UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GARMIN INTERNATIONAL, INC., GARMIN USA, INC., AND GARMIN LTD.

Petitioner

v.

PHILIPS NORTH AMERICA LLC,

Patent Owner

Inter Partes Review Case No. IPR2020-00910

U.S. Patent No. 7,088,233

DECLARATION OF DR. JOSEPH PARADISO

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I, Dr. Joseph Paradiso, declare as follows:

I. INTRODUCTION

1. I have been retained as an independent expert consultant in this proceeding before the United States Patent and Trademark Office ("PTO") regarding U.S. Patent No. 7,088,233 ("the '233 patent") (Ex. 1001).[1] I have been asked to consider, among other things, whether certain references disclose or suggest the features recited in claims 1, 7-10, 13-16, 22, 24-26 ("the challenged claims") of the '233 patent. My opinions are set forth below.

2. I am being compensated at my normal rate of $600/hour for the time I spend working on this proceeding. My compensation is not dependent on the nature of my findings, or the outcome of this proceeding or any other proceeding. I have no other interest in this proceeding.

[1] In this declaration, I refer to exhibit numbers that I understand are assigned to documents that will be attached with the petition for *Inter Partes* Review of the '233 patent.

II. QUALIFICATIONS

3. My qualifications for forming the opinions in this report are summarized here and explained in more detail in my curriculum vitae, which I understand is provided as Exhibit 1003.

4. I received a B.S. in electrical engineering and physics from Tufts University in 1977 and a Ph.D. in physics from the Massachusetts Institute of Technology (MIT) in 1981. Currently, I am the Alexander W. Dreyfoos (1954) Professor and Associate Academic Head in the Program in Media Arts and Sciences at the MIT Media Laboratory.

5. For over three decades, I have been involved with the research and development of sensor technology in a variety of applications. For example, after receiving my Ph.D., I was a post-doctoral researcher at the Swiss Federal Institute of Technology (ETH) in Zurich from 1981 to 1983, where I worked on sensor technology for high-energy particle physics. Following my post-doctoral position at ETH, I was a physicist at the Draper Laboratory until 1994, where I was a member of the Control and Decision Systems Directorate and Sensor and Signal Processing Directorate. There, my research encompassed spacecraft control systems, image processing algorithms, underwater sonar, and precision alignment sensors for large high-energy physics detectors.

6. In 1994, I joined the MIT Media Lab, a research laboratory, founded in 1985, that promotes a unique, cross-disciplinary culture and focuses on highly-collaborative research that joins seemingly disparate technological and academic fields. Researchers at the MIT Media Lab have pioneered areas such as wearable computing, tangible interfaces, and affective computing, which has led to numerous products and platforms that have become a ubiquitous part of consumer life today. Examples of technologies that have spun off from the Media Lab's research include e-readers, such as the Amazon Kindle and Barnes & Noble Nook, the popular video game Guitar Hero, the MPEG-4 structured audio format, the first bionic lower-leg system for amputees, wireless mesh networks developed by Nortel, and the Mercury RFID Reader, commercialized by spin-off ThingMagic. Today, the Lab is supported by more than 80 members, including some of the world's leading corporations that represent the fields of electronics, entertainment, fashion, health care, toys, and telecommunications, among others. Currently, faculty members, research staff, and students work in over 25 research groups and initiatives on more than 450 projects that range from digital approaches for treating neurological disorders, to advancing imaging technologies that can "see around a corner," to the word's first "smart" powered ankle-foot prosthesis.

7. When I joined the Media Lab, I focused on developing new sensing modalities for human-computer interaction, which, by 1997, evolved into wearable

and non-wearable wireless sensing and distributed sensor networks to measure movement activity. This work anticipated and influenced transformative products and industries that have blossomed in recent years.

8. For example, in 1997, I developed a shoe with wireless sensors for measuring dynamic movement of the human foot during, for example, interactive dance and other physical activities. The shoe was intended to capture motion data, which were mapped into different information representations to facilitate interactivity. The design of this sensor-laden wireless shoe is now recognized as a watershed in the field of wireless sensing for activity tracking and was an inspiration for the Nike+, one of the very first activity trackers and the first commercial product to integrate dynamic music with monitored exercise. My team went on to pioneer on-shoe sensor architecture for clinical gait analysis in collaboration with the Massachusetts General Hospital (MGH) in 2002. We then worked in sports medicine with another MGH collaboration that developed an attachable, ultra-wide-range, wireless inertial measurement unit system for evaluating professional baseball pitchers and batters in 2007.

9. Leading to over 300 publications, at least 17 issued patents, and a string of awards in the Pervasive Computing, Human-Computer Interaction, and sensor network communities, my research has become the basis for widely established curricula. Many of these publications are directed to fixed, wearable, or portable

sensor devices. I have also advised over 55 graduate (M.S. and Ph.D.) theses for students who have done their work in my research group, and served as a reader for roughly 100 M.S. and Ph.D. students in other groups and at other universities.

10. I have given over 300 invited talks, panel appearances, and seminars worldwide, recently keynoting on topics relating to ubiquitous sensing and the Internet of Things (IoT) for prestigious venues ranging from the Sensors Expo (the main industrial sensors conference) to the World Economic Forum. I am frequently asked to address industrial groups on sensing systems and IoT. For example, I recently gave the opening keynote at IoT Solutions World Congress in Barcelona, the leading Industrial IoT event, and I have been on the Editorial Board (and have served as Associate Editor in Chief) of IEEE Pervasive Computing Magazine (the original flagship publication in this area) since 2006. I often engage with the Media Lab's extensive list of industrial partners in strategizing these areas.

11. I also belong to and participate in numerous professional organizations. I am a senior member of the Institute of Electrical and Electronics Engineers (IEEE), and also belong to the Association for Computer Machinery (ACM). I also belong to the American Physical Society (the major professional society in physics), and am a senior member in the American Institute of Aeronautics and Astronautics (AIAA). Within the IEEE, I belong to the Signal Processing Society, the Controls Society, and the Computer Society. I have served on many Technical Program

Committees (which solicit, review, and select papers for academic conferences) and journal editorial boards. I have also organized academic conferences in areas such as wireless sensor networks, wearable computing and wearable sensing, human-computer interfaces, ubiquitous computing, and the like.

III. SUMMARY OF OPINIONS AND MATERIAL CONSIDERED[2]

12. All of the opinions contained in this declaration are based on the documents I reviewed and my professional judgment, as well as my education, experience, and knowledge regarding computer networking. I am not an attorney and I am not offering any legal opinions in this declaration.

13. In forming my opinions expressed in this declaration, I reviewed:

- the ’233 patent (Ex. 1001);
- the prosecution file history for the ’233 patent (Ex. 1004);
- U.S. Patent No. 6,198,394 (“*Jacobsen*”) (Ex. 1005);
- U.S. Patent No. 6,175,752 (“*Say*”) (Ex. 1006);
- U.S. Patent No. 6,602,191 (“*Quy*”) (Ex. 1007);

[2] My citations to non-patent publications are to the original page numbers of the publication, and my citations to U.S. Patents or Patent Applications are to the column:line number or paragraph number, as applicable.

- U.S. Patent No. 6,366,871 ("*Geva*") (Ex. 1008);
- Kaveh Pahlavan, Ali Zahedi, and Prashant Krishnamurthy, "*Wireband Local Access: Wireless LAN and Wireless ATM*," IEEE Communications Magazine, Vol. 35 Issue 11, November 1997, pgs. 34-40 (Ex. 1009);
- Paradiso, J.A., Hsiao, K., Benbasat, A. and Teegarden, Z., "*Design and Implementation of Expressive Footwear*," IBM Systems Journal, Vol. 39, No. 3&4, October 2000, pp. 511-529 (Ex. 1010);
- Paradiso, J.A. "*The Brain Opera Technology: New Instruments and Gestural Sensors for Musical Interaction and Performance*," Journal of New Music Research, 28(2), 1999, pp. 130-149 (Ex. 1011);
- Specification of the Bluetooth System, Vol. 1, Bluetooth v1.0B (Dec. 1, 1999) (Ex. 1012);
- Provisional application No. 60/105,493 (Ex. 1013);
- Provisional application No. 60/135,862 (Ex. 1014);
- Provisional application No. 60/279,401 (Ex. 1015);
- Digital Networks' "*RoamAbout 2.4 GHz frequency hopping wireless LAN adapters*" (1996) (Ex. 1018);

- Shawn Willett, "*Digital ships tools for mobile clients*," InfoWorld, February 7, 1994 (Ex. 1019);
- U.S. Patent No. 5,961,451 ("*Reber*") (Ex. 1020);
- Distributed Sensor Networks, Proceedings of a Workshop held at Carnegie-Mellon University December 7-8, 1978 (*available at* https://resenv.media.mit.edu/classarchive/MAS961/readings/DSN_CMU_1978.pdf) (Ex. 1021);
- 'Sensor networks: evolution, opportunities, and challenges," IEEE Proceedings, Aug. 2003 (Ex. 1022);
- Mark Weiser, "*The Computer for the 21st Century*," Scientific American (1991) (Ex. 1023);
- Richard S. Johnston et al., "*Biomedical Results of Apollo*" (1975) (*available at* http://history.nasa.gov/SP-368/sp368.htm) (Ex. 1024);
- Steve Mann, "*Wearable computing: A first step toward personal imaging*", IEEE Computer vol. 30 no. 2, pgs. 25-32 (Feb. 1997) (Ex. 1025);
- Steve Feiner, "*A Touring Machine: Prototyping 3D Mobile Augmented Reality Systems for Exploring the Urban Environment*," Personal Technologies, pgs. 208-217 (1997) (Ex. 1026);

- Kris Goodfellow, One Digital Day in Her Life, N.Y. Times, Apr. 16, 1998 (*available at:* http://www.nytimes.com/1998/04/16/technology/one-digital-dayin-her-life.html) (Ex. 1027);
- Maria S. Redin, "Marathon Man" thesis, MIT Media Laboratory, June 15, 1998 (Ex. 1029);
- Brian Clarkson and Alex Pentland, "*Predicting Daily Behavior via Wearable Sensors*," Technical report, MIT Media Laboratory, July 2001 (*available at* https://pdfs.semanticscholar.org/2fd4/7fe8b3c65bfb32ffe91c616869e071c4894a.pdf) (Ex. 1031);
- Brian Clarkson and Alex Pentland, "*Unsupervised Clustering of Ambulatory Audio and Video*," ICASSP, March 1999 (Ex. 1032);
- Joseph Paradiso, "*Expressive footwear for computer-augmented dance performance*," ISWC '97: Proceedings of the 1st IEEE International Symposium on Wearable Computers, October 1997 (Ex. 1033);
- Robert Poor, "*Hyphos: A Self-Organizing, Wireless Network*," MIT Master's thesis, 1997 (Ex. 1034);

- Per Johansson et al., "*Short Range Radio Based Ad-hoc Networking: Performance and Properties*," ICC'99, 1999 (Ex. 1036);
- Application no. 09/384,165 (Ex. 1038);
- U.S. Patent No. 6,160,986 ("*Gabai*") (Ex. 1040);
- U.S. Patent No. 6,026,165 ("Marino") (Ex. 1041);
- U.S. Patent No. 5,408,250 ("Bier") (Ex. 1042)

My opinions are additionally guided by my appreciation of how a person of ordinary skill in the art would have understood the claims of the '233 patent at the time of the alleged inventions.

14. Based on my experience and expertise, it is my opinion that certain references disclose or suggest all the features recited in claims 1, 7-10, 13-16, 22, 24-26 of the '233 patent.

IV. LEVEL OF ORDINARY SKILL IN THE ART

15. At the time of the alleged inventions a person of ordinary skill in the art ("POSITA") would have had at least a B.S. in computer science, electrical engineering, or an equivalent, and at least two years of experience in the relevant field, i.e., wireless communications. More education can substitute for practical experience and *vice versa*. I apply this understanding in my analysis herein.

16. In determining the level of ordinary skill, I have considered, for example, the types of problems encountered in the art and prior solutions to these

problems, the rapidity with which innovations are typically made, the sophistication of the technology, and the educational level and experience of workers in the field.

17. My analysis of the ’233 patent and my opinions in this declaration are from the perspective of a POSITA, as I have defined it above, during the relevant time frame (*see* section VI.B). During this time frame, I possessed at least the qualifications of a POSITA, as defined above.

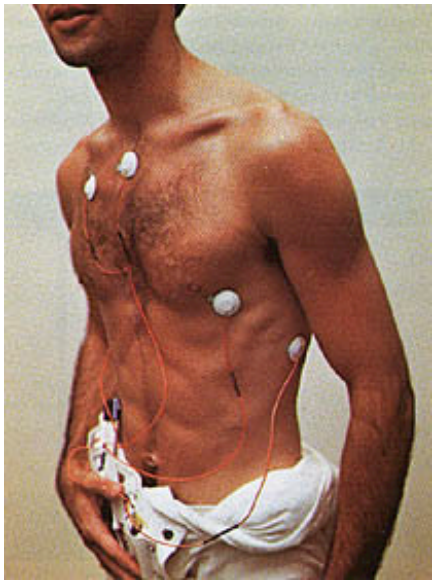
V. TECHNOLOGICAL BACKGROUND

18. In this section, I provide an overview of certain technologies, systems, and concepts that were known in the art at or before the dates of the alleged inventions of the ’233 patent. I believe the technologies and concepts I describe below were widely known and appreciated by POSITAs at or before that time. I rely on at least the discussions below (including references cited therein) to demonstrate the state of the art known to POSITAs at that time, which supports my opinions and analysis regarding the ’233 patent and my opinions and analysis provided in section IX.

A. Electronic sensing and computer networks in the 1970s and 1980s

19. Personal monitoring with electronic sensors has been well-known since at least the second half of the 20th century. Early examples of practical electronic sensing in the context of personal monitoring grew out of NASA’s space program. Crewman of the Apollo missions, for example, “wore a biosensor harness which

provided a means of transmitting critical physiological data to the ground." Ex. 1024, 61. The harness, which provided "real-time telemetry of vital biomedical information," included sensors for obtaining an "electrocardiogram, heart rate, and respiratory pattern and rate data." *Id.* The wearable sensors also included sensing means for recording and transmitting media: "Voice communications and real-time television observations, coupled with monitoring of the vital signs, provided the medical basis for an inflight clinical profile of the Apollo astronauts." *Id.* The data obtained from wearable sensors was displayed on remote monitors at the launch and at mission control centers. *Id.*; *see also id.* at 485-93.



Example of a biobelt from the Apollo missions being worn with the electrode sensors in place. Id. at 491

Around the same time, advancements in computer networking research were yielding practical applications. The precursor for the Internet—i.e., ARPANET—was built by DARPA and successfully implemented in the late 1960s.

20. The combination of the distributed sensors and computer networking, i.e., sensor networks, were gestated mainly under DARPA funding, starting in the 1970s. *See* Ex. 1021. These sensor networks were described as "a group of sensor devices connected by a communications networking trying to achieve a common goal—deriving an accurate world picture." *Id.* at 38. As compact wireless networking technologies and capable microcomputer scaling were still fairly undeveloped at that time, these systems were mainly wired or hypothetical until the 1990s, when building practical wireless systems began to be feasible. Again, much of this work was spurred by DARPA, this time under its SensIT program. Many papers from this program appeared in the 90s and made their way into the popular press at the time. *See e.g.*, Ex. 1022.

21. The idea of ubiquitously networking artifacts of daily life to form a new paradigm in Human-Computer Interfaces was first and famously elucidated by Mark Weiser of Xerox PARC in his visionary article 'The Computer for the 21st Century' published in Scientific American in 1989. Ex. 1023. This article spoke of what Weiser called Ubiquitous Computing, where processing, networking and sensing would be in essentially everything, fundamentally changing the way we interact with

things and information. Weiser punctuates the article with examples drawn from his group at PARC that pointed at possibilities extrapolated from the technology available at the time. This article (and the enormous flood of research that it inspired) foreshadowed the Internet of Things.

B. Communicatively-coupled portable and wearable computing in the 1990s

22. By the 1990s, researchers had begun development of the concept of wearable computing. These pioneers were living in a world of distributed sensing, interface, and display, all arrayed on-body. They believed even then that the future of computing was to be up close and personal, always on, and with capabilities at the right place—*e.g.*, a display at the eyes and an interface near the hands, ubiquitously networked to nearby and remote artifacts and resources with wireless and cellular links, etc. These researchers did not just speculate, patent, or write about it these concepts; they developed and lived with these systems. Several of them were close colleagues of mine at the MIT Media Lab at the time (*see* image below). Steve Mann, now a longstanding professor at the University of Toronto, was (and still is) one of the field's most poignant visionaries, and Thad Starner, now a professor at Georgia Tech, went on to be one of the chief developers of Google Glass. Steve Mann traces his fielded wearable systems back to 1980 in his landmark survey article "Wearable computing: A first step toward personal imaging", IEEE Computer Feb.

1997. Ex. 1025. Steve's wearable rig back then incorporated many of the challenged claims' features, including wearable user interfaces, heart-rate and other monitors, GPS and other localization systems, and a variety of wireless links.

MIT Wearable Computing Evangelists outside the Media Lab in the mid 90s – note Steve Mann at left and Thad Starner at right.

23. The MIT Media Lab's wearable researchers openly published and posted profusely during the 1990s, and many of their papers (and selected papers from other groups) are listed and linked on the Media Lab's website. *See* http://www.media.mit.edu/wearables/papers.html.

