would be known to a PHOSITA. The '300 patent admits as much. EX1001, 7:22-24. See paragraph 115.

212. Money teaches an encoder configured to encode the bitstream into a baseband signal. EX1008, 3:24-29, 6:8-10.

7. Dependent Claim 7: "The portable monitor of claim 6, wherein the baseband signal comprises a single signal."

213. Money teaches a single baseband signal. EX1008, 6:8-10; 10:21-35. Money teaches that the RF transmitter transmits all measured physiological parameters together as one signal. *Id*. Again, this claim is describing conventional wireless functionality.

8. Dependent Claim 8: "The portable monitor of claim 6, wherein the baseband signal comprises multiple related signal components including at least one of: in-phase signals or quadrature signals."

214. Money teaches that the wireless signal comprises multiple in-phase signal components. EX1008, 6:8-10. Specifically, Money teaches that encoded FSK digital data is combined with analog data on an RF FM carrier wave. *Id.* Thus, Money teaches analog components in-phase with digital components. *Id.*

9. Dependent Claim 9: "The portable monitor of claim 6, wherein the transmitter is further configured to transmit on multiple frequency channels."

215. Money teaches that data is transmitted using frequency modulation (FM), which a PHOSITA would recognize as using multiple channels. EX1008, 3:24-29, 6:2-10.

10. Dependent Claim 10: "The portable monitor of claim 1, wherein the plurality of sensor ports comprise at least: a second sensor port configured to receive a signal from an EKG sensor arrangement; and a third sensor port configured to receive a signal from a blood pressure sensor arrangement."

216. Money communicates with both a blood pressure and ECG (same thing as EKG – just a different acronym based on the German language rather than English) sensors. EX1008, 5:20-37, 5:42-44.

11. Dependent Claim 11

a. "The portable monitor of claim 10 further comprising: a plurality of sensor interfaces configured to receive the plurality of signals and initially process the plurality of signals, wherein:"

217. Money teaches that each connection with a physiological sensor includes sensor interface. EX1008, 3:14-24, 5:28-51. Money teaches a highly specific monitor where each sensor has its own unique sensor interface. EX1008, Abstract, 5:38-51.

b. "each of the plurality of sensor interfaces is associated with a respective sensor port of the plurality of sensor ports, and"

218. Money teaches that each sensor is connected to the monitor via respective sensor interfaces. EX1008, Abstract, 5:38-51.

c. "each of the plurality of sensor interfaces is configured to receive a signal from a respective physiological sensor of the plurality of physiological sensors."

219. Money teaches that each sensor interface receives a respective signal from a respective sensor. *Id.*

12. Dependent Claim 12: "The portable monitor of claim 1, wherein a face of the housing comprises a single user interface, and the face of the housing is viewable by a user when the portable monitor is attached to the arm of the patient."

220. Money clearly teaches a display 42 positioned on the front side of the housing 5, which is viewable as seen in FIG. 10.

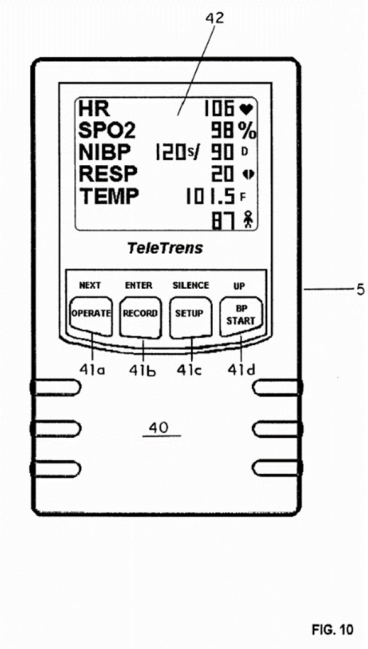


FIG. 10

221. Money further teaches that the display 42 simultaneously displays data from all connected sensors. EX1008, 6:27-33, FIG. 10. Finally, Money

teaches a display 42 positioned on a front panel, which would be visible to the user. EX1008, 6:24-27, FIG. 10.

222. As I explained above in paragraphs 171-175, it would have been obvious to modify Money's housing in view of Akai. Akai illustrates that its display is visible when the monitor unit 110 is worn. EX1007, FIG. 1. Thus, it would have been obvious to ensure that the display 42 was visible to the user while being worn when modifying Money in view of Akai, especially considering that Money's housing 5 looks so similar to Akai's housing 113. *Compare* EX1008, FIG. 10; EX1007, FIG. 1.

223. Finally, Money teaches a single display for displaying data to a user on the front side of the housing. EX1008, 6:21-48. A PHOSITA would understand that the display 42 is a user interface.

224. Therefore, Money in view of Akai renders obvious this limitation.

13. Dependent Claim 13: "The portable monitor of claim 12, wherein the single user interface comprises the display."

225. The user interface of Money is the display 42. *Id.*

14. Dependent Claim 14: "The portable monitor of claim 13, wherein the display is positioned centrally on the face of the housing."

226. The display 42 of Money is positioned centrally on the front side of the housing 5. EX1008, FIG. 10.

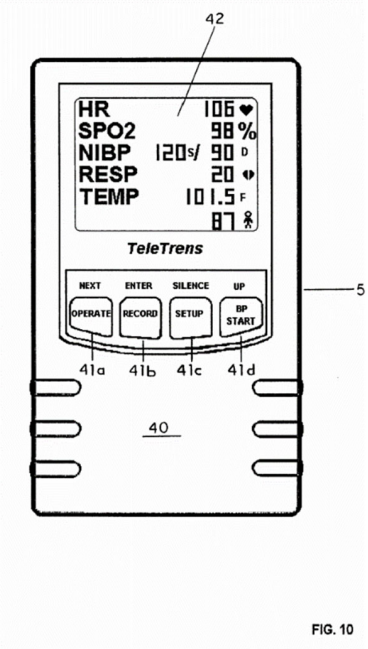


FIG. 10

15. Dependent Claim 15: "The portable monitor of claim 14, wherein the display positioned on the face of the housing is sized such that the display covers more than half of a length of a shortest dimension of the face of the housing."