24. The Media Lab hosted the world's first conference dedicated to Wearable Computing (ISWC) at MIT back in October of 1997, an event that is continuing to this day. One of many papers of note at the 1997 symposium was written by Prof. Steve Feiner and his team from Columbia University: 'A Touring Machine: Prototyping 3D Mobile Augmented Reality Systems for Exploring the Urban Environment'. Ex. 1026. This paper describes classic, well-known pioneering

work in mobile augmented reality, where his subjects would walk around Manhattan with a wearable computer then in a backpack, coupled to a separate GPS receiver, and including a "head-tracked, see-through, headworn, 3D display, and an untracked, opaque, handheld, 2D display with stylus and trackpad" with a RF wireless network link. A comprehensive history of significant mobile AR research and development is presented here: https://www.icg.tugraz.at/~daniel/HistoryOfMobileAR/

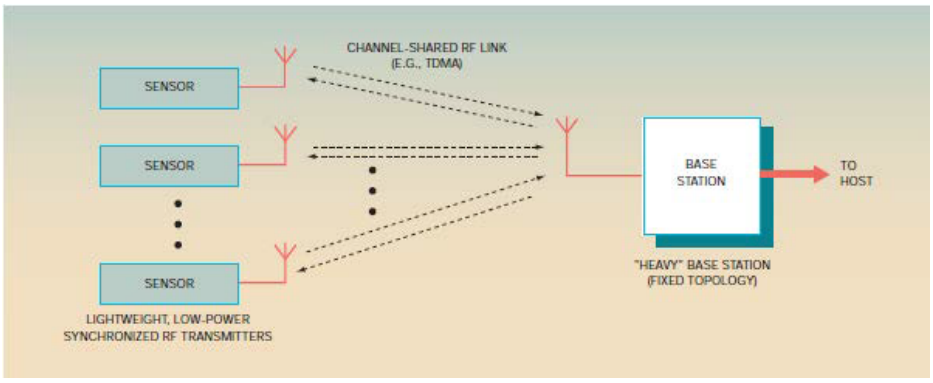
25. The wearable community also explored physiological and health-related monitoring in their prototype systems back in the 1990s. In addition to Mann, researchers like Rosalind Picard (Mann's advisor) and Dr. Jenn Healey used distributed biosensors in wearable systems for pioneering research in affective computing and e-health. Dr. Healey's work on affective wearables was featured in the New York Times. *See* Ex. 1027. Dr. Picard's group web page from 1997 includes articles on many other related projects conducted by the group around this time, including those using a multiplicity of biosensors and incorporating a variety of interface and graphing devices, including Palm Pilots and early tablet computers like the iPAQ. *See* http://affect.media.mit.edu/areas.php.

26. Prof. Mike Hawley's Personal Information Architecture research group at the MIT Media Lab was also building wearable computers for physiological sensing and dynamic tracking of athletes. His 'Marathon Man' project from 1997

equipped marathon runners with a wearable system that sensed heart rate, step cadence, core body temperature, and GPS position with a frequent data offlink via a cellphone or cellular modem to a remote internet-connected control center, where collaborators could plot the runners' progress at frequent updates together with sensor state and communicate back to them. *See* 1029.

27. Much of the early research in wearable and ubiquitous computing during the late 1990s explored context and activity recognition, fusing multiple sensors in the user's environment (wearable and/or fixed), including audio, video, and acceleration, physiological sensing, etc. Early examples here came from the many students in Professor Sandy Pentland's group at the MIT Media Lab. One example can be found in the research of Brian Clarkson, whose work I followed closely (as I was on his Ph.D. committee). Dr. Clarkson built and lived for an extended period with a wearable computer featuring many sensors, already by 2000 featuring a camera, microphone, and touch pad for annotation (his subsequent systems incorporated even more sensors). The aim of his work was to build systems that could determine context by tagging media and data with other data. Although his summary publication 'Predicting Daily Behavior via Wearable Sensors,' was publicly posted in July 2001 (Ex. 1031) his work was already well known, as he published beforehand (*see e.g.*, Ex. 1032) and was covered in the popular press.

28. My own work in this field sprouted from the intersection of wearable sensing and wireless sensor networks. My first of many well-known projects here was a shoe for a dancer that enabled users to produce interactive music. *See* Ex. 1033. Sensing 16 different parameters per foot, and streaming them from both feet to a base station in real time, this system likewise anticipated aspects of the patents discussed. The first paper on this system was published at ISWC in 1997 (*see id.*) and after several other open publications, a comprehensive paper on the system was published in the IBM Systems' Journal in October 2000. Ex 1010. This was a landmark project in wearable wireless sensing. As Nike was a research sponsor of my laboratory back then, I had several interactions during this project with members of the team that went on to develop the Nike+. My group leveraged our capability in wearable sensors to subsequently evolve early systems for wearable gait analysis and multimodal, multipoint wireless inertial sensors for baseball pitchers and batters, a collaborative project with the doctors working with the Boston Red Sox.



Ex. 1010, Fig. 13.

C. Wireless personal area networks

29. By the late-1990s, wireless personal area networks were common knowledge. For example, groups like the IEEE's WPAN were defining a standard for a low-power personal network that would be suitable for wearables (this evolved into 802.15.4 and eventually Zigbee). This group was started by Dick Braley of FedEx in 1997, who was motivated by the wearable research at the MIT Media Lab. He envisioned the FedEx delivery worker of the future to be equipped with a modular distributed wearable system instead of a bulky tablet.[3] Various sensor network topologies were already well-realized, including mesh networking, examples of which can be found in Rob Poor's 1997 MIT Media Lab PhD thesis. *See* Ex. 1034. Already by 1998, it was publicly known that companies like Cambridge Silicon Radio were developing Bluetooth and other radios with embedded processors that could be used to host applications.

30. There was also, of course, Bluetooth. Bluetooth is a wireless communication link, operating in the unlicensed ISM band at 2.4 GHz using a frequency hopping transceiver. It allows real-time voice and data communications between Bluetooth Hosts. In other words, it is a type of close range wireless network that eliminates the need for people to configure one specific device to work with

[3] I participated in its early meetings.

another. Instead, any Bluetooth-enabled device can connect to any other Bluetooth-enabled device wirelessly without requiring any device-specific configuration. Because the Bluetooth specification is an open, global specification, it is an ideal candidate to enable the device-to-device communications necessary in a personal area network, or "PAN".

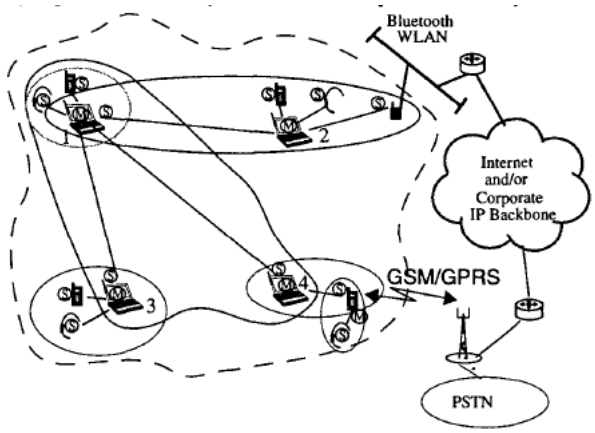
31. The development of Bluetooth and its release in 1999 was well known and common knowledge among those of skill in the art. Bluetooth was originally conceived in 1994 by Ericsson Mobile Communications as an alternative to the cables that connected their mobile phones to accessories. The RF technology used by Ericsson provided a couple advantages over the infra-red links previously used between handsets and devices. First, radio waves are not directional and do not require line of sight to communicate. Thus, two devices communicating through RF technology do not need to be oriented in a specific direction or location relative to one another. Second, radio waves penetrate many objects that reflect infra-red. This allows RF technology to pass through many common obstacles such as clothing, bodies, walls, doors, and plastic casings.

32. RF technologies utilize precisely tuned transmitters and receivers in order to send and accept radio waves of a specific frequency. Because the usable radio frequency space is finite, governments partition the frequency ranges and regulate their use. However, through multinational agreement, the 2.4 GHz spectrum

requires no license for its use anywhere in the world. This is the frequency in which Bluetooth operates.

33. At least as early as December 1999 (*see* Ex. 1012), POSITAs recognized Bluetooth's potential for dozens of applications related to PANs, such as allowing mobile devices to be broken up into components in order to create tiny access nodes that could easily fit in wearable devices. This concept of breaking a device down into its modular constituent parts so that they might be conveniently worn by a user is a principle behind wearable computing.

34. Early adopters of Bluetooth recognized its suitability for linking together a variety of separate devices in order to allow them to operate and communicate with one another through a PAN. Given Bluetooth's ease of interoperability, the array of devices that could be configured to communicate and work together in a PAN—*e.g.*, cameras, camcorders, audio input and output devices, cellular phones, keyboards and other data input devices, and personal computers—would have been immediately apparent to a lay person familiar with Bluetooth's capabilities. *See* Ex. 1036 ("Networks using an ad-hoc configuration concept can be used in a large collection of military applications, ranging from … to networks of wireless devices carried by individuals. The latter is often referred to as a *Personal Area Network*, *PAN,* and could consist of a digital map, body sensors, voice communication, etc.").



Ex. 1036, Figure 5

D. Applicant's admitted prior art

35. In the "Background of the Invention" section of the '233 patent's specification, the inventors admit that personal health monitoring devices and systems had already been developed and were already in use in the prior art. *See* Ex. 1001, 1:20-57

36. For example, the specification states that the delivery of medical services was changing in the art due to "trends" such as "longer lifespan, medical technology improvements, automation of diagnostic processes, specialization of caregivers, the rapid pace of technology that causes a shortening of the amortization of development and investment costs, increasing expense of medical care centers, and the shortage of health care workers." *Id.* at 1:30-35.

37. These "trends" had already spurred numerous changes in the provision of medical care, including:

- "moving more of the delivery services out of a medical center and away from the direct super vision of highly trained medical personnel"
- "providing personal medical devices to allow long-term patients to resume a more mobile lifestyle"
- "allowing patients to be treated from home for issues of cost and comfort"
- "reducing the level of training associated with caregivers so that in some cases, even a casual passerby is able to provide meaningful assistance with devices once associated only with properly trained medical personnel, for example using Portable Automated Defibrillators." *Id.* at 1:36-47

38. The '233 specification also admits that many short-range bidirectional wireless communication schemes were known in the art. *See id.* at 4:45-6:16. In fact, any known "RF system that conforms to FCC requirements and power requirements may be used" in the invention. *Id.* at 4:47-48; *see also id.* at 4:60-63 ("Of course, other suitable wireless communication standards and methods now existing or developed in the future are contemplated in the present invention"); 5:10-13 ("In one embodiment, the present system includes a transceiver in compliance with standards established, or anticipated to be established, by the Institute of Electrical and Electronics Engineers, Inc., (IEEE)"). This includes the admittedly-known Bluetooth standard: "The BLUETOOTH standard was developed by the Bluetooth

Special Interest Group ("BSIG"), a consortium formed by Ericsson, IBM, Intel, Nokia, and Toshiba." *Id.* at 4:53-56.

39. The '233 specification admits that long-range bi-directional wireless communication schemes were known in the art. *See id.* at 6:17-7:52. For example, the invention could utilize: "cellular communications network[s]," "paging network[s]," "satellite network[s]," "wideband or narrowband PCS network[s]," "wideband or narrowband trunk radio module[s]," or any other "consumer or proprietary network designed to serve end users in range of the detection system, including but not limited to a cellular network such as analog or digital cellular systems employing such protocols and designs as CDPD, CDMA, GSM, PDC, PHS, TDMA, FLEX™, ReFLEX™, iDEN™, TETRA™, DECT, DataTAC™, and Mobitex™, RAMNET™ or Ardis™ or other protocols such as trunk radio, Microburst™, Cellemetry™, satellite, or other analogue or digital wireless networks or the control channels or portions of various networks." *Id.* at 6:23-59.

40. The '233 specification also admits that security mechanisms governing the transmission of data were known in the art at the time of invention. *See id.* at 13:24-14:14. For example, "standard encryption algorithms" may be used to encrypt "data transmitted to and from" the claimed personal device. *Id.* at 13:43-46. The specification also incorporates by reference prior art references that describe known authorization strategies. *Id.* at 14:11-14.

VI. THE '233 PATENT

A. Overview

41. The '233 patent, titled "Personal Medical Communication System and Method" is generally directed to a bi-directional communication system. Ex. 1001, Title. The '233 patent describes a "personal medical device (PMD) 100" including at least one "wireless communications module 300" and "detector inputs 140":

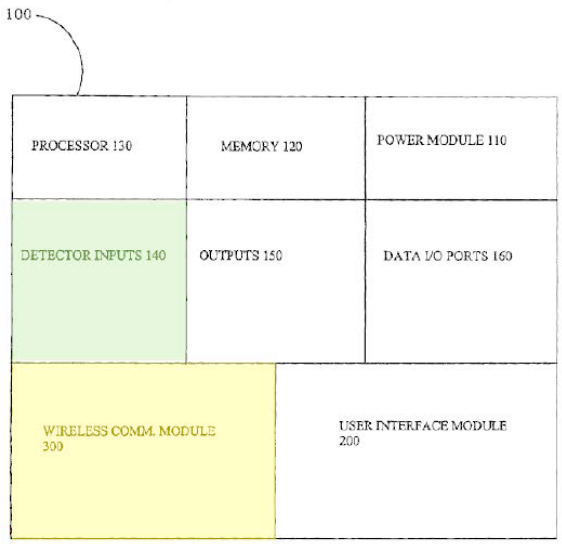


FIG. 2

Id. at FIG. 2, 2:40-41[4]

The wireless communications module 300 allows the PMD to communicate with another device using known short-range wireless communications. *Id.* at 3:54-58. The "detector inputs 140" allows for "connections to related external or embedded"

[4] All emphasis and annotations are added unless stated otherwise.

detectors 140, which may be "any sensor or bodily or physiological parameters." *Id.* at 3:27-30. As I discussed in section V, before the alleged invention of the '233 patent, devices that contained connections to sensors were well-known in the art.

42. The '233 patent describes different wireless communications paths the PMD 100 may participate in. *Id.* at 4:10-13. For example, the PMD 100 may communicate with "personal wireless device (PWD) 500" through a short-range "local area wireless (LAW) 330" scheme, which may include infrared or radio frequency (RF). *Id.* at 4:14-18, 4:45-6:16. The PMD 100 may also communicate with a "central communication base station 700" which may "serve to extend the communication range of the" PMD 100. *Id.* at 8:40-63. As I discussed in section V, before the alleged invention of the '233 patent, systems including sensor devices communicatively coupled to other devices were known in the art, as were short-range communication schemes, including wireless personal area networks.

43. The '233 patent also describes that the communications schemes may utilize a security mechanism, because the ability "to receive and/or transmit to and control the personal device 100 requires some measure of security." *Id.* at 13:27-30. The '233 patent describes many "possible embodiments of security [that are] not meant to be exclusive," including employing "standard encryption algorithms," entering a "security key," pre-authorizing access for certain users, or asking a third-party for permission to access the device. *See id.* at 13:24-14:14. As I discussed in

section V, the security mechanisms disclosed in the '233 patent include many well-known and previously-used security mechanisms.

B. Priority claims for the '233 patent[5]

44. I have been told that a claim is not entitled to a priority date of an earlier application to which it claims priority unless that earlier application provides adequate written description support for that claim. I have been informed that to provide written description support for a claim, the patent application to which priority is claimed must describe the claimed invention in a manner that one of ordinary skill in the art would know that the patentee had possession of the full scope of the claimed invention at the time of the patent application. I understand that Provisional application No. 60/105,493 ("the '493 provisional"), which was filed on October 23, 1998, is the earliest application in the '233 patent's priority chain. Ex. 1001, cover; Ex. 1013. For purposes of this proceeding, I have been asked to assume the priority date of challenged claims 1, 7-10, 14-16, 22, and 26 is October 23, 1998.

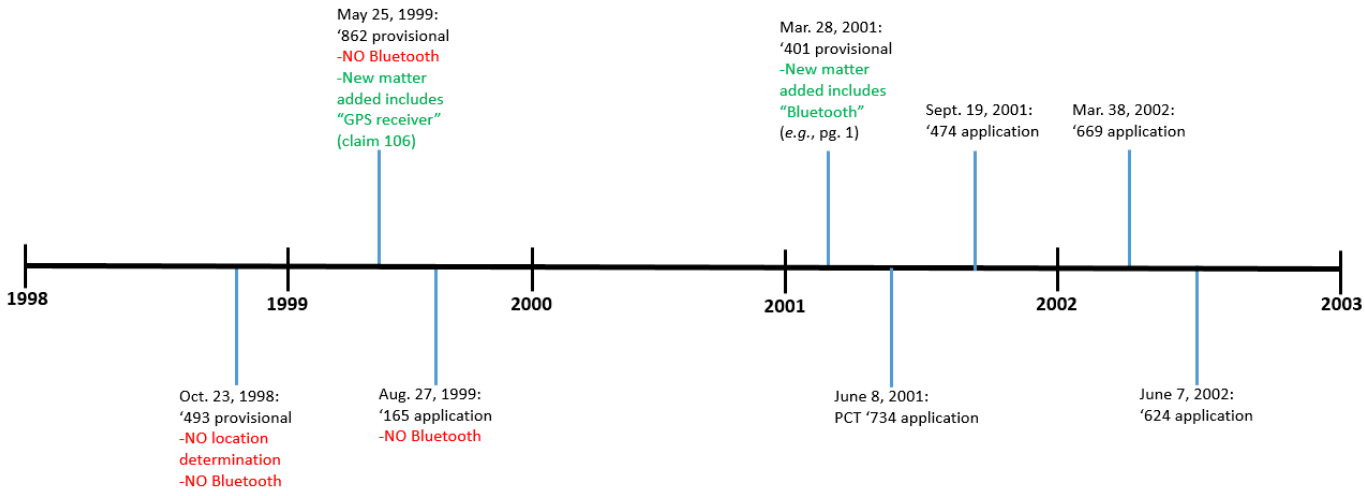
[5] None of my assumptions or the priority dates I assign in this section should be taken as an admission that any challenged claims are supported by the disclosure of a particular application in the '233 patent's priority chain.

45. I have been asked to review the '493 provisional to determine whether it provides written support for challenged claims 13 and 24-25. I believe it does not. For example, challenged claim 13 recites "BLUETOOTH technology." The '493 provisional does not describe or refer to Bluetooth technology. *See id.* Ex. 1013. This makes sense, as the first Bluetooth specification was not released until December 1999. *See* Ex. 1012. Challenged claim 24 (and its depending claim 25) recites a "location determination module." The '493 provisional does not disclose such a module or any method for obtaining location information for the claimed personal device. *See generally* Ex. 1013.

46. As the '493 provisional does not provide written description support for claims 24-25, I have been asked to assume the priority date for challenged claims 24-25 is May 25, 1999, which is the filing date of provisional application No. 60/135,862 ("the '862 provisional"). Ex. 1001, cover; Ex. 1014. The '862 provisional is the second oldest application (after the '493 application, which does not provide written support for at least claim 24-25's "location determination module") in the '233 patent's priority chain. Ex. 1001, cover.

47. I have been asked to review the '862 provisional to determine whether it provides written support for challenged claim 13. I believe it does not. For example, claim 13 recites "BLUETOOTH technology." The '862 provisional does not describe or refer to Bluetooth technology. *See generally* Ex. 1014. This makes

sense, as the first Bluetooth specification was not released until December 1999. *See* Ex. 1012. I have also been asked to review the third oldest application in the '233 patent's priority chain, application No. 09/384,165 ("the '165 application"), to determine whether it provides written support for challenged claim 13. Ex. 1001, cover. I believe it does not. Claim 13 recites "BLUETOOTH technology," and the '165 application does not describe or refer to Bluetooth technology. *See generally* Ex. 1038. Therefore, I have been asked to assume the priority date for claim 13 is March 28, 2001, which is the filing date of Provisional Application No. 60/279,401 ("the '401 provisional"). This is consistent with my review of the '233 patent's priority chain, as the '401 provisional is the first to mention "Bluetooth technology." *See* Ex. 1015, 1-2.



VII. CLAIM CONSTRUCTION

48. I understand that when considering the meaning of claims subject to *inter partes* review, one must consider the claim language, in addition to the patent specification and its prosecution history. I understand that claim terms are usually construed in accordance with their ordinary and customary meanings, as would have been understood by a POSITA at the time of invention. For my opinions in this declaration, I have been asked to consider the challenged claims under their plain and ordinary meanings as understood by a POSITA at the time of the alleged invention, and I have applied the above principles in forming my opinions provided in this declaration.

A. "means for signaling the bi-directional communications module to transition from the powered-down state to the powered-up state"

49. Challenged claim 26 recites this phrase. I understand that Petitioner has offered that, if the Board determines this phrase is subject to § 112(f), the function is "signaling the bi-directional communications module to transition from the powered-down state to the powered-up state," and the associated structure for the claimed function is components capable of providing a magnetic, mechanical, sound or ultrasound, infrared, or radio frequency signal, and structural equivalents thereof.

50. I agree that this construction is consistent with the '233 patent's claims and specification. For example, the specification explains a number of mechanisms

/ components used for signaling the bi-directional communications module to transition from the powered-down state to the powered-up state:

> In a number of scenarios, the power consumed by the personal device 100 is critical. For example, it the personal device 100 is implanted in a human being, long battery life is essential.
>
> Although some communications systems, such as BLUETOOTH, have low power consumption states, nevertheless power is being consumed. Further, in an environment such as BLUETOOTH, a BLUETOOTH transceiver that is powered on may constantly be wakened from the low power states whenever a transmission is received from another BLUETOOTH transceiver.
>
> It is therefore an important aspect of the present invention to provide a completely powered-off state for the bi-directional communications module, and for a means of signaling the bi-directional communications module to transition from the powered-off state to the powered-on state. The transceiver must consume no power in the powered-off state.
>
> A number of mechanisms for doing this signaling are possible. First, a mechanical signal, such as throwing a switch or applying pressure to a pad, may be used. Second, a magnetic signal may be used, as in passing a magnet in the vicinity of the communications module. Third, sound or ultra-sound may be used. Fourth, infrared may be used provided there is a direct line of sight to the communications module. Sixth, [*sic*] radio frequency may be used, which has the advantage of not requiring like of sight to the communications module. *Id.* at 14:16-43.

The claims also describe mechanical, magnetic, sound or ultra-sound, infrared, or radio frequency mechanisms for signaling the bi-directional communications module to transition from the powered-down state to the powered-up state:

> 26. The system of claim 1, wherein the bi-directional communications module has a powered-down state and a powered-up state, and further comprising a means for signaling the bi-directional communications module to transition from the powered-down state to the powered-up state.
>
> 27. The system of claim 26, wherein the means for signaling is mechanical.
>
> 28. The system of claim 26, wherein the means for signaling is magnetic.
>
> 29. The system of claim 26, wherein the means for signaling is sound or ultra-sound.
>
> 30. The system of claim 26, wherein the means for signaling is infrared.
>
> 31. The system of claim 26, wherein the means for signaling is radio frequency.

Although I believe Petitioner's proposed construction is consistent with the '233 patent, I believe that the prior art discloses and/or suggests the challenged claims under any reasonable interpretation of this term and the remaining terms in the claims.

VIII. OVERVIEW OF THE PRIOR ART

A. Jacobsen

51. U.S. Patent No. 6,198,394 ("*Jacobsen*") was filed on December 5, 1996 and issued on March 6, 2001. Ex. 1005, cover. I am told it is thus prior art to all challenged claims under at least 35 U.S.C. § 102(e), and prior art to challenged claim 13 under at least 35 U.S.C. §§ 102(a) and (e).

52. *Jacobsen*, titled "System for Remote Monitoring of Personnel," generally relates to tracking physiological and location data obtained from personal devices and transmitting this data to devices at both nearby and remote locations. *Id.* at Abstract.

53. *Jacobsen's* system contemplates individuals wearing various devices, including: a wearable apparatus including a "soldier unit 50" and other components; an "integrated sensor unit 14"; and a "wrist/sensor display unit 18."

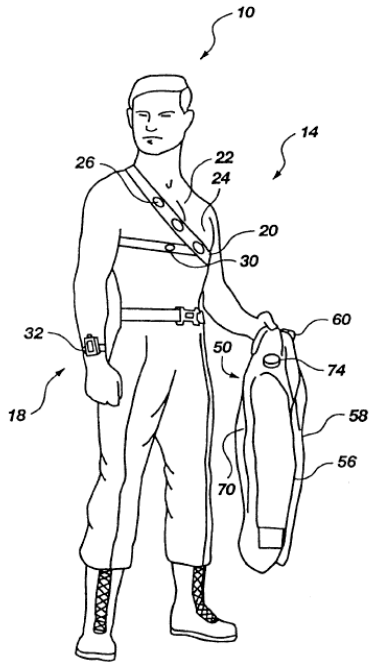


Fig. 1

Id. at FIG. 1, 5:66-7:2

54. *Jacobsen's* Figure 4 provides a more detailed view of a "vest/harness configured for holding the soldier status unit"

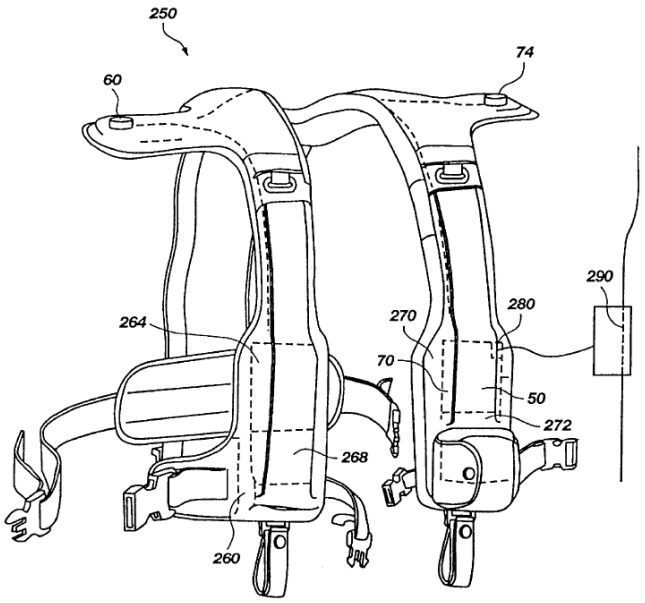


Fig. 4

This figure illustrates the components contained within the vest/harness configured for holding soldier unit 50. This "vest 250" has one pocket which receives "radio 264," and "battery pack 268." *Id.* at 9:50-56. This radio 264 is connected to "antenna 60" for wireless communications. *Id.* at 9:56-57. In a second pocket, the vest 250 contains a second battery pack 272 and the soldier unit 50. *Id.* at 9:58-59. The vest 250 also contains a global positioning system 70. *Id.* at 9:61-65.

55. *Jacobsen's* system also includes a wearable "wrist sensor/ display unit 18" and "integrated sensor unit 14." Figure 3 provides a perspective view of the wrist sensor/display unit 18:

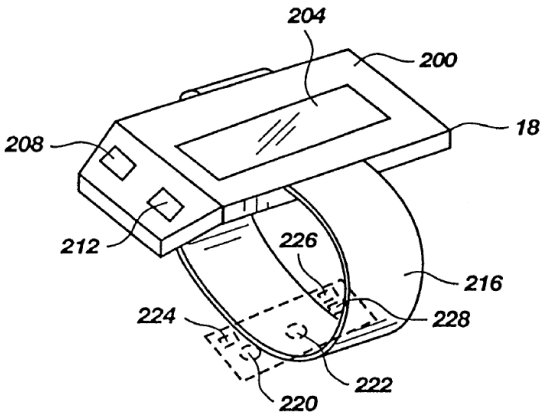


Fig. 3

The wrist sensor/display unit 18 contains "sensors 220 and 222" disposed in the band 216. *Id.* at 9:34-37. The sensors measure physiological parameters and/or environmental variables. *Id.* at 9:37-40. The wrist sensor/display unit 18 contains a display screen 204 to display both information regarding sensor data and physiological status, and information regarding current position. *Id.* at 9:21-30. The wrist sensor/display unit 18 also contains a communications mechanism for communicating with the soldier unit 50 and one or more controllers for processing the information obtained by the sensors and/or for operating medical equipment. *Id.* at 9:42-49. Similar to the wrist sensor/display unit 18, the integrated sensor unit 14 contains multiple sensors which sense physiological data. *Id.* at 7:61-65, 8:37-43, 8:52-56.

56. Figure 4A provides a functional block diagram of the integrated sensor unit 14, the wrist sensor/display unit 18, and the soldier unit 50. *Id.* at 10:54-56. This

diagram illustrates how these three devices communicate with each other and with other (remote) devices in *Jacobsen's* system:

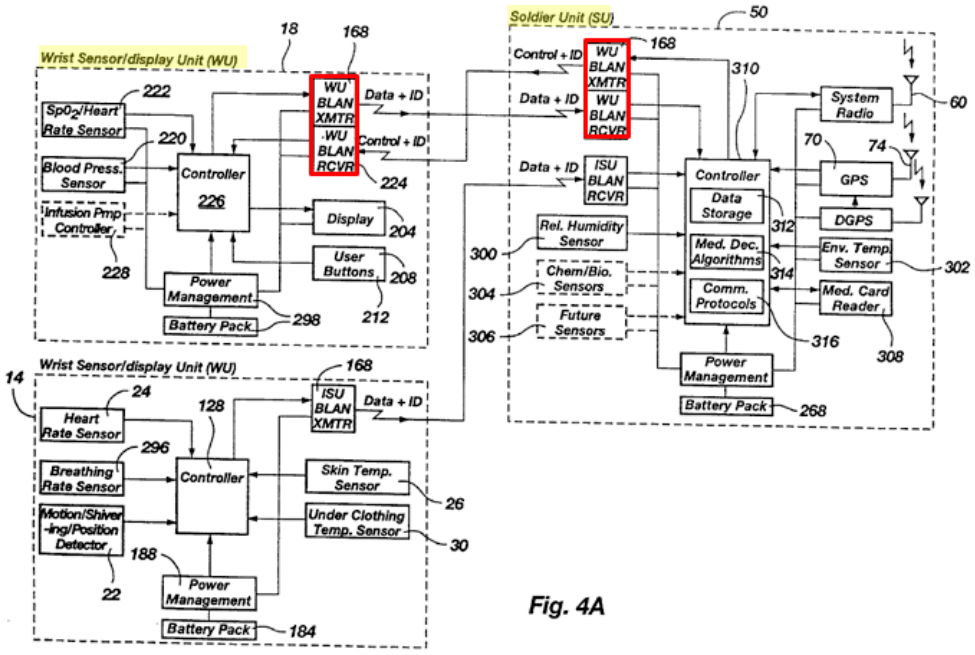


Fig. 4A

57. As illustrated in this Figure, the integrated sensor unit 14, wrist sensor/display unit 18, and soldier unit 50 all have communications modules that allow for bi-directional "BLAN" (body-LAN) wireless communications. *See id.* at FIG. 4A, 8:66-67. The wrist sensor/display unit 18 contains a "communications mechanism 224" which includes both a body-LAN receiver and transmitter. *See id.* at FIG. 4A, 11:1-5. This "communications mechanism 224 forms part of the body local area network 168. *Id.* at FIG. 4A, 8:65-9:7. By providing for a wireless body-LAN 168, the integrated sensor unit 14 and the wrist sensor/display unit 18 are able to communicate with the soldier unit 50 without interfering with the ability of the soldier to perform his/her duties." *Id.* at 11:5-10. The integrated sensor unit 14 is

also part of the body-LAN, but, unlike the wrist sensor/display unit 18, it only has the ability to transmit data to the soldier unit 50. *See* FIG. 4A, 11:14-18. *Jacobsen* explains:

> "While both the integrated sensor unit 14 and the wrist sensor/display unit 18 communicate through the body-LAN 168, the involvement of the communications are different. Because the integrated sensor unit 14 simply senses physiological status and generates signals indicative of the same, the integrated sensor unit will typically only send signals to the soldier unit 50. In contrast, because the wrist sensor/ display unit 18 displays information regarding position can can [sic] include a controller 228 for controlling other medical equipment such as a microinfusion pump or a ventilator, it is important for the wrist sensor/display unit to be able to both send signals to and receive signals from the soldier unit 50. Thus, the communications mechanism 224 of wrist sensor/ display unit 18 has both a transmitter and receiver." *Id.* at 11:14-28.

58. In addition to engaging in short-range wireless body-LAN communications with the wrist sensor/ display unit 18 and the integrated sensor unit 14, the soldier unit 50 engages in long-range wireless communications over a network. As illustrated in Figure 4A (above), the soldier unit 50 contains a "radio 264" connected to "antenna 60" for wireless communications. *Id.* at 9:54-57. This antenna 60 is used for sending and receiving data from "remote monitoring units, such as a leader/medic unit or a command unit." *Id.* at 6:66-7:7. *Jacobsen* explains that, "[b]ecause soldiers are constantly changing location and moving across varying

terrain, the system for remotely monitoring personnel status can include satellites 510 and aircraft 520 as relays to assist in communications" between soldier units and remote leader/medic or command units. *Id.* at 15:35-50. Figure 7 provides a perspective view of these long-range bi-directional wireless communications:

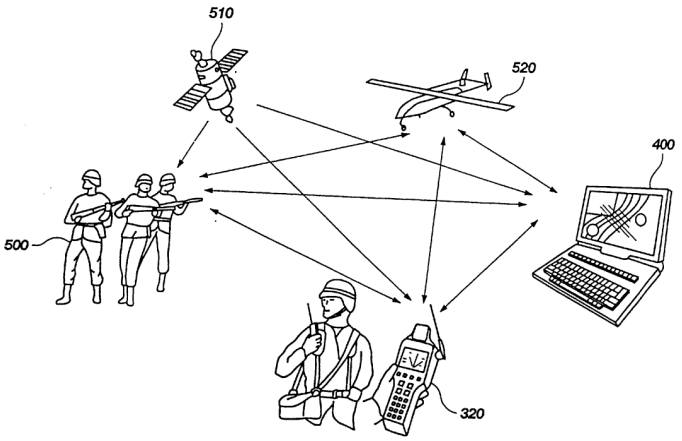
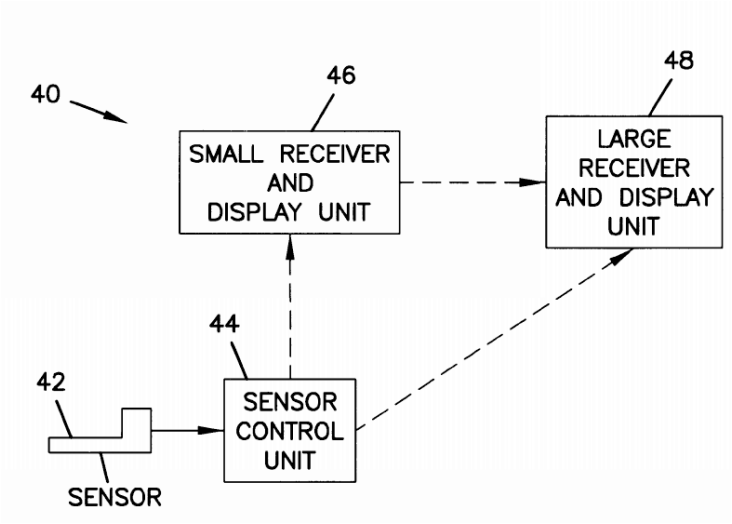


Fig. 7

B. Say

59. U.S. Patent No. 6,175,752 ("*Say*") was filed on April 30, 1998 and issued on January 16, 2001. Ex. 1006, cover. I am told it is thus prior art to all challenged claims under at least 35 U.S.C. § 102(e), and prior art to challenged claim 13 under at least 35 U.S.C. § 102(a) and (e).