227. Money also illustrates the display sized and positioned on the front side such that it covers most of the shortest dimension of the front side of the housing. EX1008, FIG. 10.

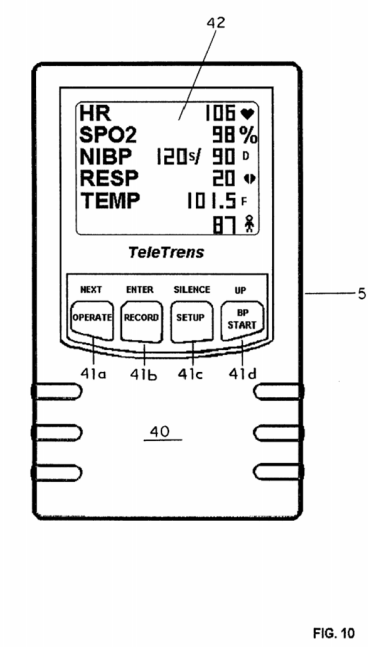


FIG. 10

16. Independent Claim 16

a. "A battery-powered wearable physiological monitoring device configured to communicate with multiple types of sensor arrangements via a plurality of sensor interfaces, the wearable physiological monitoring device comprising:"

228. To the extent the preamble is limiting, I fully discussed how Money teaches a wearable physiological monitoring device configured to communicate with multiple types of sensor arrangements above in paragraphs 160-162. Additionally, I fully explained how Money teaches a plurality of sensor interfaces for communicating with a plurality of connected sensors above in paragraph 217. Finally, Money teaches a battery powered monitor. EX1008, 5:52-55, 7:4-23, FIGs. 17A-B.

b. "a plurality of sensor communication ports including:"

229. I fully discussed how Money in view of Kiani teaches this limitation in paragraphs 165-170.

c. "a first sensor communication port configured to provide wired communication with a first type of physiological sensor arrangement, wherein the first sensor port is positioned on the device such that a wire extending from the first sensor communication port to the first type of physiological sensor arrangement extends from the device along an axis perpendicular to a face of the device upon which the first sensor port is positioned;"

230. I fully discussed how Money in view of Kiani and Akai teaches this limitation in paragraphs 171-176.

d. "a second sensor communication port configured to provide wired communication with a second type of physiological sensor arrangement different from the first type of physiological sensor arrangement; and"

231. I fully discussed how Money in view of Kiani teaches this limitation in paragraph 216.

e. "a third sensor communication port configured to provide wired communication with a third type of physiological sensor arrangement different from both the first and second types of physiological sensor arrangements"

232. I fully discussed how Money in view of Kiani teaches this limitation in paragraph 216.

f. "a plurality of sensor interfaces including:"

233. I fully discussed how Money teaches this limitation in paragraph 217.

g. "a first sensor interface configured to receive a first signal from a first sensor arrangement of the first type, the first signal including analog information;"

234. I fully discussed how Money teaches respective sensor interfaces for each connected sensor in paragraph 217. I also explained in paragraphs 171-175 how a PHOSITA would have been motivated to include Akai's analog pulse oximetry sensor interface (first sensor interface), rather than Money's digital pulse oximetry sensor interface, after substituting the pulse oximetry cuff transducer 39 of Money with the analog SpO_2 sensor of Akai. Thus, Money as modified by Kiani and Akai teaches a first sensor interface configured to receive an analog signal from the pulse oximetry sensor 104a. *Id.*

h. "a second sensor interface configured to receive a second signal from a second sensor arrangement of the second type the second signal including digital information; and"

235. I fully discussed how Money teaches respective sensor interfaces for each connected sensor in paragraph 217. I also fully explained in paragraphs 182-189 how a PHOSITA would have been motivated to modify Money's monitor 10 to continue receiving at least one discrete parameter via RS232 (digital signal), such as a temperature sensor, in view of the dual purposes serial port taught by Money. Thus, Money in view of Kiani and Akai renders obvious this limitation.

i. "a third sensor interface configured to receive a third signal from a third sensor arrangement of the third type;"

236. Money teaches a third sensor interface 25 to receive a third signal from a blood pressure sensor 70. EX1008, 5:42-44.

j. "wherein the plurality of sensor interfaces are configured to output one or more signals indicative of physiological parameters sensed by the first, second, and third sensor arrangements;"

237. Money teaches that all sensor interfaces output signals indicative of parameters measured by connected sensors. EX1008, 5:42-52, 8:20-27.

k. "a display positioned on a face of the wearable physiological monitoring device configured to display information while the wearable physiological monitoring device is being worn by a patient;"

238. I fully explained above in paragraphs 190 and 220-224 that Money teaches a display 42 positioned on a face of the portable device that displays parameter readings while the portable device is being worn by the patient.

l. "a processor configured to:"

239. I fully discussed how Money teaches this limitation in paragraph 177.

m. "responsive to the one or more signals indicative of the physiological parameters, cause to be displayed, on the display, physiological parameter measurements;"

240. I fully discussed how Money teaches this limitation in paragraph 190.

n. "combine information indicative of the one or more signals into a single digital word or bit stream; and;"

241. I fully discussed how Money teaches this limitation in paragraphs 191-192.

o. "encode the single digital word or bit stream to generate a baseband signal;"

242. I fully discussed how Money teaches this limitation in paragraphs 193-194.

p. "a transmitter configured to:"

243. I fully discussed how Money teaches this limitation in paragraph 195.

q. "modulate the baseband signal with a carrier to generate a transmit signal; and"

244. I fully discussed how Money teaches this limitation in paragraph 196.

r. "wirelessly transmit the transmit signal to a receiving patient monitoring device that is not wired to the wearable physiological monitoring device; and"

245. I fully discussed how Money teaches this limitation in paragraphs 197-200.

s. "a battery configured to provide power to at least the processor, the display, the transmitter, and the first sensor arrangement via the first sensor communication port such that the wearable physiological monitoring device is portable and wearable by a patient."