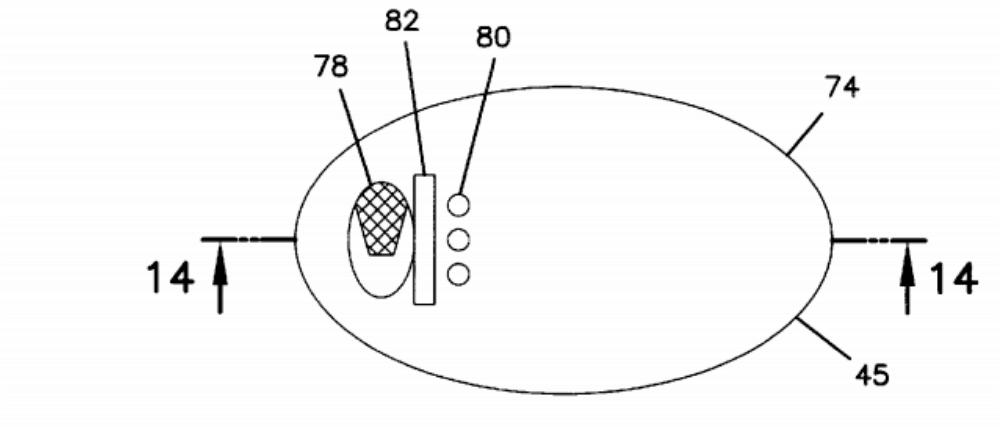
60. *Say*, titled "Analyte Monitoring Device and Methods of Use," generally relates to monitoring and recording of physiological parameters with a personal device, and transmitting this information to other devices. *See id.* at Abstract, 2:13-3:56. Figure 1 provides a block diagram illustrating *Say*'s system:

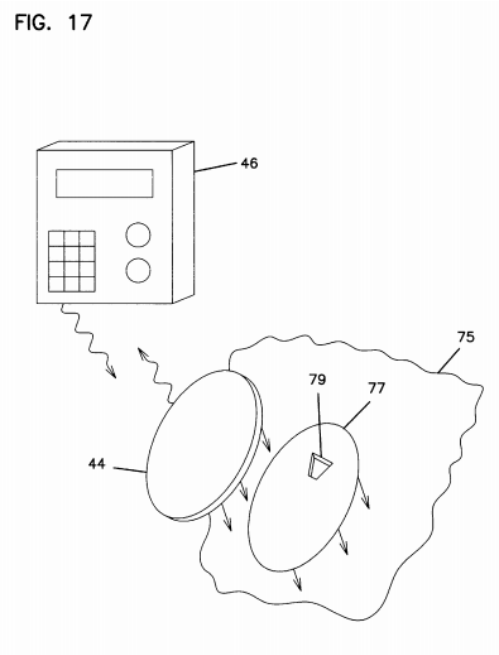


Id. at FIG. 1; *see also id.*, 2:13-61, 3:63-65. This figure presents the basic devices utilized in *Say*'s "analyte monitoring system 40": an "on-skin sensor control unit 44" coupled to at least one "sensor 42," and one or more "receiver/display units 46, 48" in wireless communication with the on-skin sensor control unit 44. *See id.*

61. *Say*'s sensor control unit 44 is configured to be placed on the skin of a patient. *Id.* at 29:28-40. One embodiment of this device has a thin, oval shape and is depicted in Figures 15 (top view) and 17 (perspective view):

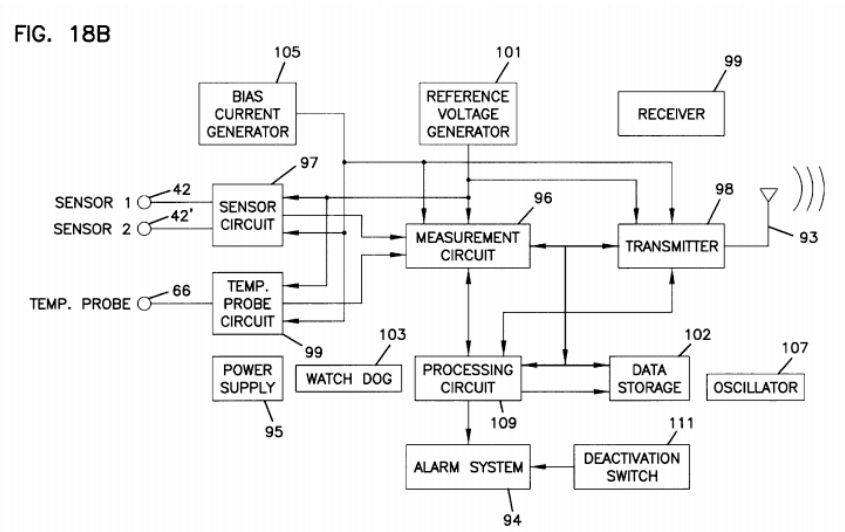
FIG. 15





Id. at FIGS. 15, 17, 4:28-34.

62. The sensor control unit 44 may contain components such as: a "processing circuit 109," a "data storage 102," a "power supply 95," a "sensor circuit 97" connected to one or more "sensor(s) 42," and a "transmitter 98" and "receiver 99" (or, alternatively, just a transceiver). *Id.* at FIG. 18B, 36:40-60, 37:26-35, 43:21-44. These components are depicted in the block diagram of the sensor control unit 44 illustrated in Figure 18B:

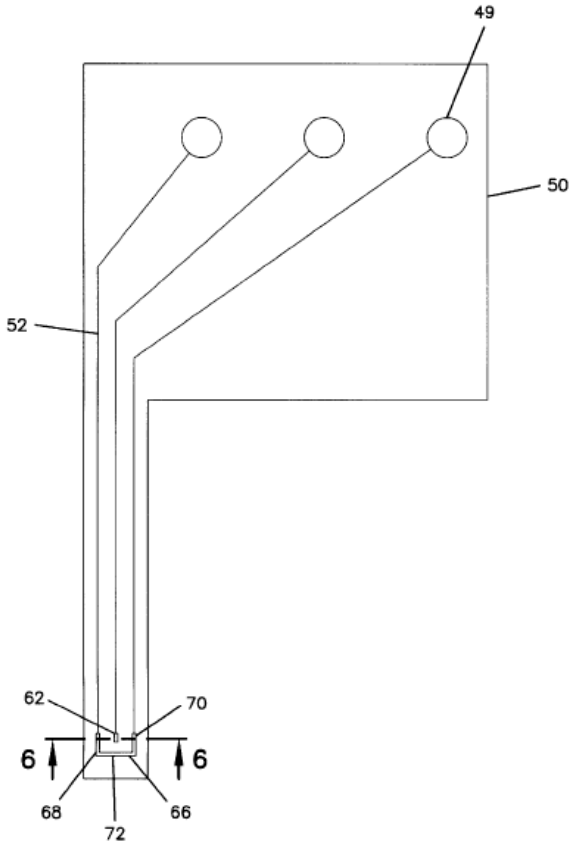


Id. at FIG. 18B, 4:37-38.

63. The sensor control unit 44 also contains "conductive contacts 80" which couple the one or more sensor(s) 42 to the electronic components on the sensor control unit 44. *Id.* at 34:28-42. These conductive contacts 80 may be provided on either the exterior or the interior of the sensor control unit 44. Compare *id.* FIGS. 19A-D, 30:14-18 with FIGS. 19E-F, 30:33-38. In embodiments where the conductive contacts are on the interior of the sensor control unit 44, the sensor control unit 44 must contain a "port 78" through which the sensor 42 can directly access the conductive contacts 80. *Id.* at 30:33-38.

64. *Say* illustrates one embodiment of the sensor 42:

FIG. 11



Id., FIG. 11. The "sensor 42" includes "contact pads 49," and during operation of the system, the contact pads 49 are in contact with the conductive contacts 80 of the on-skin sensor control unit 44. *Id.* at 14:39-60. This contact allows the sensor to be connected to the sensor control unit 44's sensor circuitry 97. *Id.* at 37:59-67.

65. *Say*'s sensor 42 may also contain a "temperature probe 66" used for detecting body temperature:

FIG. 6

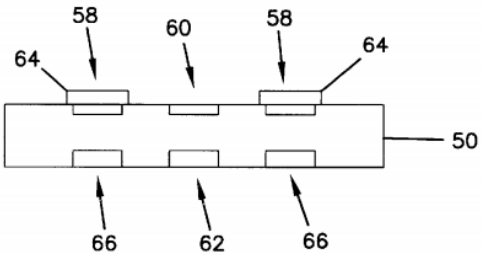
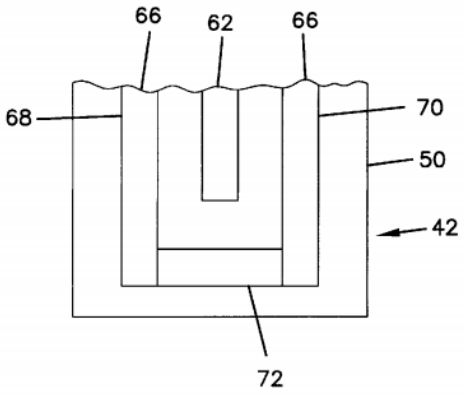


FIG. 8

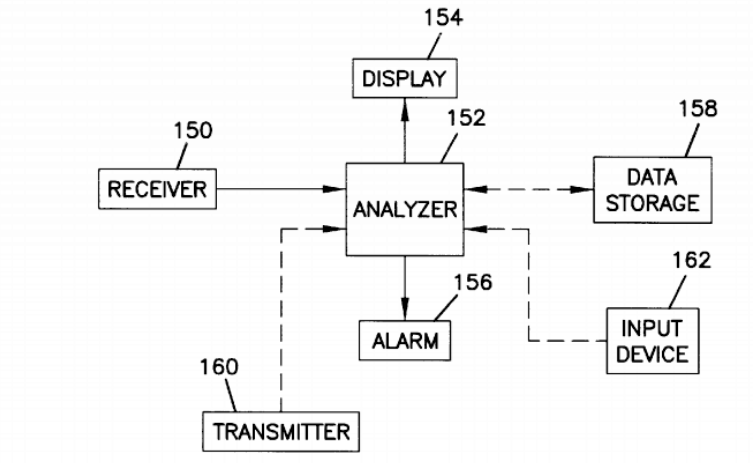


Ex. 1006, FIGS. 6, 8, 11, 2:32-41, 4:11-12, 4:14-16, 7:58-64.

66. *Say* discloses that, in addition to sensing temperature with the temperature probe 66, the sensor 42 is used for "in vivo determination of a concentration of an analyte, such as glucose of lactate, in a flu*id.*" *Id.* at 5:25-37. *Say* discloses sensor 42 may be used in various ways, such as "subcutaneously implanted in a patient for the continuous or periodic monitoring an analyte in a patient's interstitial fluid," in order to determine analyte levels in a patient's bloodstream, or it can "insert[ed] into a vein, artery, or other portion of the body containing flu*id.*" *Id.*

67. *Say* describes that one or more "receiver/display units 46, 48" may be used in the analyte monitoring system "for easy access to the data generated by the sensor 42" and may also be used for additional processing of sensor data. *Id.* at 47:49-62. *Say* discloses that the analyte monitoring system may include a "small receiver/display unit 46," which may be carried by a patient, and/or a "large receiver/display unit 48," which may be designed to sit on a shelf or nightstand. *Id.* at 47:49-48:3. *Say* discloses the one or more receiver/display units 46, 48 may include a "transmitter 160" and a "receiver 150," both depicted in Figure 22's block diagram of the receiver/display unit:

FIG. 22



Id. at FIG. 22, 4:53-54.

68. The on-skin sensor control unit 44's transmitter 98 (or transceiver) with "antenna 93" can be used "for transmitting the sensor signals or processed data from the processing circuit 109 to a receiver/display unit 46['s]" receiver 150. *Id.* at 36:61-

37:4, 48:4-17. *Say* explains that "[t]he receiver 150 typically is formed using known receiver and antenna circuity and is often tunable to the frequency or frequency band of transmitter 98 on the on-skin sensor control unit 44." *Id.* at 48:49-62. *Say* describes that this receiver 150 is "typically" capable of receiving signals from the on-skin sensor control unit 44 from between 2 and 20 meters away, depending on the implementation of the invention. *Id. Say* discloses that, in order to avoid noise or interference within the frequency band of the transmitter 98, the transmitter may use various encryption techniques that allow the receiver 150 to identify which device the transmission is coming from. *Id.* at 49:15-53, 53:33-38.

69. Conversely, the on-skin sensor control unit 44's receiver 99 can receive various information through RF transmission from the receiver/display unit 46, 48's transmitter 160. *Id.* at 37:26-35, 52:44-65. *Say* describes that the range of transmitter 160 may vary, but in some implementations of the invention, the range is "less than one foot, and preferably less than six inches." *Id.* at 52:44-65.

70. *Say* also discloses that, in some implementations of the invention, the receiver/display unit 46, 48 contains a "separate transmitter" which may transmit data to a device at another location, such as a computer at a doctor's office. *Id.* at 52:66-53:14. *Say* further explains that this receiver/display unit 46, 48 may contain a "pager" and be capable of "two-way paging." *Id.* at 2:43-61, 52:66- 53:14, 47:49-62.

C. Quy

71. U.S. Patent No. 6,602,191 ("*Quy*") was filed on December 15, 2000 and issued on August 5, 2003. Ex. 1007, cover. It is a conversion of U.S. Provisional App. Ser. No. 60/172,486, which was filed on December 17, 1999. *Id.* I am told it is thus prior art to at least claim 13 under at least 35 U.S.C. § 102(e).

72. *Quy*, titled "Method and Apparatus for Health and Disease Management Combining Patient Data Monitoring with Wireless Internet Connectivity," generally relates to monitoring health conditions of a patient by wirelessly connecting a personal medical device to an internet-enabled device. *Id.* at Abstract.

73. *Quy* discloses a "wireless health-monitoring apparatus ('WHMA') 10," as depicted in Figure 2:

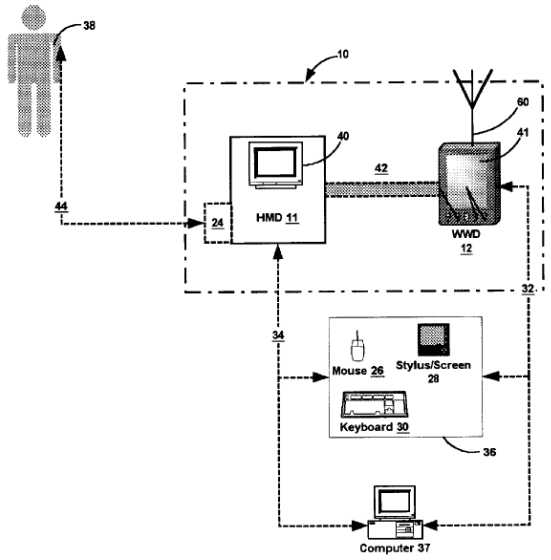


FIG. 2

74. This WHMA 10 contains a "health monitoring device ('HMD') 11" coupled to "an internet-enabled wireless web device ('WWD') 12." *Id.* at 2:55-56, 3:3-4, 6:29-30, 6:37-43. *Quy* discloses that HMD 11 may include one or more "physiologic sensor[s] 24," which can measure physiological parameters such as "blood glucose levels, blood pressure, heart rate, or any other desired parameter[.]" *Id.* at 6:44-45, 7:3-4. The HMD 11 can then transfer the sensor data "to WWD 12 via wireless communication schemes, such as RF includes [sic] Bluetooth® or 802.11, infrared, optical, microwaves, etc." *Id.* at 7:25-30.

75. *Quy* discloses that the WHMA 10 is "linked in a wireless fashion" to a "base station antenna 15 coupled to a server 17" which is, in turn, "connected to the wired, or even a wireless (not shown) Internet 21, which may include the World Wide Web." *Id.* at 6:27-36. This architecture is illustrated in Figure 1:

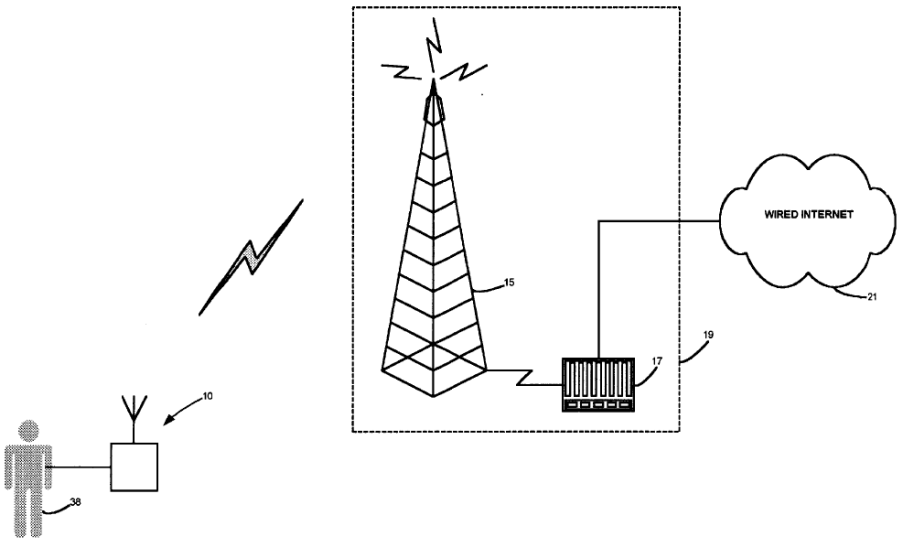


FIG. 1

Quy explains that, in order for WHMA 10 to connect wirelessly with the Internet, it "sends a wireless signal to a base station 14 (in known fashion) that is connected to server 18 that is in signal communication (in known fashion) with the internet." *Id.* at 7:41-50. This communication scheme is illustrated in Figure 3:

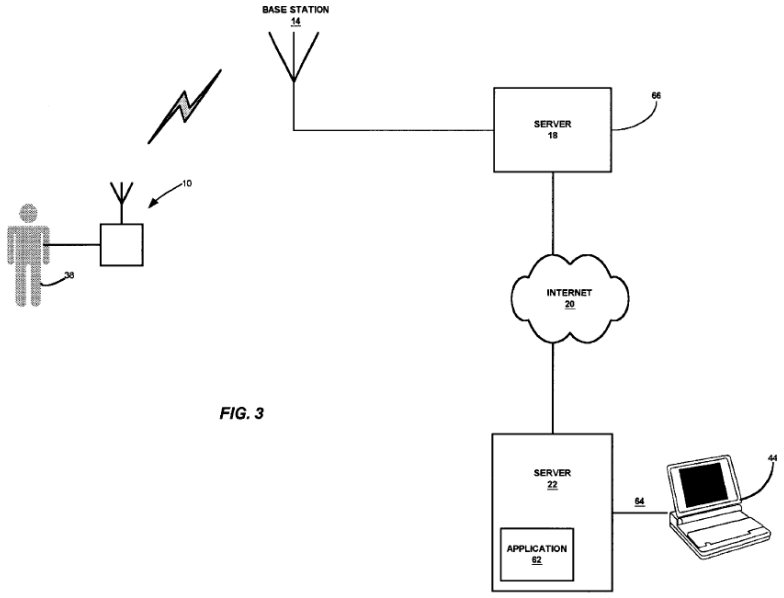


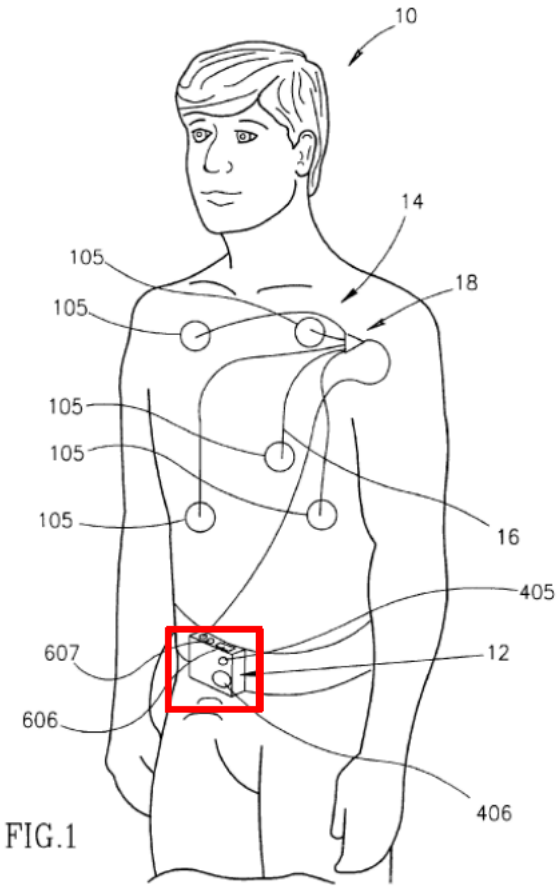
FIG. 3

D. Geva

76. U.S. Patent No. 6,366,871 ("*Geva*") was filed on March 3, 1999 and issued on April 2, 2002. Ex. 1008, cover. I am told it is thus prior art to at least claims 13, 24-25 under at least 35 U.S.C. § 102(e).

77. *Geva*, titled "Personal Ambulatory Cellular Health Monitor for Mobile Patient," generally relates to portable patient health and location monitoring and wireless reporting of health and location data. *Id.* at Abstract, 1:5-8.

78. *Geva* describes a "personal ambulatory cellular health monitor 12," which is depicted in Figure 1:



79. *Geva* discloses that physiological sensors may be either built into monitor 12 or connected to monitor 12 (as illustrated in Figure 1). *Id.* at 5:37-48, 5:58-6:50. This monitor also includes "personal location subsystem (PLC) 200," which "determine[s] the location of patient 10." *Id.* at 5:49-57, 6:51-52. Geva discloses that PLC subsystem 200 "preferably includes location determination circuitry such as GPS components including a GPS receiver 202 and a filter 201 which is tuned to a known GPS frequency for GPS satellite communication via a

built-in antenna 501 typically shared by radio subsystem 500." *Id.* at 6:52-7:7. This location determination system is depicted in Figure 2C, which is a section of Figure 2's "simplified block diagram illustration of the personal ambulatory cellular health monitor 12 of Fig. 1":

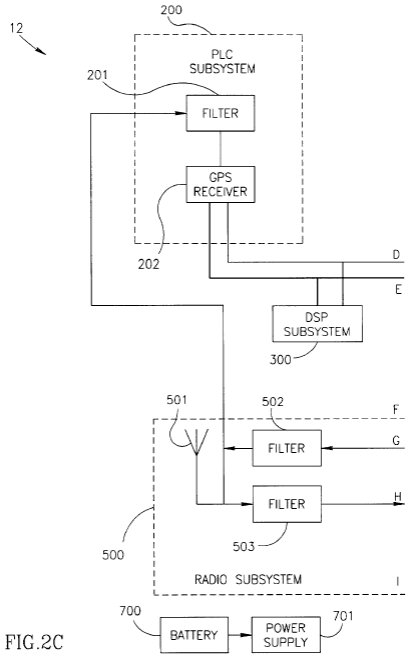


FIG.2C

E. Reber

80. U.S. Patent No. 5,961,451 ("*Reber*") was filed on April 7, 1997 and issued on October 5, 1999. Ex. 1020, cover. I am told it is thus prior art to all challenged claims under at least 35 U.S.C. § 102(e) and also prior art to challenged claim 13 under at least 35 U.S.C. §§ 102(a) and (b).

81. *Reber*, titled "Noninvasive Apparatus Having a Retaining Member to Retain a Removable Biosensor," generally relates to a system for noninvasively

monitoring physiological parameters and communicating this data to another device. *See id.* at Abstract, FIG. 1, 1:28-60, 2:20-5:3.

82. *Reber*'s system includes a "noninvasive apparatus" which includes a "noninvasive extraction device 10 to noninvasively extract a biological sample from an end user" (*id.* at 2:20-34), a "biosensor 16 to sense a characteristic, property, or parameter of the biological sample" (*id.* at 2:51-3:17), a "display device" (*id.* at 3:56-66), a "processor," "memory," and "power source" (*id.* at 3:57-4:21), a "power button" that "[i]n response to [] user-initiated input . . . powers various components" (*id.* at 4:21-29), and an "interface" for engaging in shortrange wireless communications with an "external device" (*id.* at 4:31-5:3). Embodiments of this noninvasive apparatus are shown in Figures 2 and 3:

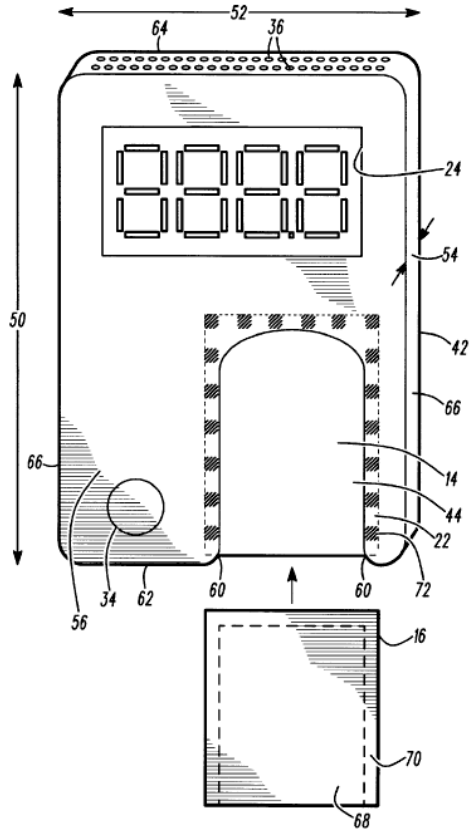


FIG.2

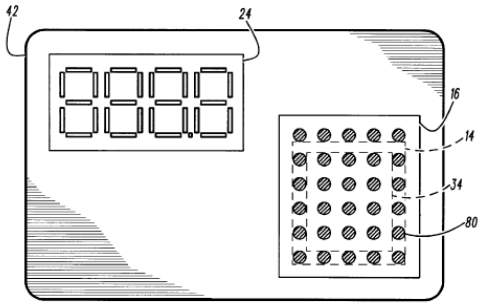


FIG.3

F. Gabai

83. *Gabai* was filed on May 19, 1998 and issued on December 12, 2000. Ex. 1040, cover. I am told it is thus prior art to all challenged claims under at least

35 U.S.C. § 102(e) and also prior art to challenged claim 13 under at least 35 U.S.C. §§ 102(a).

84. *Gabai*, titled "Interactive Toy," discloses a "toy 10" including "toy control device 24" and "any multitude of known sensors and input devices":

FIGURE 1A

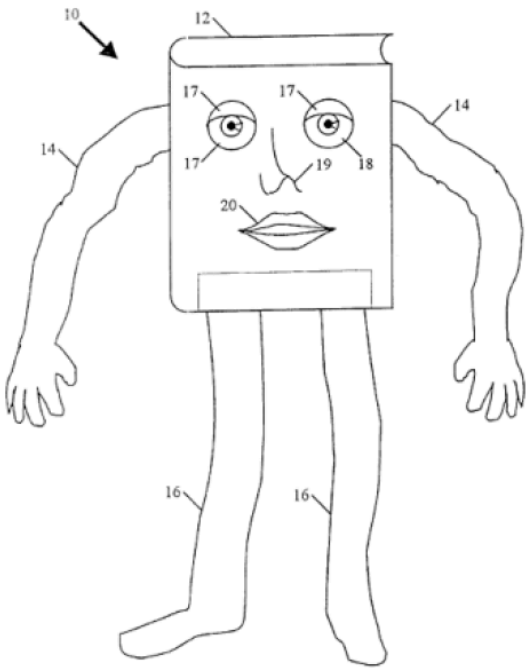
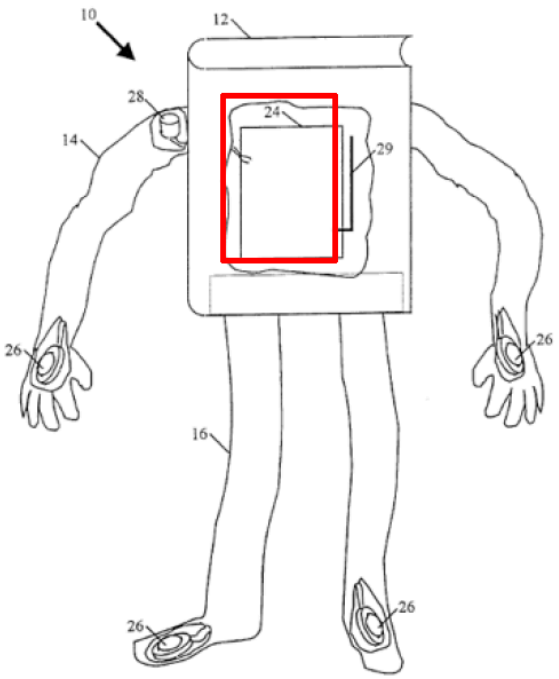
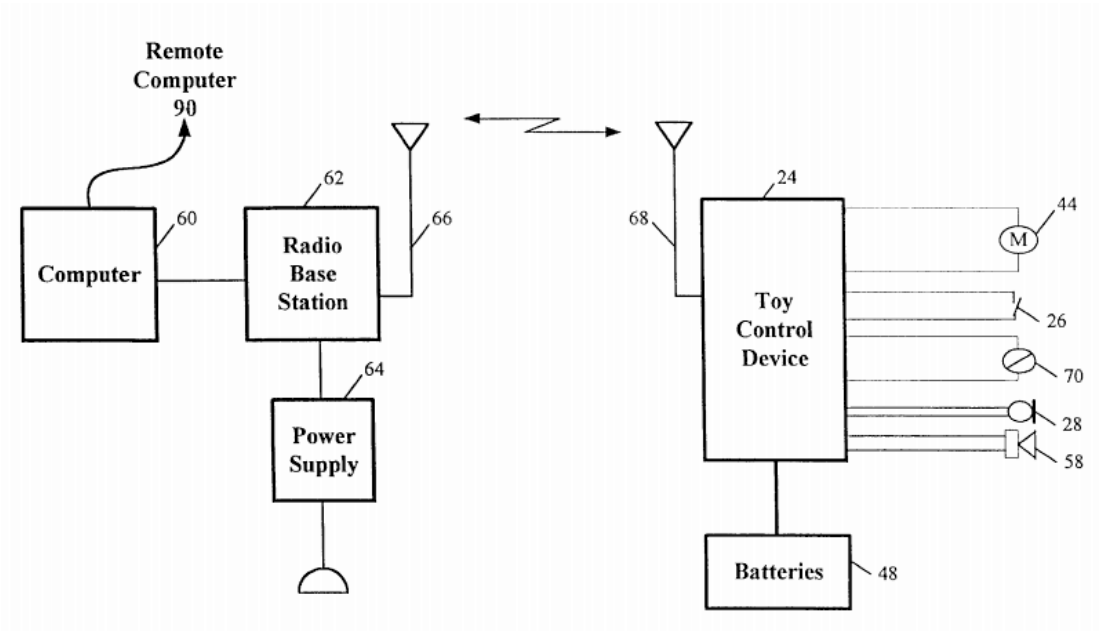


FIGURE 2



Ex. 1040, FIGS. 1A, 2, 7:16-24, 9:22-59.

85. Toy control device 24 engages in bi-directional wireless communications with "base communication unit 62":



Id. at FIG. 5-7, 10:23-43, 11:65-12:18. Base communication 62 is connected to "computer 60," which provides an Internet connection. *Id.*, 11:8-20

IX. THE PRIOR ART DISCLOSES AND/OR SUGGESTS ALL THE FEATURES OF CLAIMS 1, 7-10, 13-16, 22 AND 24-26 OF THE '233 PATENT

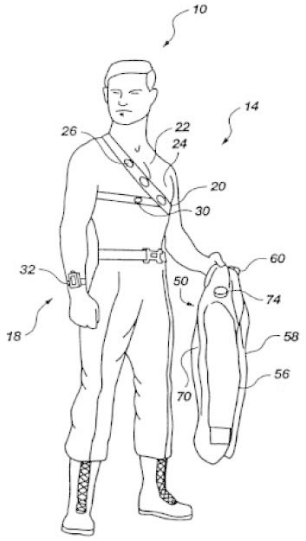
A. Ground 1: Jacobsen discloses the features of claims 1, 7-10, and 14 of the '233 patent

86. In my opinion, the *Jacobsen* discloses all of the features of claims 1, 7-10, and 14 of the '233 patent. Below, I address each of these claims and their respective limitations.

1. Claim 1

87. As described below, *Jacobsen* discloses the features of claim 1.

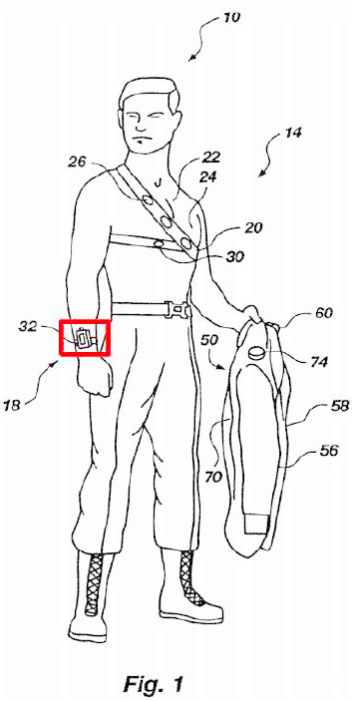
[1p] A bi-directional wireless communication system comprising:

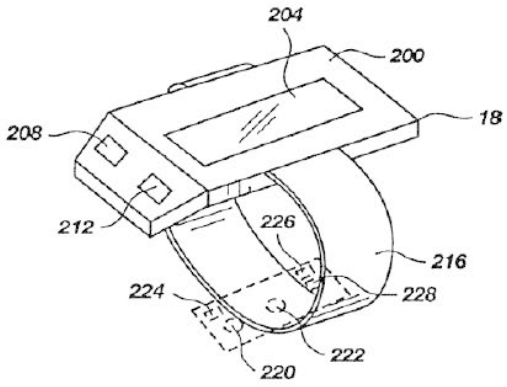
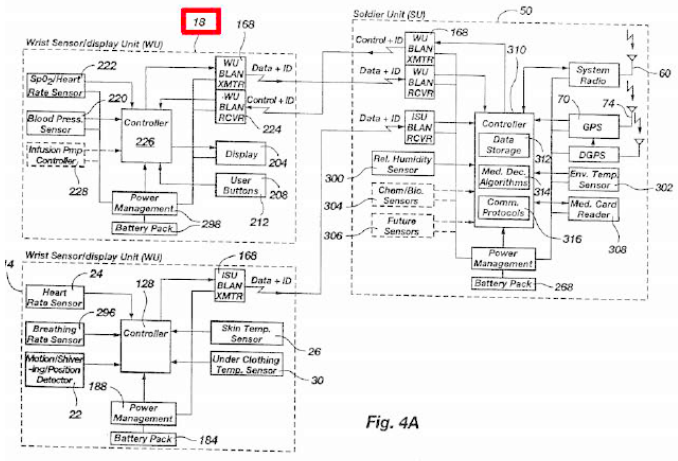
Claim Language	***Jacobsen***
A bi-directional wireless communication system comprising	For purposes of this analysis, I assume the preamble is limiting: *Jacobsen* discloses a bi-directional wireless communication system. *Jacobsen's* system is depicted in Figure 1:  *Fig. 1* Ex. 1005, FIG. 1. As depicted in this figure and further taught by *Jacobsen*, the disclosed system includes multiple wearable devices, including a "**wrist sensor/display unit 18**" and **a wearable vest/harness including "soldier unit 50."** *Id.* at FIGS. 1, 3-4, 5:66-7:55, 9:20-10:53. As I describe in more detail below, the wrist sensor/display unit 18 and the soldier unit 50 engage in short-range wireless bi-directional communications.

	Specifically, as I describe in more detail below, the system's **wrist sensor/display unit 18** corresponds to claim l 's "**first personal device**" and the system's **vest/harness with soldier unit 50** corresponds to claim l's "**second device**," and there two devices engage in short-range wireless bi-directional communications. Thus, in my opinion, a POSIT A would have understood that *Jacobsen* discloses this claim element. *See also* my discussions in sections VIII.A and for claim elements 1[a]-1[h], which are relevant and incorporated here.

[1a] (a) a first personal device, the first personal device further comprising:

Claim Language	***Jacobsen***
(a) a first personal device, the first personal device further comprising:	*Jacobsen* discloses a first personal device. *Jacobsen* discloses a "**wrist sensor/display unit 18**" which, as I describe below, comprises all characteristics of claim l's "**first personal device**." *Jacobsen's* wrist sensor/display unit 18 is worn by "user IO" and thus is a "first personal device." *See* Ex.