246. Money teaches a battery-powered monitor. EX1008, 5:52-55, 7:4-23, FIGs. 17A-B. Money teaches that the battery powers all components of the

monitor, including the transmitter 21, the pulse oximetry sensor, and the display. EX1008, 5:38-41, 5:52-55, 7:4-23, FIGs. 17A-B.

17. Dependent Claim 17:

a. "The wearable physiological monitoring device of claim 16, wherein: at least one of the first, second, or third sensor interfaces is configured to process signals at least in part in the analog domain; and"

247. Money teaches that the ECG sensor interface processes signals in the analog domain. EX1008, 8:48-56.

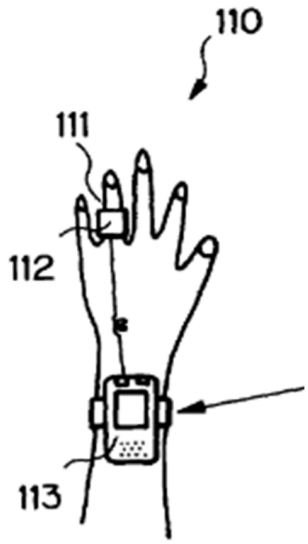
b. "at least at different one of the first, second, or third sensor interfaces is configured to process signals at least in part in the digital domain."

248. Money teaches a sensor interface that receives digital packets, thereby teaching a sensor interface processing data in the digital domain. EX1008, 5:38-41, 6:11-20, 13:24-32. For example, this sensor interface could receive data from any discrete sensor, such as the temperature sensor, as I more fully explained above in paragraphs 185-188.

18. Dependent Claim 18: "The wearable physiological monitoring device of claim 17, wherein the first sensor arrangement comprises a pulse oximetry sensor configured to be attached to a digit of a patient."

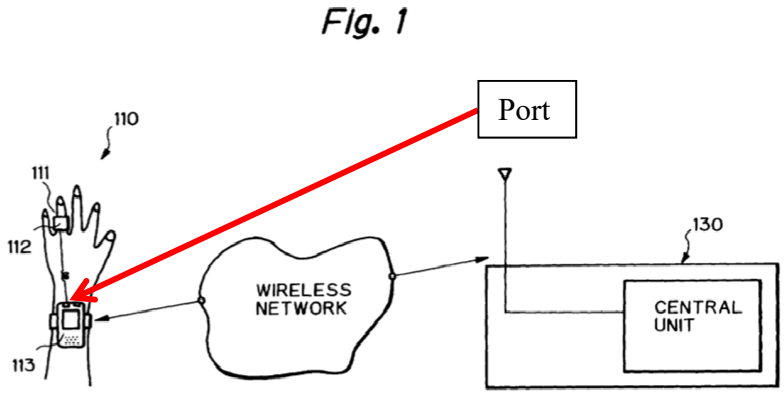
249. Money teaches that the pulse oximetry sensor 39 transmits electrical signals representing oxygen saturation to the processor 14 via a wired connection. EX1008, 5:23-28, 5:42-44. Such a wired connection would include a port for the reasons I explained in paragraphs 165-170 above.

250. As I explained above in paragraphs 171-175, it would have been obvious to modify Money to include a finger-placed, pulse oximetry sensor in view of Akai.



19. Dependent Claim 19: "The wearable physiological monitoring device of claim 18, wherein the first sensor port is positioned on a side of the wearable physiological monitoring device that faces a hand of a patient when the wearable physiological monitoring device is attached to an arm of the hand of the patient."

251. As shown in FIG. 1 of Akai, the first sensor port exists on the top side (first side) of the housing, which is the side of the housing closest to and facing the hand when the person is wearing the portable device 100a, thereby facilitating a wired connection. EX1007, FIG. 1.



Id. (annotated).

252. As I said above in paragraph 172, a PHOSITA looking at FIG. 2 of Akai would assume that the wired connections with sensors would occur via sensor ports. Furthermore, it would have been obvious to modify Money's housing configuration in view of Akai for the reasons discussed above in paragraphs 165-170. Therefore, Money in view of Kiani and Akai renders this limitation obvious.

20. Dependent Claim 20: "The wearable physiological monitoring device of claim 19, wherein the face of the wearable physiological monitoring device comprises a single user interface, and the single user interface comprises the display."

253. I fully discussed how Money in view of Akai teaches this claim in paragraphs 220-225.

D. Ground 3: Claims 1-5 and 10-20 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of Goldberg, Kiani, and Money

1. Independent Claim 1

a. "A wearable, portable physiological monitor configured to wirelessly transmit real time information regarding a plurality physiological parameters, the portable monitor comprising:"

254. I fully discussed how Goldberg teaches this limitation in paragraphs 55-60.

b. "a plurality of sensor ports positioned on a housing of the portable monitor and configured to provide respective wired interfaces with different respective physiological sensors of a plurality of physiological sensors, wherein:"

255. I fully discussed how Goldberg in view of Kiani teaches this limitation in paragraphs 61-63.

c. "at least a first sensor port of the plurality of sensor ports is positioned on a side of the housing of the portable monitor such that, when the portable monitor is attached to an arm of a patient, a wired connection extending from the first sensor port to a first physiological sensor positioned on a digit of the patient follows a path to the digit of the patient that is substantially perpendicular to the side of the housing and avoids tangling of the wired connection;"

256. I fully discussed how Goldberg in view of Kiani teaches this limitation in paragraphs 64-69.

d. "one or more processing devices configured to,"

257. I fully discussed how Goldberg teaches this limitation in paragraph 70.

e. "receive, via the plurality of sensor ports, a plurality of signals from the plurality of physiological sensors, at least some of the plurality of signals including digital information, and at least some of the plurality of signals including analog information"

258. I fully discussed how Goldberg in view of Kiani and Money teaches this limitation in paragraphs 71-84.

f. "cause to be displayed, on a display of the portable monitor, a plurality of physiological parameters values responsive to the plurality of signals"

259. I fully discussed how Goldberg teaches this limitation in paragraph 85.

g. "combine information indicative of the plurality of signals into a single digital word or bit stream; and"

260. Goldberg teaches that the communication unit 110 wirelessly transmits sensor data and measurements, which can include oxygen saturation, glucose, blood pressure, and temperature (physiological measurements) to a remote computer 302. EX1005, 4:50-56, 5:9-21. By the time of the invention, wireless transmission was well known, as Goldberg shows. *Id.* More specifically, Goldberg teaches that all received parameter values from all connected sensors are combined

into digital packets for wireless transmission using any one of several well-known wireless standards, including Mobitex. EX1005, 5:62-6:5.

261. Taylor teaches the granular functions of Mobitex data transmission, including how a terminal, such as the portable device 100 of Goldberg, could transmit data according to Mobitex. EX1009, 2:29-3:10, 3:4-22. While these functions would have been well-known to a PHOSITA, Taylor unequivocally teaches that a digital signal processor (DSP) of the wireless transmitter receives combined data from the terminal as a bitstream. EX1009, 5:19-6:5, 6:31-7:3. Again, I note that the '300 patent admits that this function is not novel. EX1001, 7:22-24.

262. The combination of Taylor's teachings with Goldberg's does not modify Goldberg at all. Goldberg already teaches that the portable device can wirelessly transmit data according to Mobitex. Taylor's teachings regarding the granular steps of Mobitex communication simply fills details that Goldberg omitted because they are well understood by a PHOSITA. Thus, the combination of Goldberg and Taylor isn't a combination at all – it's merely a reference explaining in more detail what the first reference is taught.

263. Even so, Taylor does offer some advantages over traditional Mobitex communication. Most importantly, Taylor offers power reduction schemes while communicating using Mobitex. EX1009, 4:27-5:8, 3:31-4:26. Thus, a PHOSITA

would have been motivated to combine Goldberg and Taylor to reduce the portable device's 100 power usage when communicating via Mobitex. *Id.* And, the combination of Goldberg and Taylor is a combination of prior art elements (a medical monitor performing wireless communications using Mobitex and lowered power when transmitting via Mobitex) according to known methods to yield predictable results (sensor readings transmitted wirelessly according to Mobitex using less power), which would have predictably resulted in the portable device communicating via Mobitex using less power. *Id.*

h. "encode the single digital word or bit stream to generate a baseband signal; and"

264. Taylor teaches an encoder that encodes the bitstream to generate a baseband signal. EX1009, 6:7-18, 7:8-10. Taylor uses quadrature modulation to generate a waveform, which a PHOSITA would know is a baseband signal. EX1009, 5:19-6:5, 6:31-7:3, 7:27-29.

i. "a transmitter configured to:"

265. I fully discussed how Goldberg teaches this limitation in paragraph 93.

j. "modulate the baseband signal with a carrier to generate a transmit signal; and"

266. Taylor teaches that the transmitter circuitry modulates the baseband signal using frequency modulation (FM) as part of the wireless data transmission. EX1009, 7:31-8:15.

k. "wirelessly transmit the transmit signal to a remote patient monitoring device configured to decode the signal and display, on a remote display, the plurality of physiological parameters values responsive to the plurality of signals."

267. I fully discussed how Goldberg teaches this limitation in paragraphs 95-98. In view of Taylor, Goldberg would wirelessly transmit measured medical parameters via Mobitex according to the teachings of Taylor.

268. Therefore, it is my opinion that Goldberg in view of Kiani, Money, and Taylor teaches and renders obvious all of the limitations of claim 1.

2. Dependent Claim 2: "The portable monitor of claim 1, wherein the one or more processing devices are further configured to: process, at least in part in the analog domain, at least a first signal of the plurality of signals to determine at least a first one or more of the plurality of physiological parameters values; and process, at least in part in the digital domain, at least a second signal of the plurality of signals to determine at least a second one or more of the plurality of physiological parameters values"

269. I fully discussed how Goldberg in view of Money teaches this claim in paragraphs 99-102.

3. Dependent Claim 3: "The portable monitor of claim 2, wherein the first signal is received via the first sensor port from the first physiological sensor."

270. I fully discussed how Goldberg in view of Kiani teaches this claim in paragraph 103.

4. Dependent Claim 4: "The portable monitor of claim 3, wherein the first physiological sensor comprises a pulse oximetry sensor."

271. I fully discussed how Goldberg teaches this claim in paragraph 104.

5. Dependent Claim 5: "The portable monitor of claim 4, wherein the first one or more of the plurality of physiological parameters values comprises at least oxygen saturation and pulse rate."