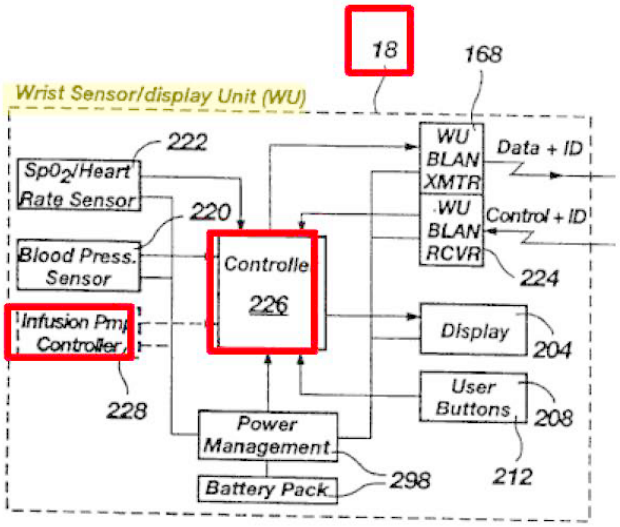
Claim Language	*Jacobsen*
	I 005, FIG. 1, 5:66-7:55. The device is depicted in FIGS. 1 (worn on user 10) and 3:  *Fig. 1* "Referring to FIG. 1, there is shown a soldier, generally indicated at 10, with an integrated sensor unit, generally indicated at 14, and **a wrist sensor/display unit 18** disposed thereon." Ex. 1005, 5:66-6:2

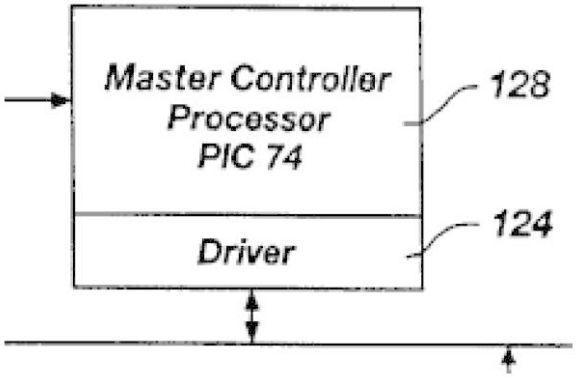
Claim Language	*Jacobsen*
	 *Fig. 3* "FIG. 3 is a perspective view of a **wrist sensor/display unit** which may be used as part of the soldier unit." *Id.* at 5:33-34; *see also id.* at 9:21-22 ("Referring now to FIG. 3, there is shown a perspective view of the wrist sensor/display unit 18 shown in FIG. 1.") *Jacobsen* also provides a functional diagram of the wrist sensor/display unit 18 in FIG. 4A:  *Fig. 4A*

Claim Language	*Jacobsen*
	"FIG. 4A is a function block diagram of the interactive arrangement between the integrated sensor unit, the **wrist sensor/display unit** and the soldier unit. " *Id.* at 5:37 -39. Thus, in my opinion, a POSIT A would have understood that *Jacobsen* discloses this claim element. *See also* my discussions in section VIII.A, which are relevant and incorporated here.

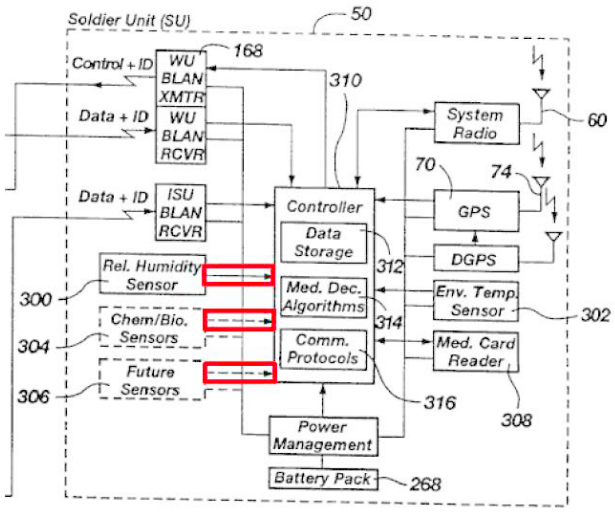
[1b] (i) a processor;

Claim Language	*Jacobsen*
(i) a processor;	*Jacobsen* discloses the first personal device ("wrist sensor/display unit 18") containing a processor. *Jacobsen's* "**wrist sensor/display unit 18**" contains a processor. The wrist sensor/display unit 18 is described as containing "**controller 226**" and potentially also "**controller 228**." *Jacobsen's* functional diagram of the wrist sensor/display unit 18 in FIG. 4A illustrates both controller 226 and controller 228:

Claim Language	*Jacobsen*
	 (cropped) The wrist sensor/display unit 18's controller 226 **"process[es]** the information obtained by the sensors 220 and 222, and [] operat[es] the display 204" of the wrist sensor/display unit 18. *Id.* at 9:42-47. *Jacobsen* explains controller 228 may also be provided in the wrist sensor/display unit 18 "for operating medical equipment, such as a microinfusion pump or a small respirator." *Id.* at 9:42-49; *see also id.* at 11 :20-26 ("In contrast, because the wrist sensor/ display unit 18 displays information regarding position can [sic] can include a controller 228 for controlling other medical equipment such as a microinfusion pump or a ventilator, it is important for the wrist sensor/display unit to be able to both send signals to and receive signals from the soldier unit 50.")

Claim Language	*Jacobsen*
	In many instances, *Jacobsen* refers to controllers and processors interchangeably. For example, *Jacobsen* discloses that the system's "integrated sensor unit 14" contains a "master controller or processor 128", which is also referred to as "controller/processor 128" or just "controller 128":  *Id.* at FIG. 2 (cropped), 8:32 -37 ("Additionally, the master controller or processor 128 may be used to indicate signals which are indicative of physiological factors not falling within acceptable ranges"); *see also id.* at FIG. 4A, 8:45-49, 8:6 1-63. Also, *Jacobsen 's* claims refer to a "processor means," which maps to a "controller 310" described in the specification: Claim 1 recites:

Claim Language	*Jacobsen*
	"1. **Wearable apparatus for monitoring physiological parameters of a person comprising:** support means for wearing by a person on one or more body parts, the support means comprising a harness having a plurality of pocket means; sensor means disposed on the support means for measuring multiple physiological parameters of the person; **means disposed in at least one of the pocket means and responsive to the sensor means for transmitting to a remote location data** indicating values of each of the multiple physiological parameters measured; and at least one antenna means disposed on the harness and in communication with the means for transmitting." Dependent claim 20 adds a "processor means" to claim 1: "20. The wearable apparatus of claim 1, ***wherein the means for transmitting further comprises processor means for evaluating values received from the sensor***

Claim Language	*Jacobsen*
	means with respect to acceptable physiological ranges for each value received by the processor means." The "wearable apparatus" of these claims is described in the specification as the "vest/harness configured for holding the soldier status unit" and its contents (illustrated in FIG. 4). *Id.* at 5:35-36. This is clear because the claims require the "wearable apparatus " to include a "pocket," and the only apparatus described in the specification that includes a pocket is the vest/harness configured for holding the soldier unit. The vest/harness configured for holding soldier unit 50 is described as containing a controller (controller 310) that performs the claimed function of "evaluating values received from the sensor means": 

Claim Language	*Jacobsen*
	Id. at FIG. 4A, 9:50-61, 6:66-67, 11:40-45 ("The ***information from the sensors is processed in the controller 310*** which accesses data storage 312, includes software or firmware with medical diagnosis algorithms 314, and communications protocols 316 to store relevant information, to communicate needed information to the leader/medical units and command units.") A POSITA would have understood, in the context of *Jacobsen's* full disclosure, that the soldier unit 50's controller 310 mapped to the claimed "processor means." And, *Jacobsen* describes a controller as a "micro-computer," which would have clearly included a processor. *Id.* at 11:62-63. This, combined with *Jacobsen's* explanation that the wrist sensor/display unit 18's controller 226 was used to "process" sensor information, would have led a POSITA to understand that controller 226 is a processor (or, at least necessarily contains a processor). Also, a POSITA at the time of the alleged invention would have understood that controllers, including *Jacobsen's* "controller 226" must include processors or similar processing devices in order to function as controllers. "Controllers" at the time were embedded computers. These were essentially a chip or small

Claim Language	*Jacobsen*
	printed circuit board or circuit assembly that included a microprocessor and a set of peripherals (*e.g.*, an AID converter, peripheral interface unit, memory, display driver, etc.). They were often called "controllers" because they were mainly designated for use in embedded systems-for example, in smart appliances, robots, industrial automation, musical instruments, and wearable sensor systems, including those described in section V. By the late 1990s, single chip microcomputers (often called microcontrollers) became dominant in the art. I used many of them at that time-for example, my wireless sensor shoe system for dancers (described above in section V) was powered by a PIC 16C711 from Microchip Systems. Notably, we called this microcomputer a "peripheral interface controller." *See* Ex. 1033, 1010. Another single chip microcomputer widely used at the time was the Motorola 68HC11, which was also referred to as a "microcontroller." I built the HCl1 into many device s dating before the '233 patent's alleged invention. For example, the system described in Ex. 1011 used an HCl1. Thus, in my opinion, a POSITA would have understood that *Jacobsen* discloses this claim element. *See also* my

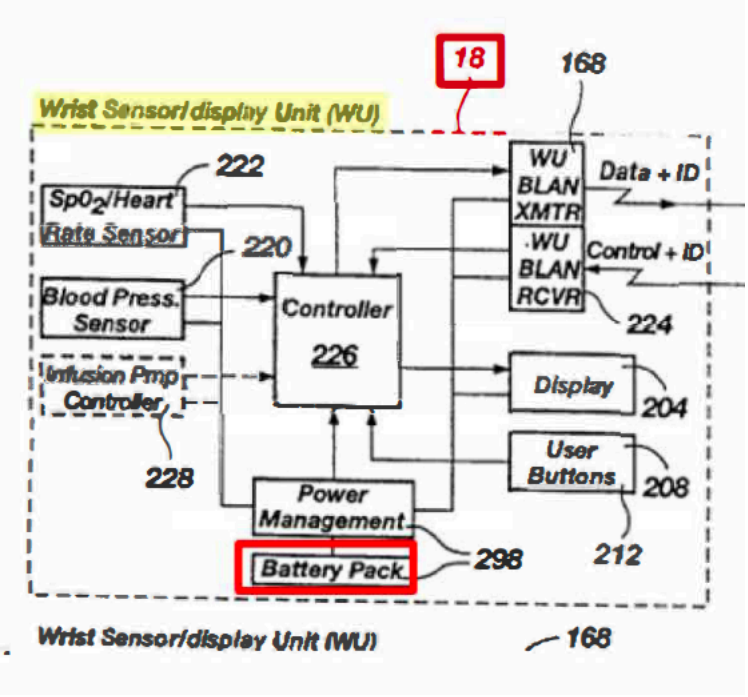
Claim Language	*Jacobsen*
	discussions in section VIII.A, which are relevant and incorporated here.

[1c] (ii) a memory;

Claim Language	*Jacobsen*
(ii) a memory;	*Jacobsen* discloses a first personal device ("wrist sensor/display unit 18") containing a memory. *Jacobsen* states "**all units** may be equipped with a ***nonremovable, nonvolatile memory module*** which contains relevant personal records and acquired data." Ex. 1005, 5:7-9. *Jacobsen's* specification describes many "units": "wrist sensor/display ***unit*** 18," an "integrated sensor ***unit*** 14," a "soldier ***unit*** 50," a "leader /medic ***unit*** 320," and a "command ***unit*** 400." Any of these units, including the wrist sensor/display unit, may thus be equipped with a "memory module." *Jacobsen* goes on to describe this "memory module": "The memory modules, the attachment means and the sensors are sufficiently rugged for the operational environment. Thus, for example, a card having a magnetic strip for storing information may be used to download needed information. Likewise, a bar code reader may also be included for rapid entry of pre-coded information." *Id.* at 5:13-19.

	Thus, in my opinion, a POSIT A would have understood that *Jacobsen* discloses this claim element. *See also* my discussions in section VIII.A, which are re levant and incorporated here.

[1d] (iii) a power supply:

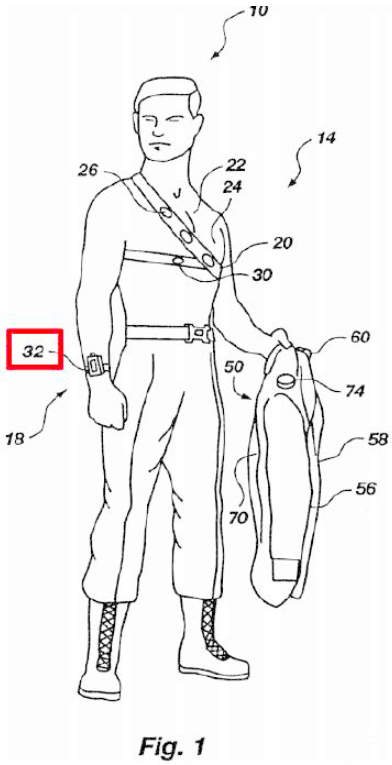
Claim Language	*Jacobsen*
(iii) a power supply;	*Jacobsen* discloses a first personal device ("wrist sensor/display unit 18") containing a power supply. *Jacobsen's* "**wrist sensor/display unit 18**" is powered by "**battery pack 298**," which is a **power supply**. *Jacobsen's* functional diagram of the wrist sensor/display unit 18 in FIG. 4A illustrates battery pack 298: 

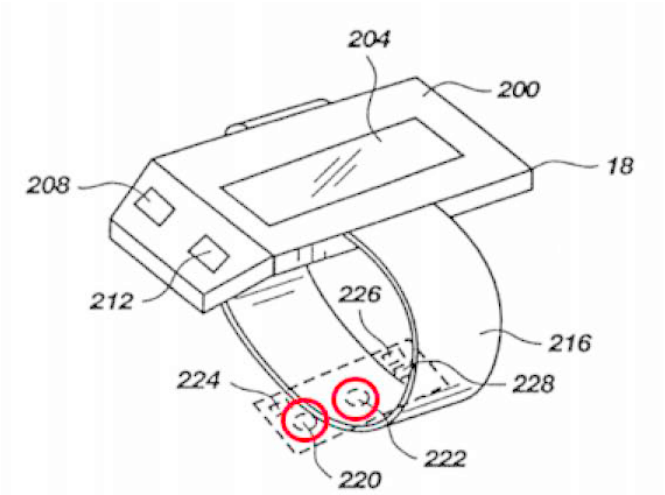
	(cropped) *Jacobsen* describes: "[t]he wrist sensor/display unit 18 shown in FIG. 4A contains all of the same elements described above, except that ***the power management battery combination 298*** is shown, and the communications mechanism 224 is shown in additional detail." *Id.* at 11: 1-5. Thus, in my opinion, a POSITA would have understood that *Jacobsen* discloses this claim element. *See also* my discussions in section VIII.A, which are relevant and incorporated here.

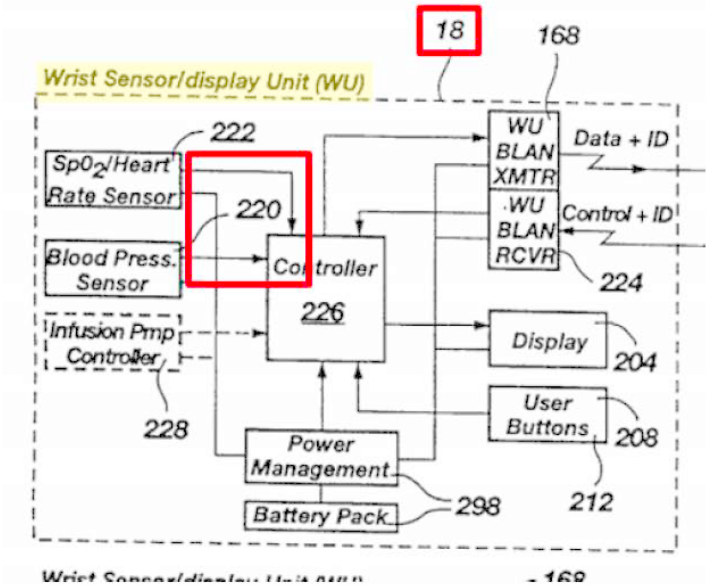
[1c] (iv) at least one detector input; and

Claim Language	***Jacobsen***
(iv) at least one detector input; and	*Jacobsen* discloses a first personal device ("wrist sensor/display unit 18") containing at least one detector input. The '233 patent illustrates "detector inputs 140" in FIG. 1 and states: "Optionally, PMD **100** has connections to related external or embedded devices. In one embodiment, PMD 100 includes connections to detectors 140. Detectors 140 may be any sensor of bodily or physiological parameters such as, but not limited to: temperate, motion, respiration, blood

Claim Language	*Jacobsen*
	oxygen content, electrocardiogram (ECG), electroencephalogram (EEG), and other measurement s." Ex. 1001, 3:27-33. Thus, the '233 patent describes a "detector input" as a "connection to [a] detector," which may be embedded. The '233 patent also uses the terms "detector" and "detector input" interchangeably. Compare *id.* at Fig. 1 ("Detector Inputs 140") with *id.* at 3:27-33 ("Detectors 140"). *Jacobsen's* **wrist sensor /display unit 18** contains one or more connected "sensors." I describe these sensors in more detail in my analysis for claims 7-9 below. These sensors can be "**modularly connected**" to the wrist sensor/display unit 18 so that sensors can be added and removed to this device as needed. Ex. 1005, 10:59-67 ("As will be appreciated, as sensor technology improves and facilitates the use of smaller, less energy consumptive sensors, the number of sensors which may be practically included in the integrated sensor unit can be increased. ***Such sensors could also be modularly connected*** to either the integrated sensor unit 14 or ***to the wrist sensor/display unit 18 such that sensors could be added when needed, and then removed to enable the use of still other sensors***.")