272. I fully discussed how Goldberg in view of Kiani teaches this claim in paragraphs 105-109.

6. Dependent Claim 10: "The portable monitor of claim 1, wherein the plurality of sensor ports comprise at least: a second sensor port configured to receive a signal from an EKG sensor arrangement; and a third sensor port configured to receive a signal from a blood pressure sensor arrangement."

273. I fully discussed how Goldberg in view of Kiani teaches this claim in paragraph 120.

7. Dependent Claim 11: "The portable monitor of claim 10 further comprising: a plurality of sensor interfaces configured to receive the plurality of signals and initially process the plurality of signals, wherein: each of the plurality of sensor interfaces is associated with a respective sensor port of the plurality of sensor ports, and each of the plurality of sensor interfaces is configured to receive a signal from a respective physiological sensor of the plurality of physiological sensors."

274. I fully discussed how Goldberg in view of Money teaches this claim in paragraphs 121-127.

8. Dependent Claim 12: "The portable monitor of claim 1, wherein a face of the housing comprises a single user interface, and the face of the housing is viewable by a user when the portable monitor is attached to the arm of the patient."

275. I fully discussed how Goldberg teaches this claim in paragraphs 128-129.

9. Dependent Claim 13: "The portable monitor of claim 12, wherein the single user interface comprises the display."

276. I fully discussed how Goldberg teaches this claim in paragraph 130.

10. Dependent Claim 14: "The portable monitor of claim 13, wherein the display is positioned centrally on the face of the housing."

277. I fully discussed how Goldberg teaches this claim in paragraph 131.

11. Dependent Claim 15: "The portable monitor of claim 14, wherein the display positioned on the face of the housing is sized such that the display covers more than half of a length of a shortest dimension of the face of the housing."

278. I fully discussed how Goldberg teaches this claim in paragraph 132.

12. Independent Claim 16

a. "A battery-powered wearable physiological monitoring device configured to communicate with multiple types of sensor arrangements via a plurality of sensor interfaces, the wearable physiological monitoring device comprising:"

279. I fully discussed how Goldberg in view of Kiani teaches this limitation in paragraph 133.

b. "a plurality of sensor communication ports including:"

280. I fully discussed how Goldberg in view of Kiani teaches this limitation in paragraph 134.

c. "a first sensor communication port configured to provide wired communication with a first type of physiological sensor arrangement, wherein the first sensor port is positioned on the device such that a wire extending from the first sensor communication port to the first type of physiological sensor arrangement extends from the device along an axis perpendicular to a face of the device upon which the first sensor port is positioned;"

281. I fully discussed how Goldberg in view of Kiani teaches this limitation in paragraph 135.

d. "a second sensor communication port configured to provide wired communication with a second type of physiological sensor arrangement different from the first type of physiological sensor arrangement; and"

282. I fully discussed how Goldberg in view of Kiani teaches this limitation in paragraph 136.

e. "a third sensor communication port configured to provide wired communication with a third type of physiological sensor arrangement different from both the first and second types of physiological sensor arrangements"

283. I fully discussed how Goldberg in view of Kiani teaches this limitation in paragraph 137.

f. "a plurality of sensor interfaces including:"

284. I fully discussed how Goldberg in view of Money teaches this limitation in paragraph 138.

g. "a first sensor interface configured to receive a first signal from a first sensor arrangement of the first type, the first signal including analog information;"

285. I fully discussed how Goldberg in view of Kiani and Money teaches this limitation in paragraph 139.

h. "a second sensor interface configured to receive a second signal from a second sensor arrangement of the second type the second signal including digital information; and"

286. I fully discussed how Goldberg in view of Money teaches this limitation in paragraph 140.

i. "a third sensor interface configured to receive a third signal from a third sensor arrangement of the third type;"

287. I fully discussed how Goldberg in view of Money teaches this limitation in paragraph 141.

j. "wherein the plurality of sensor interfaces are configured to output one or more signals indicative of physiological parameters sensed by the first, second, and third sensor arrangements;"

288. I fully discussed how Goldberg in view of Kiani and Money teaches this limitation in paragraph 142.

k. "a display positioned on a face of the wearable physiological monitoring device configured to display information while the wearable physiological monitoring device is being worn by a patient;"

289. I fully discussed how Goldberg teaches this limitation in paragraph 143.

l. "a processor configured to:"

290. I fully discussed how Goldberg teaches this limitation in paragraph 144.

m. "responsive to the one or more signals indicative of the physiological parameters, cause to be displayed, on the display, physiological parameter measurements;"

291. I fully discussed how Goldberg teaches this limitation in paragraph 145.

n. "combine information indicative of the one or more signals into a single digital word or bit stream; and;"

292. I fully discussed how Goldberg in view of Taylor teaches this limitation in paragraphs 260-263.

o. "encode the single digital word or bit stream to generate a baseband signal;"

293. I fully discussed how Goldberg in view of Taylor teaches this limitation in paragraph 264.

p. "a transmitter configured to:"

294. I fully discussed how Goldberg teaches this limitation in paragraph 265.

q. "modulate the baseband signal with a carrier to generate a transmit signal; and"

295. I fully discussed how Goldberg in view of Taylor teaches this limitation in paragraph 266.

r. "wirelessly transmit the transmit signal to a receiving patient monitoring device that is not wired to the wearable physiological monitoring device; and"

296. I fully discussed how Goldberg teaches this limitation in paragraph 150.

s. "a battery configured to provide power to at least the processor, the display, the transmitter, and the first sensor arrangement via the first sensor communication port such that the wearable physiological monitoring device is portable and wearable by a patient."

297. I fully discussed how Goldberg in view of Kiani teaches this limitation in paragraphs 151-152.

13. Dependent Claim 17: "The wearable physiological monitoring device of claim 16, wherein: at least one of the first, second, or third sensor interfaces is configured to process signals at least in part in the analog domain; and at least at different one of the first, second, or third sensor interfaces is configured to process signals at least in part in the digital domain."