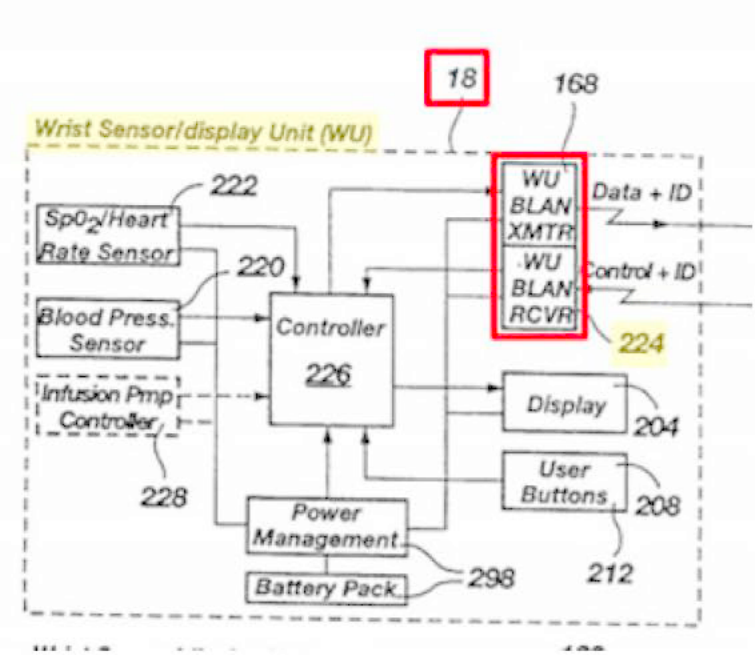
Claim Language	*Jacobsen*
	Specifically, *Jacobsen* discloses sensors being placed in the wrist band of the wrist sensor/display unit 18: "All of the sensors may be contained within the integrated sensor unit 14. Alternatively, some may use other platforms on the body, such as an attachment mechanism to the ear or neck, or ***disposed in the wrist band 32 of the wrist sensor/display unit 18***." *Id.* at 6:33-37. FIG. 1 illustrates "wristband 32" of the wrist sensor/display unit 18:  Fig. 1 FIG. 3 further illustrates sensors connected to the wristband of wrist sensor/ display device 18:

Claim Language	*Jacobsen*
	 Fig. 3 In reference to FIG. 3, *Jacobsen* describes: "The wrist sensor/display unit 18 is held in place with a band 2 16. If desired, sensors ***220 and 222 can be disposed in the band 216*** and integrated with the integrated sensor unit 14 FIGS. 1 and 2)." *Id.* at 9:34-37. The connection between sensors 220 and 222 and the wrist sensor/display unit 18 is also illustrated in Figure 4A. Here, the lines between sensors 220 and 222 and the controller 226 represent the wrist sensor/ display unit 18 's connection to these sensors:

Claim Language	*Jacobsen*
	 (cropped). *Jacobsen 's* disclosure of connections between sensors 220 and 222 and the wrist sensor/display unit 18 is no different than that provided by the '233 patent in terms of a "detector" and a "detector input." Thus, in my opinion, a POSITA would have understood that *Jacobsen* discloses this claim element. *See also* my discussions in section VIII.A, which are relevant and incorporated here.

[1f] (v) a short-range bi-directional wireless communications module;

Claim Language	*Jacobsen*
v) a short-range bi-directional wireless	*Jacobsen* discloses a first personal device ("wrist sensor/display unit 18") including a short-range bidirectional wireless communications module.

Claim Language	*Jacobsen*
communications module;	*Jacobsen's* ***wrist sensor/ display unit 18*** contains a "***communications mechanism 224***." *Jacobsen's* functional diagram of the wrist sensor/display unit 18 in FIG. 4A illustrates this communications mechanism 224:  (cropped) Communications mechanism 224 is a short-range wireless communications module because it is part of a wireless body local area network (body-LAN). *Jacobsen* describes: "***The communications mechanism 224 forms part of the body local area network 168***. By

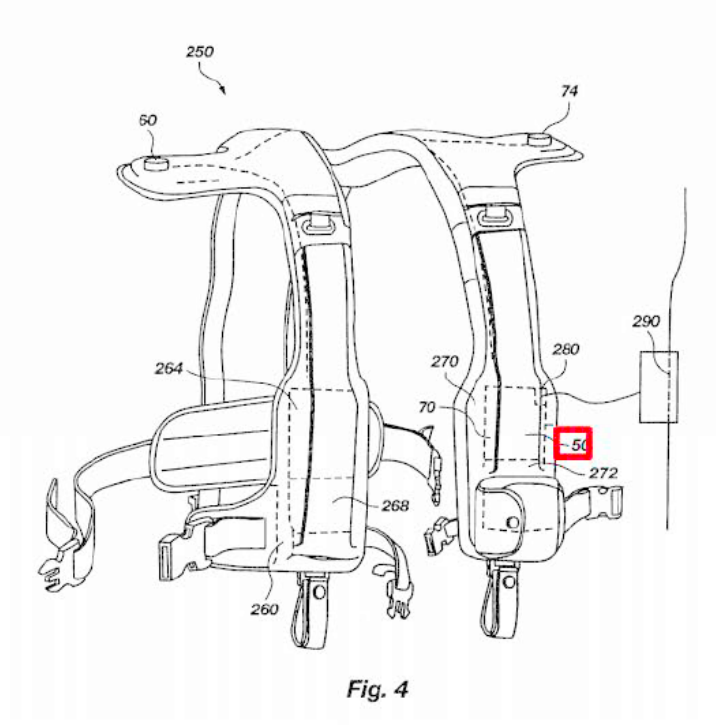
Claim Language	*Jacobsen*
	providing for a wireless body-LAN 168, the integrated sensor unit 14 and the wrist sensor/display unit 18 are able to communicate with the soldier unit 50 without interfering with the ability of the soldier to perform his/her duties. Because the respective components are so small, they provide minim al interference to the soldier, while simultaneously reducing the risk of death or serious injury." *Id.* at 11:5-13; *see also id.* at 8:66-67, 6:45-51. As shown in FIG. 4A, the communications mechanism 224 contains both a transmitter ("xmtr") and receiver ("rcvr"). This allows the wrist sensor/ display unit 18 to engage in bi-directional communications with soldier unit 50 (which I describe in more detail for claim element 1 [g] below). *Jacobsen* explains why it is important for the wrist sensor/ display unit 18 to have these bi-directional communication capabilities: "***While both the integrated sensor unit 14 and the wrist sensor/display unit 18 communicate through the body-LAN 168***, the involvement of the communications are different. Because the integrated sensor unit 14 simply senses physiological status and generates signals indicative of

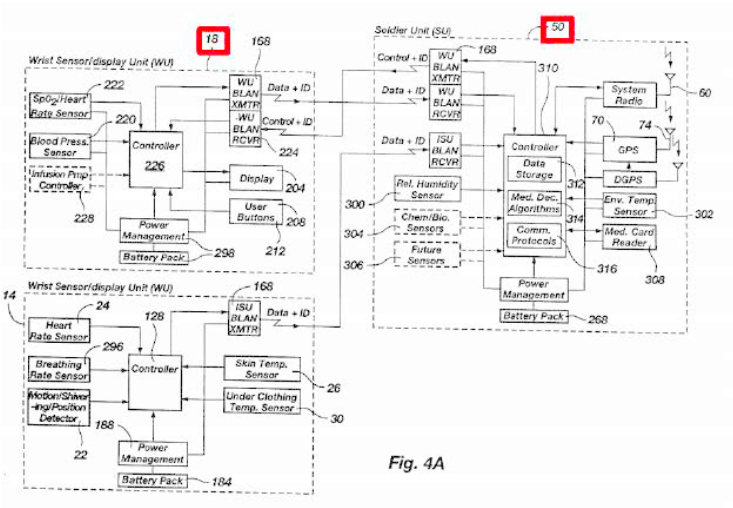
Claim Language	*Jacobsen*
	the same, the integrated sensor unit will typically only send signals to the soldier unit 50. In contrast, because the wrist sensor/display unit 18 displays information regarding position can can [sic] include a controller 228 for controlling other medical equipment such as a microinfusion pump or a ventilator, ***it is important for the wrist sensor/display unit to be able to both send signals to and receive signals from the soldier unit 50. Thus, the communications mechanism 224 of wrist sensor/display unit 18 has both a transmitter and receiver***." *Id.* at 11: 14-27. *Jacobsen* also specifies that the communications mechanism 224 is part of a wireless "local area network or ***body*** -LAN 168." *Id.* at 8 :66-67, 11: 1-13 ~ *see also id.* at FIG. 4A (depicting the wrist sensor/ display unit 18 including a BLAN transmitter and receiver). The '233 patent states: "According to one definition, and subject to the vagaries of radio design and environmental factors, short-range may refer to systems designed primarily for use in and around a premises and thus, ***the range generally is below a mile***. Short-range communications may also be construed as point-to-point communications, examples of which include those compatible with protocols such as

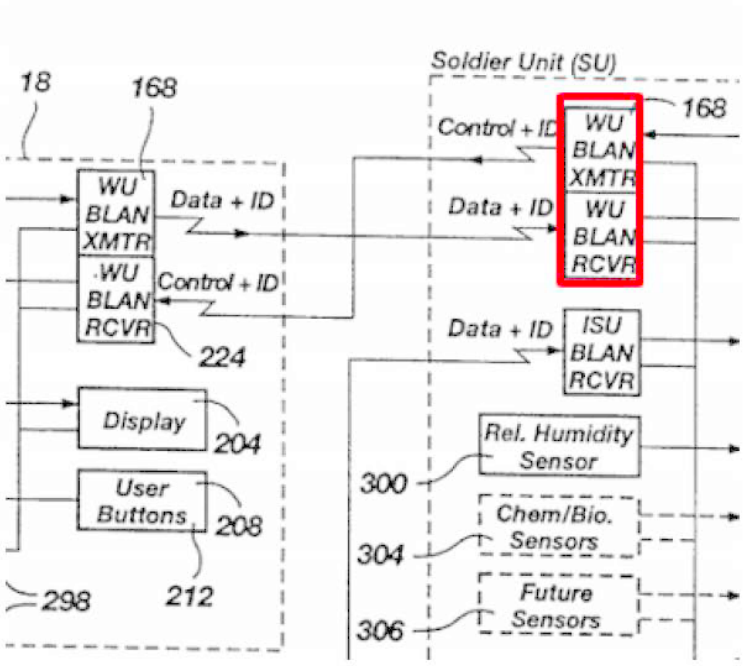
Claim Language	*Jacobsen*
	BLUETOOTH®, HomeRF™, and the IEEE 802.11 ***WAN standard*** (described subsequently)." Ex. 1001, 5:35-43. A body-LAN contained a range of below a mile. And, WANs were typically comprised of interconnected LANs. A POSITA would have understood a body -LAN is a short-range wireless network. Thus, in my opinion, a POSIT A would have understood that *Jacobsen* discloses this claim element. *See also* my discussions in section VIII.A, which are relevant and incorporated here.

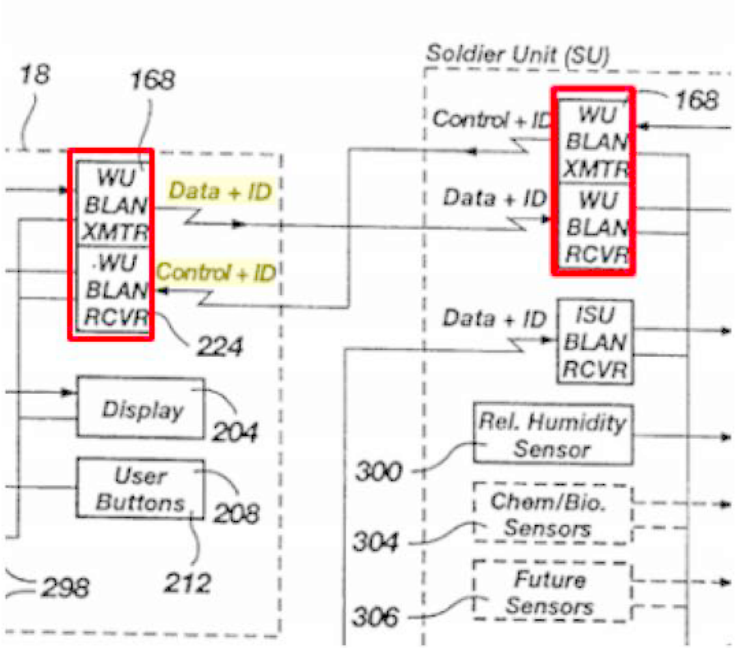
[1g] (b) a second device communicating with the first device, the second device having a short-range bidirectional wireless communications module compatible with the short-range bi-directional wireless communications module of the first device; and

Claim Language	*Jacobsen*
(b) a second device communicating with the first device, the second device having a short-range bi-directional wireless communications module compatible with the short-range bi-directional wireless	*Jacobsen* discloses a **second device** ("**vest/harness" with "soldier unit 50**") communicating with the first device ("wrist sensor/display unit 18"), the second device having a short-range bi-directional wireless communications module compatible with the short-range bi-directional wireless communications module of the first device.

Claim Language	*Jacobsen*
communications module of the first device; and	*Jacobsen* discloses claim 1's "second device" as the "vest/harness" with "soldier unit 50." The **vest/harness with soldier unit 50** is illustrated in Figure 4:  *Fig. 4* "FIG. 4 is a perspective view of a vest/harness configured for holding the soldier status unit." Ex. 1005, 5:35-36; *see also id.* at 9:58-59 ("Disposed in a second pocket 270 in the vest 250 is a second battery pack 272 and the soldier unit 50.") The vest/harness includes soldier unit 50, which contains a "short-range bi-directional wireless communications module compatible with the short-

Claim Language	*Jacobsen*
	range bi-directional wireless communications module" of the wrist sensor/display unit 18 (i.e., claim 1 's "first personal device"). FIG. 4A provides a function block diagram of the arrangement between these two devices:  *See also id.* at 5:37-39. A cropped version of FIG. 4A illustrates the soldier unit 50's short-range bi-directional communications module communicating with the shortrange bi-directional communications module of the wrist sensor/display unit 18:

Claim Language	*Jacobsen*
	 *Id.* at FIG. 4A (cropped), 5:37-39. Here, *Jacobsen* depicts the "BLAN XMTR " (body-LAN transmitter) and "BLAM RCVR" (body-LAN receiver) module in soldier unit 50. As explained for claim element l[e], *Jacobsen's* BLAN stands for "body-LAN," which is a short-range wireless network. The soldier unit 50's body-LAN module is "compatible with the short-range bi-directional wireless communications module" of the wrist sensor/display unit 18 because it engages in bidirectional communications with the wrist sensor/display unit 18's body-LAN module. *Id.* at 6:45-57, 9:42-47, 11: 1-27. Figure 4A above depicts this compatibility: "data + ID" is sent from the wrist sensor/display unit 18"s communications module to be received by soldier unit 50's

Claim Language	*Jacobsen*
	communications module, and "control + ID" is sent from soldier unit 50's communications module to be received by wrist sensor/ display unit 18 's communications module:  *Id.* at FIG. 4A (cropped). *Jacobsen* further explains communication s between the two devices: "***Physiological data is conveyed from the*** integrated sensor unit 14, and ***wrist sensor/display unit 18*** (if so used) ***to an executive controller of a soldier unit***, generally indicated at 50, which is disposed within a harness 56, such as a vest or jacket, of the uniform 58 worn by the soldier 10." *Id.* at 6:45-49.

Claim Language	*Jacobsen*
	"***The soldier unit 50 contained within the harness 56 is responsive to*** the integrated sensor unit 14 and ***wrist sensor/ display unit 18 in that it receives sensor data*** and communicates the data to a remote monitoring unit, such as the leader/medic unit and/or the command unit which are discussed in detail below." *Id.* at 6:52-57. "***If sensors are provided, the wrist sensor/display unit 18 will also include a communications mechanism 224 for communicating*** with the integrated sensor unit 14, or with **the soldier unit 50**, and a controller 226 for processing the information obtained by the sensors 220 and 222, and for operating the display 204." *Id.* at 9:42-47. "The wrist sensor/display unit 18 shown in FIG. 4A contains all of the same elements described above, except that the power management battery combination 298 is shown, and the communications mechanism 224 is shown in additional detail. The communications mechanism 224 forms part of the body local area network 168. ***By providing for a wireless body-LAN 168***, the integrated sensor unit 14 and ***the wrist sensor/ display unit 18 are able to communicate with the soldier unit 50*** without

Claim Language	*Jacobsen*
	interfering with the ability of the soldier to perform his/her duties." *Id.* at 11:1-10. "***While both the integrated sensor unit 14 and the wrist sensor/display unit 18 communicate through the body-LAN 168***, the involvement of the communications are different. Because the integrated sensor unit 14 simply senses physiological status and generates signals indicative of the same, the integrated sensor unit will typically only send signals to the soldier unit 50. In contrast, because the wrist sensor/display unit 18 displays information regarding position [sic] can can include a controller 228 for controlling other medical equipment such as a microinfusion pump or a ventilator, ***it is important for the wrist sensor/display unit to be able to both send signals to and receive signals from the soldier unit 50. Thus, the communications mechanism 224 of wrist sensor/display unit 18 has both a transmitter and receiver***." *Id.* at 11: 14-27. Thus, in my opinion, a POSIT A would have understood that *Jacobsen* discloses this claim element. *See also* my discussions in section VIII.A, which are relevant and incorporated here.

[1h] (c) a security mechanism governing information transmitted between the first personal device and the second device.