298. I fully discussed how Goldberg in view of Kiani and Money teaches this claim in paragraphs 153-154.

14. Dependent Claim 18: "The wearable physiological monitoring device of claim 17, wherein the first sensor arrangement comprises a pulse oximetry sensor configured to be attached to a digit of a patient."

299. I fully discussed how Goldberg teaches this claim in paragraph 155.

15. Dependent Claim 19: "The wearable physiological monitoring device of claim 18, wherein the first sensor port is positioned on a side of the wearable physiological monitoring device that faces a hand of a patient when the wearable physiological monitoring device is attached to an arm of the hand of the patient."

300. I fully discussed how Goldberg in view of Kiani teaches this claim in paragraphs 156-157.

16. Dependent Claim 20: "The wearable physiological monitoring device of claim 19, wherein the face of the wearable physiological monitoring device comprises a single user interface, and the single user interface comprises the display."

301. I fully discussed how Goldberg teaches this claim in paragraph 158.

E. Ground 4: Claims 1-5 and 10-20 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of Money, Kiani, and Akai

1. Independent Claim 1

a. "A wearable, portable physiological monitor configured to wirelessly transmit real time information regarding a plurality physiological parameters, the portable monitor comprising:"

302. I fully discussed how Money teaches this limitation in paragraphs 160-164.

b. "a plurality of sensor ports positioned on a housing of the portable monitor and configured to provide respective wired interfaces with different respective physiological sensors of a plurality of physiological sensors, wherein:"

303. I fully discussed how Money in view of Kiani teaches this limitation in paragraphs 165-170.

c. "at least a first sensor port of the plurality of sensor ports is positioned on a side of the housing of the portable monitor such that, when the portable monitor is attached to an arm of a patient, a wired connection extending from the first sensor port to a first physiological sensor positioned on a digit of the patient follows a path to the digit of the patient that is substantially perpendicular to the side of the housing and avoids tangling of the wired connection;"

304. I fully discussed how Money in view of Kiani and Akai teaches this limitation in paragraphs 171-176.

d. "one or more processing devices configured to,"

305. I fully discussed how Money teaches this limitation in paragraph 177.

e. "receive, via the plurality of sensor ports, a plurality of signals from the plurality of physiological sensors, at least some of the plurality of signals including digital information, and at least some of the plurality of signals including analog information"

306. I fully discussed how Money in view of Kiani and Akai teaches this limitation in paragraphs 178-189.

f. "cause to be displayed, on a display of the portable monitor, a plurality of physiological parameters values responsive to the plurality of signals"

307. I fully discussed how Money teaches this limitation in paragraph 190.

g. "combine information indicative of the plurality of signals into a single digital word or bit stream; and"

308. Money teaches wireless transmission of all collected medical data via an RF transmitter 21. EX1008, 5:10-13, 5:61-6:10. RF transmission of this nature may be insufficient in some situations. For example, if the central monitoring station were outside the RF transmitter's range, then Money's monitor would be unable to wirelessly transmit the data to the central monitoring station. EX1008, 2:64-3:2, 6:2-10. In this situation, a PHOSITA would be motivated to transmit the collected data via a wide-range wireless network, such as a Mobitex cellular network. EX1009, 2:29-31.

309. Taylor teaches the granular functions of Mobitex data transmission, including how a terminal, such as the monitor 10 of Money, would transmit data according to Mobitex. EX1009, 2:29-3:10, 3:4-22. While these functions would

have been well-known to a PHOSITA, Taylor unequivocally teaches that a digital signal processor (DSP) of the wireless transmitter receives combined data from the terminal as a bitstream. EX1009, 5:19-6:5, 6:31-7:3. Again, I note that the '300 patent admits that this function is not novel. EX1001, 7:22-24.

310. A PHOSITA would have been motivated to combine Taylor with Money to transmit data on a wireless network. EX1009, 2:29-31. Also, the combination of Money and Taylor is a combination of prior art elements (a medical monitor transmitting data wirelessly and wireless network communications using Mobitex) according to known methods to yield predictable results (sensor readings transmitted wirelessly on a network according to Mobitex). *Id.*

h. "encode the single digital word or bit stream to generate a baseband signal; and"

311. Taylor teaches an encoder that encodes the bitstream to generate a baseband signal. EX1009, 6:7-18, 7:8-10. Taylor uses quadrature modulation to generate a waveform, which a PHOSITA would know is a baseband signal. EX1009, 5:19-6:5, 6:31-7:3, 7:27-29.

i. "a transmitter configured to:"

312. I fully discussed how Money teaches this limitation in paragraph 195.

j. "modulate the baseband signal with a carrier to generate a transmit signal; and"

313. Taylor teaches that the transmitter circuitry modulates the baseband signal using frequency modulation (FM) as part of the wireless data transmission. EX1009, 7:29-8:15.

k. "wirelessly transmit the transmit signal to a remote patient monitoring device configured to decode the signal and display, on a remote display, the plurality of physiological parameters values responsive to the plurality of signals."

314. I fully discussed how Money teaches this limitation in paragraphs 197-199. In view of Taylor, Money would wirelessly transmit measured medical parameters via Mobitex according to the teachings of Taylor.

315. Therefore, it is my opinion that Money in view of Kiani, Akai, and Taylor teaches and renders obvious all the limitations of claim 1.

2. Dependent Claim 2: "The portable monitor of claim 1, wherein the one or more processing devices are further configured to: process, at least in part in the analog domain, at least a first signal of the plurality of signals to determine at least a first one or more of the plurality of physiological parameters values; and process, at least in part in the digital domain, at least a second signal of the plurality of signals to determine at least a second one or more of the plurality of physiological parameters values"

316. I fully discussed how Money in view of Akai teaches this claim in paragraphs 201-202.

3. Dependent Claim 3: "The portable monitor of claim 2, wherein the first signal is received via the first sensor port from the first physiological sensor."

317. I fully discussed how Money in view of Kiani and Akai teaches this claim in paragraphs 203-204.

4. Dependent Claim 4: "The portable monitor of claim 3, wherein the first physiological sensor comprises a pulse oximetry sensor."

318. I fully discussed how Money in view of Akai teaches this claim in paragraph 205.

5. Dependent Claim 5: "The portable monitor of claim 4, wherein the first one or more of the plurality of physiological parameters values comprises at least oxygen saturation and pulse rate."

319. I fully discussed how Money in view of Kiani teaches this claim in paragraphs 206-208.

6. Dependent Claim 10: "The portable monitor of claim 1, wherein the plurality of sensor ports comprise at least: a second sensor port configured to receive a signal from an EKG sensor arrangement; and a third sensor port configured to receive a signal from a blood pressure sensor arrangement."

320. I fully discussed how Money in view of Kiani teaches this claim in paragraph 216.

7. Dependent Claim 11: "The portable monitor of claim 10 further comprising: a plurality of sensor interfaces configured to receive the plurality of signals and initially process the plurality of signals, wherein: each of the plurality of sensor interfaces is associated with a respective

sensor port of the plurality of sensor ports, and each of the plurality of sensor interfaces is configured to receive a signal from a respective physiological sensor of the plurality of physiological sensors."

321. I fully discussed how Money teaches this claim in paragraphs 217-219.

8. Dependent Claim 12: "The portable monitor of claim 1, wherein a face of the housing comprises a single user interface, and the face of the housing is viewable by a user when the portable monitor is attached to the arm of the patient."

322. I fully discussed how Money teaches this claim in paragraphs 220-224.

9. Dependent Claim 13: "The portable monitor of claim 12, wherein the single user interface comprises the display."

323. I fully discussed how Money teaches this claim in paragraph 225.

10. Dependent Claim 14: "The portable monitor of claim 13, wherein the display is positioned centrally on the face of the housing."

324. I fully discussed how Money teaches this claim in paragraph 226.

11. Dependent Claim 15: "The portable monitor of claim 14, wherein the display positioned on the face of the housing is sized such that the display covers more than half of a length of a shortest dimension of the face of the housing."

325. I fully discussed how Money teaches this claim in paragraph 227.

12. Independent Claim 16

a. "A battery-powered wearable physiological monitoring device configured to communicate with

multiple types of sensor arrangements via a plurality of sensor interfaces, the wearable physiological monitoring device comprising:"

326. I fully discussed how Money teaches this limitation in paragraph 228.

b. "a plurality of sensor communication ports including:"

327. I fully discussed how Money in view of Kiani teaches this limitation in paragraph 229.

c. "a first sensor communication port configured to provide wired communication with a first type of physiological sensor arrangement, wherein the first sensor port is positioned on the device such that a wire extending from the first sensor communication port to the first type of physiological sensor arrangement extends from the device along an axis perpendicular to a face of the device upon which the first sensor port is positioned;"

328. I fully discussed how Money in view of Kiani and Akai teaches this limitation in paragraph 230.

d. "a second sensor communication port configured to provide wired communication with a second type of physiological sensor arrangement different from the first type of physiological sensor arrangement; and"

329. I fully discussed how Money in view of Kiani teaches this limitation in paragraph 231.

e. "a third sensor communication port configured to provide wired communication with a third type of physiological sensor arrangement different from both the first and second types of physiological sensor arrangements"

330. I fully discussed how Money in view of Kiani teaches this limitation in paragraph 232.

f. "a plurality of sensor interfaces including:"

331. I fully discussed how Money teaches this limitation in paragraph 233.

g. "a first sensor interface configured to receive a first signal from a first sensor arrangement of the first type, the first signal including analog information;"

332. I fully discussed how Money in view of Akai teaches this limitation in paragraph 234.

h. "a second sensor interface configured to receive a second signal from a second sensor arrangement of the second type the second signal including digital information; and"

333. I fully discussed how Money in view of Akai teaches this limitation in paragraph 235.

i. "a third sensor interface configured to receive a third signal from a third sensor arrangement of the third type;"

334. I fully discussed how Money teaches this limitation in paragraph 236.

j. "wherein the plurality of sensor interfaces are configured to output one or more signals indicative of physiological parameters sensed by the first, second, and third sensor arrangements;"

335. I fully discussed how Money teaches this limitation in paragraph 237.

k. "a display positioned on a face of the wearable physiological monitoring device configured to display information while the wearable physiological monitoring device is being worn by a patient;"

336. I fully discussed how Money in view of Akai teaches this limitation in paragraph 238.

l. "a processor configured to:"

337. I fully discussed how Money teaches this limitation in paragraph 239.

m. "responsive to the one or more signals indicative of the physiological parameters, cause to be displayed, on the display, physiological parameter measurements;"

338. I fully discussed how Money teaches this limitation in paragraph 240.

n. "combine information indicative of the one or more signals into a single digital word or bit stream; and;"

339. I fully discussed how Money in view of Taylor teaches this limitation in paragraphs 308-310.

o. "encode the single digital word or bit stream to generate a baseband signal;"

340. I fully discussed how Money teaches this limitation in paragraph 311.

p. "a transmitter configured to:"

341. I fully discussed how Money teaches this limitation in paragraph 312.

q. "modulate the baseband signal with a carrier to generate a transmit signal; and"

342. I fully discussed how Money teaches this limitation in paragraph 313.

r. "wirelessly transmit the transmit signal to a receiving patient monitoring device that is not wired to the wearable physiological monitoring device; and"

343. I fully discussed how Money teaches this limitation in paragraph 245.

s. "a battery configured to provide power to at least the processor, the display, the transmitter, and the first sensor arrangement via the first sensor communication port such that the wearable physiological monitoring device is portable and wearable by a patient."

344. I fully discussed how Money teaches this limitation in paragraph 246.

13. Dependent Claim 17: "The wearable physiological monitoring device of claim 16, wherein: at least one of the first, second, or third sensor interfaces is configured to process signals at least in part in the analog domain; and at least at different one of the first, second, or third sensor interfaces is configured to process signals at least in part in the digital domain."

345. I fully discussed how Money in view of Akai teaches this claim in paragraphs 247-248.

14. Dependent Claim 18: "The wearable physiological monitoring device of claim 17, wherein the first sensor arrangement comprises a pulse oximetry sensor configured to be attached to a digit of a patient."

346. I fully discussed how Money in view of Akai teaches this claim in paragraphs 249-250.

15. Dependent Claim 19: "The wearable physiological monitoring device of claim 18, wherein the first sensor port is positioned on a side of the wearable physiological monitoring device that faces a hand of a patient when the wearable physiological monitoring device is attached to an arm of the hand of the patient."

347. I fully discussed how Money teaches this claim in paragraphs 251-252.

16. Dependent Claim 20: "The wearable physiological monitoring device of claim 19, wherein the face of the wearable physiological monitoring device comprises a single user interface, and the single user interface comprises the display."

348. I fully discussed how Money teaches this claim in paragraph 253.

F. Ground 5: Claims 6-9 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of Goldberg, Kiani, Money, Taylor, and Hylton

1. Dependent Claim 6

a. "The portable monitor of claim 2, wherein the one or more processing devices comprise: a multiplexer configured to combine the information indicative of the plurality of signals into the single digital word or bit stream; and"

349. This claim limitation claims the well-known functionality of a multiplexer. All multiplexers do what is claimed. Thus, this limitation is merely claiming a multiplexer.

350. Hylton unequivocally teaches a multiplexer's function. EX1010, 14:24-26, 18:32-35. It would have been obvious to include a multiplexer in the portable device 100 of Goldberg so that the portable device 100 could combine

data from multiple sources for transmission as a single wireless communication, which Goldberg teaches at a higher level than the granular circuitry necessary to perform this function. EX1005, 4:41-49, 5:9-17; EX1008, 6:8-10; EX1010, 14:24-26, 18:32-35. A PHOSITA would know to use this common, electrical component to perform this electrical function.

b. "an encoder configured to encode the single digital word or bit stream to generate the baseband signal."

351. Taylor teaches a DSP that encodes the input data ("bitstream") using quadrature modulation. EX1009, 6:20-7:7. A PHOSITA would recognize that the DSP is an encoder or includes an encoder. Regardless, the DSP is performing the claimed functions and is, at worst, equivalent to an encoder.

2. Dependent Claim 7: "The portable monitor of claim 6, wherein the baseband signal comprises a single signal."

352. Taylor teaches a single baseband signal. EX1009, 6:20-7:7, 7:27-29.

3. Dependent Claim 8: "The portable monitor of claim 6, wherein the baseband signal comprises multiple related signal components including at least one of: in-phase signals or quadrature signals."

353. Taylor teaches that the baseband signal uses both quadrature and in-phase signals. EX1009, 6:20-7:7.

4. Dependent Claim 9: "The portable monitor of claim 6, wherein the transmitter is further configured to transmit on multiple frequency channels."

354. Taylor teaches multiple quadrature and in-phase signals channels. *Id*.

G. Ground 6: Claims 6-9 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of Money, Kiani, Akai, Taylor, and Hylton

1. Dependent Claim 6

a. "The portable monitor of claim 2, wherein the one or more processing devices comprise: a multiplexer configured to combine the information indicative of the plurality of signals into the single digital word or bit stream; and"

355. This claim limitation claims the well-known functionality of a multiplexer. All multiplexers do what is claimed. Thus, this limitation is merely claiming a multiplexer.

356. Hylton unequivocally teaches a multiplexer's function. EX1010, 14:24-26, 18:32-35. It would have been obvious to include a multiplexer in the monitor 10 of Money so that the monitor 10 could combine data from multiple sources for transmission as a single wireless communication, which Money already teaches. EX1008, 6:8-10.

b. "an encoder configured to encode the single digital word or bit stream to generate the baseband signal."

357. Taylor teaches a DSP that encodes the input data ("bitstream") using quadrature modulation. EX1009, 6:20-7:7. A PHOSITA would recognize that the DSP is an encoder or includes an encoder. Regardless, the DSP is performing the claimed functions and is, at worst, equivalent to an encoder.

2. Dependent Claim 7: "The portable monitor of claim 6, wherein the baseband signal comprises a single signal."

358. Taylor teaches a single baseband signal. EX1009, 6:20-7:7, 7:27-29.

3. Dependent Claim 8: "The portable monitor of claim 6, wherein the baseband signal comprises multiple related signal components including at least one of: in-phase signals or quadrature signals."

359. Taylor teaches that the baseband signal uses both quadrature and in-phase signals. EX1009, 6:20-7:7.

4. Dependent Claim 9: "The portable monitor of claim 6, wherein the transmitter is further configured to transmit on multiple frequency channels."

360. Taylor teaches multiple quadrature and in-phase signals channels. *Id*.

IX. CONCLUSION

361. For these reasons, it is my opinion that all claims of the '300 patent are unpatentable.

* * *

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed on this 28th day of May, 2020.

George E. Yanulis