Claim Language	*Jacobsen*
(c) a security mechanism governing information transmitted between the first personal device and the second device.	*Jacobsen* discloses a security mechanism governing information transmitted between the first personal device ("wrist sensor/display unit 18") and the second device (vest/harness with "soldier unit 50"). The '233 patent' s specification includes a section titled "Security." In this section, the '233 specification provide s a list of "possible embodiments of security" which is "not meant to be exclusive." Ex. 1001, 13:24, 13:41-42. One example given in this list is "the user of the personal device 100 may have a security key that he can enter to release information or access to authorized parties." *Id.* at 13:52-54. Dependent claim 4 also states that this claimed "security mechanism" can include "a key entered by a user of the first personal device." *Id.* at 15:17-20. Similar to the security mechanisms described in the '233 patent, *Jacobsen* discloses the wrist sensor/display unit 18 and soldier unit 50 operating only when users enter the correct password. For example, *Jacobsen* discloses that all of his system 's devices may require security codes in order to operate:

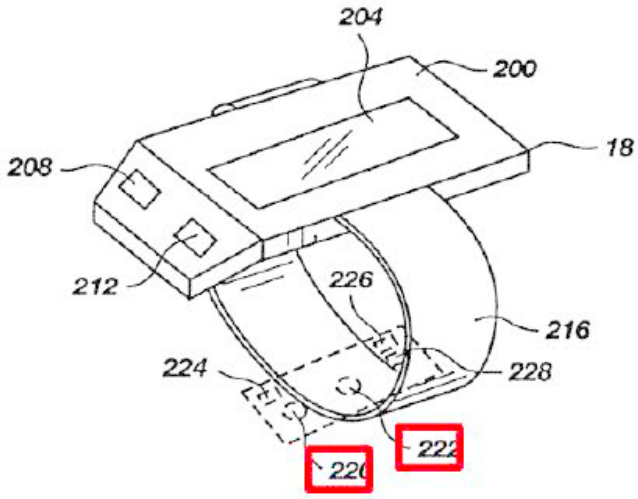
Claim Language	*Jacobsen*
	"To ensure that none of the devices may be used against the soldiers if captured by the enemy, ***each device may contain a self-disabling means***, such as software which requires the entry of a password or some other code. If the wrong password is entered for more than one attempt, the device will automatically disable itself." Ex. 1005, 15:5- 10. Although *Jacobsen* only elaborated on this self-disabling functionality with respect to the soldier unit 50, the leader/medic control unit, and the command unit, he clearly states that" ***each device*** may contain a self-disabling means[.]" Compare *id.* at 15:10-14 ("While disablement will not be critical for soldier units, it is important that leader/medic control units and command units not be usable by an enemy to track the position of the soldiers which are monitored by those unit s") with *id.*at 15: 6-7. Therefore, *Jacobsen* discloses the wrist sensor/display unit 18 and/or soldier unit 50 requiring a user-entered password in order to operate. *Jacobsen's* description of "***disabling" devices upon entry of a wrong passcode*** *is a* ***"security mechanism governing information transmitted***" between these devices. A device that was disabled would not have

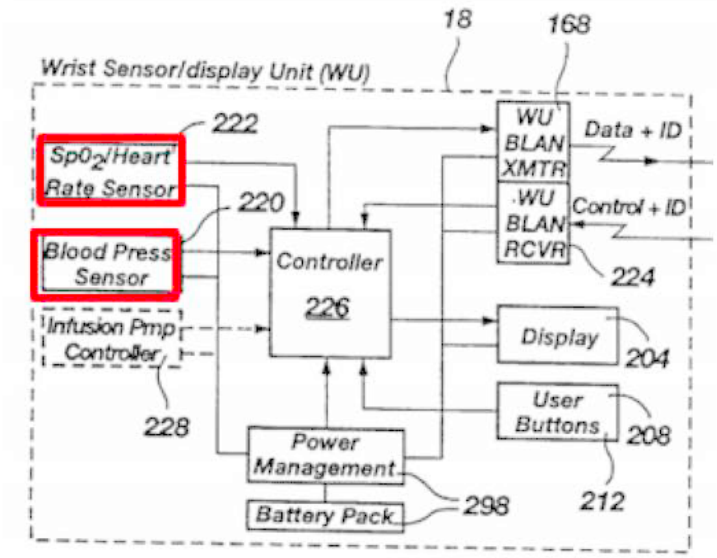
Claim Language	*Jacobsen*
	been able to transmit information in the manner described in *Jacobsen*. For example, as I explained above, the wrist sensor /display unit 18 transmits sensor data to the soldier unit 50. A "disable[d]" wrist sensor /display unit 18 could no longer transmit sensor data, and therefore disablement would govern the transmission of sensor data to the soldier unit 50. Moreover, a POSITA would have understood *Jacobsen's* passcode entry failure, leading to device "disable[ment]," as the passcode governing transmission of information between that device. It was widely known at the time that device passcodes were used to govern transmission of information. *See e.g.* Ex. 1041, 1:5-3:21 (describing systems using passcodes that governed information transmission), Ex. 1042, 1:9-2:13, 6:59-7:2, 15:8-32, 17:28-31 (same). Thus, in my opinion, a POSITA would have understood that *Jacobsen* discloses this claim element. *See also* my discussions in section VIII.A, which are relevant and incorporated here.

2. Claim 7

88. As described below, *Jacobsen* discloses the features of claim 7.

Claim Language	*Jacobsen*
7. The system of claim 1, further comprising a detector connected to the at least one detector input.	*Jacobsen* discloses the system of claim 1, further comprising a detector connected to the at least one detector input. As I explained above in claim element 1 [e], *Jacobsen's* "**wrist sensor/display unit 18**" contains "**modularly connected" sensors**. Ex. 1005 at 10:59-67 ("As will be appreciated, as sensor technology improves and facilitates the use of smaller, less energy consumptive sensors, the number of sensors which may be practically included in the integrated sensor unit can be increased. ***Such sensors could also be modularly connected*** to either the integrated sensor unit 14 or ***to the wrist sensor/display unit 18*** such that sensors could be added when needed, and then removed to enable the use of still other sensors"); *see also id.* at FIG. 4A (illustrating connection between sensors and wrist sensor/display unit 18). These sensors may be connected to the wrist sensor/display unit 18's wristband, or elsewhere. *See id.* at FIG 3, 6:22-42, 9:34-37 ("The wrist sensor/display unit 18 is held in place with a band 216. If desired, sensors 220 and 222 can be disposed in the band 216 and integrated with the integrated sensor unit 14 FIGS. 1 and 2.")

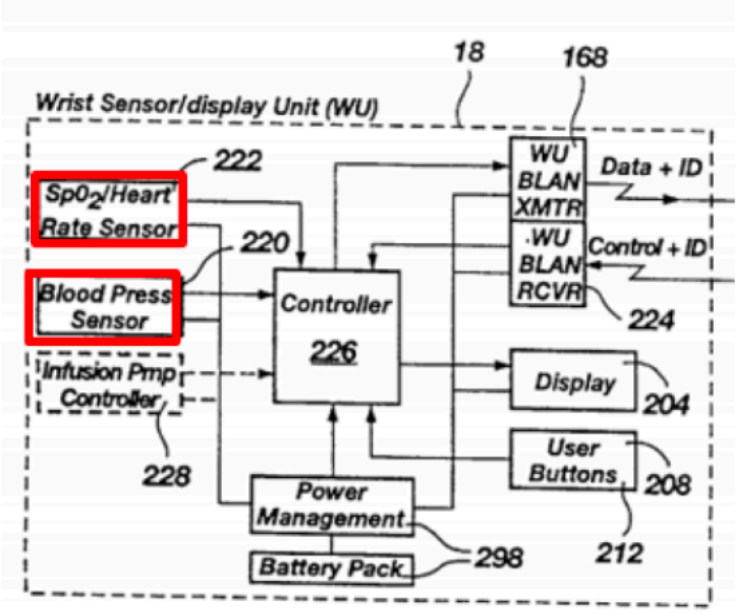
Claim Language	*Jacobsen*
	Specifically, *Jacobsen* describes the wrist sensor/display unit 18 with **connected "sensors 220 and 222**." These sensors are illustrated in FIG. 3:  *Fig. 3* In reference to this figure, *Jacobsen* states: "The wrist sensor/display unit 18 is held in place with a band 216. If desired, sensors 220 and 222 can be disposed in the band 216 and integrated with the integrated sensor unit 14 FIGS. 1 and 2)." *Id.* at 9:34-37. Each of these sensors 220 and 222 is a "detector" that is connected to a "detector input" as explained above for limitation [1e]. *Jacobsen* also illustrates these sensors 220 and 222 (and their connection to the wrist sensor/display unit 18) in FIG. 4A's function block diagram (cropped):

Claim Language	*Jacobsen*
	 Thus, in my opinion, a POSIT A would have understood that *Jacobsen* discloses this claim. *See also* my discussions in section VIII.A, which are relevant and incorporated here.

3. Claim 8

89. As described below, *Jacobsen* discloses the features of claim 8.

Claim Language	*Jacobsen*
8. The system of claim 7, wherein the detector senses body or physiological parameters	*Jacobsen* discloses the system of claim 7, wherein the detector senses body or physiological parameters. As described in claim element 1 [e] and claim 7, *Jacobsen's* "**wrist sensor/display unit 18**" includes **connected "sensors 220 and 222.**" These sensors detect physiological parameters.

Claim Language	*Jacobsen*
	Sensors 220 and 222 are described as "typically" including a "noninvasive blood pressure monitor" and a "sensor for determining oxygen saturation": "Typically, sensor 220 will be a noninvasive blood pressure monitoring system, and sensor 222 will be a sensor for determining oxygen saturation." Ex. 1005, 9:37-41, *see also id.* at 3:29-35, 19:33-55, 22:6-9, 23:17-28.  *Id.* at FIG. 4A (cropped). Notably, these sensors 220 and 222 are similar to the physiological "detectors" (or, "sensors") described in the '233 patent (Ex. 1001, 3 :28-34) and thus are detectors that sense body/physiological. parameters (*e.g.*, blood pressure, oxygen saturation levels, etc.).

Claim Language	*Jacobsen*
	Thus, in my opinion, a POSIT A would have understood that *Jacobsen* discloses this claim. *See also* my discussions in section VIII.A, which are relevant and incorporated here.

4. Claim 9

90. As described below, *Jacobsen* discloses the features of claim 9.

Claim Language	*Jacobsen*
9. The system of claim 8, wherein the body or physiological parameters are selected from the group consisting of temperature, motion, respiration, blood oxygen content, and electroencephalogram.	*Jacobsen* discloses the system of claim 8, wherein the body or physiological parameters are selected from the group consisting of temperature, motion, respiration, blood oxygen content, and electroencephalogram. As I discussed above for claims 1, 7-8, *Jacobsen* discloses its "**wrist sensor/display unit 18**" with **connected "sensor 222**" that is "**a sensor for determining oxygen saturation**." Ex.1005, 9:33-40; *see also id.*, 3:29-35, 19:33-55, 22:6-9, 23:17-28. Determining oxygen saturation is synonymous with determining blood oxygen content. Therefore, at least *Jacobsen's* sensor 222 detects blood oxygen content. So, *Jacobsen's* wrist sensor/display unit 18 contains connected sensor 222 which detects body or physiological parameters including blood oxygen content.

Claim Language	*Jacobsen*
	Thus, in my opinion, a POSITA would have understood that *Jacobsen* discloses this claim. *See also* my discussions in section VIII.A, which are relevant and incorporated here.

5. Claim 10

91. As described below, *Jacobsen* discloses the features of claim 10.

Claim Language	*Jacobsen*
10. The system of claim 1, wherein the first personal device further comprises a user interface module.	*Jacobsen* discloses the system of claim 1, wherein the first personal device ("wrist sensor/display unit 18") further comprises a user interface module. The '233 patent states "[o]ptionally, PMD 100 includes a User Interface Module 50 (UIM) 200. The UIM 200 may allow users to view or enter data, conduct voice communications, use a camera to transmit images, or view a screen for graphical images." Ex. 1001, 3:50-53 Similarly, *Jacobsen's* "**wrist sensor/display unit 18**" comprises a "**display screen 204**" which allows users to view data and graphical images **and "control buttons 208 and 212**" which allow users to enter data. FIG. 3 depicts the wrist sensor/display unit 18 with display screen 204 and control buttons 208 and 212

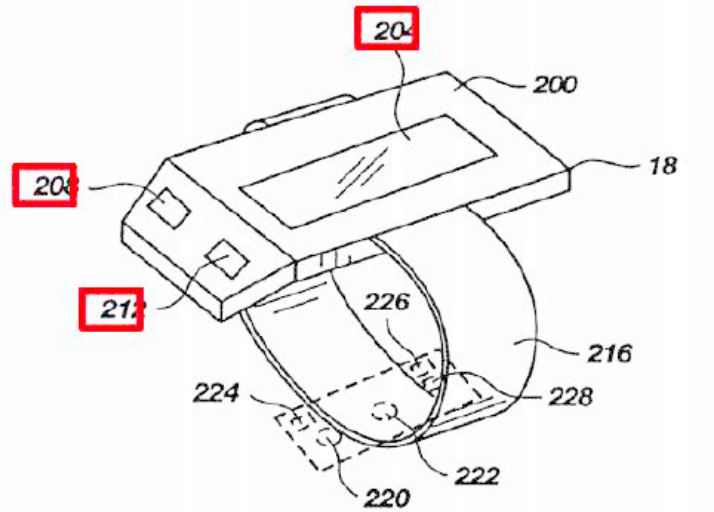
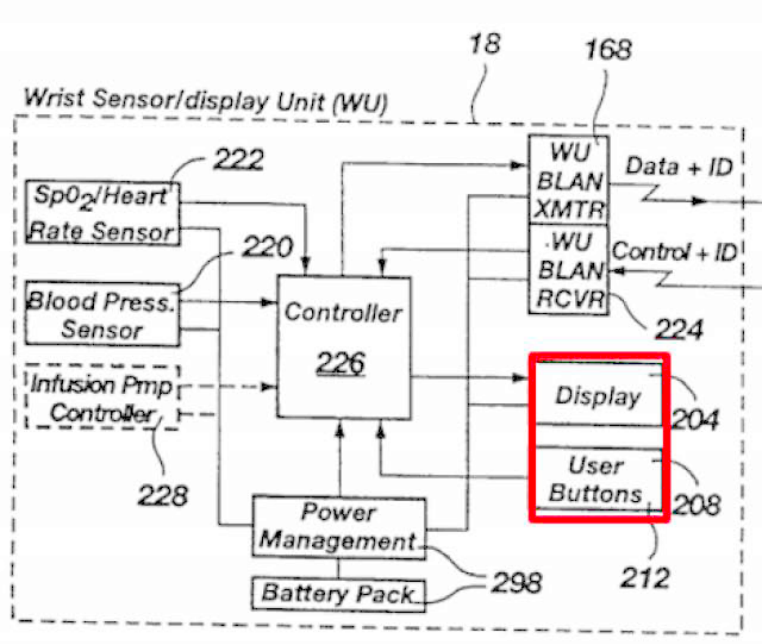


Fig. 3

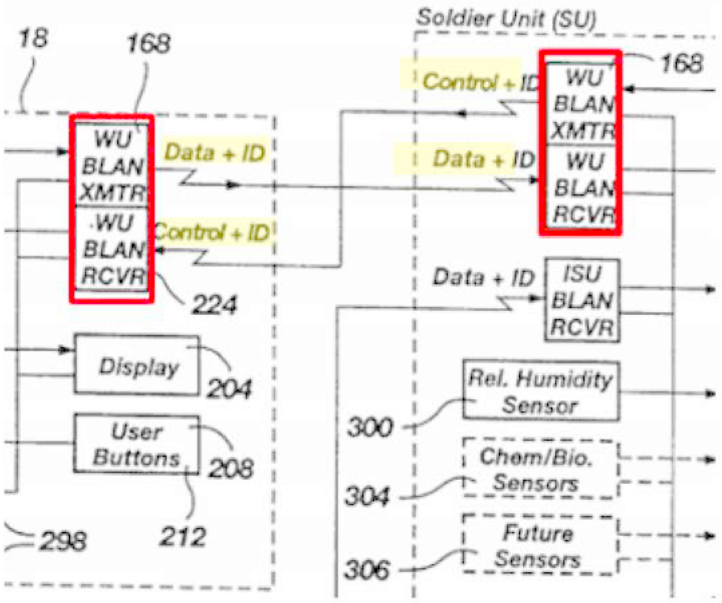
"Referring now to FIG. 3, there is shown a perspective view of the wrist sensor/display unit 18 shown in FIG. 1. ***The wrist sensor/display unit 18 includes*** a body 200 with a ***display screen 204*** contained therein. Typically, the display screen 204 will be an LCD screen, although other types of displays may be used. ***The display screen 204 is used to display information regarding time and geolocation, and could even be used to communicate instructions to a soldier regarding his physiological status, or the position or physiological status of other soldiers. A pair of control buttons 208 and 212 are provided to enable the soldier to choose what information is displayed, and to control the LCD illumination when necessary***." Ex. 1005, 9:21-33

	FIG. 4A also depicts the wrist sensor/display unit 18 including the display screen 204 and user control buttons 208 and 212 (cropped):  *Id.* at FIG. 4A, 9:21-33. *Jacobsen* explains that the primary purpose of the wrist sensor/display unit 18 is for "viewing information regarding the time and the geolocation of the soldier 10." *Id.* at 6:40-41. Thus, in my opinion, a POSITA would have understood that *Jacobsen* discloses this claim. *See also* my discussions in section VIII.A, which are relevant and incorporated here.

6. Claim 14

92. As described below, *Jacobsen* discloses the features of claim 14.

Claim Language	***Jacobsen***
14. The system of claim 1, wherein the first personal device further comprises a data input/output port, the second device further comprises a data input/output port, and wherein the second device communicates with the first personal device using the data input/output ports.	*Jacobsen* discloses the system of claim 1, wherein the **first personal device ("wrist sensor/display unit 18")** further comprises a data input/output port, the **second device (vest/harness with "soldier unit 50**") further comprises a data input/output port, and wherein the second device communicates with the first personal device using the data input/output ports. The '233 patent states "Data I/O ports 160 may include, but are not limited to: serial, parallel, USB, etc." Ex. 1001, 3:48-49. A data I/O port refers to any port that is capable of sending (output) and receiving (input) data. As I described above for claim 1, in *Jacobsen's* system, the soldier unit 50 and the wrist sensor/display unit 18 communicate bi-directionally using **body-LAN wireless communications modules**. Figure 4A illustrates these units' communications modules and provides arrows depicting the flow of data being received (input) and transmitted (output) from each module:

Claim Language	*Jacobsen*
	 Ex. 1005, FIG. 4A (cropped). As illustrated in this figure, the wrist sensor/display unit 18's communications module **outputs "data + ID" data and inputs "control + ID" data**, and the soldier unit 50's communications module **outputs "control + ID data and inputs "data + ID" data**. *Id.* at 6:45-57, 11:14-27. Since *Jacobsen* discloses body-LAN communication modules that are capable of sending and receiving data, a POSITA would have understood the disclosed body-LAN communication modules are data I/O ports used to facilitate communications between the wrist sensor/display unit 18 and the soldier unit 50. Therefore, *Jacobsen* discloses the wrist sensor/display unit 18 and soldier unit 50 including data I/O ports, and discloses soldier unit 50

Claim Language	*Jacobsen*
	communicating with the wrist sensor/display unit 18 with these data I/O ports. Thus, in my opinion, a POSITA would have understood that *Jacobsen* discloses this claim element. *See also* my discussions in section VIII.A, which are relevant and incorporated here

B. Ground 2: Say discloses and/or suggests the features of claims 1, 7-10, and 14 of the '233 patent

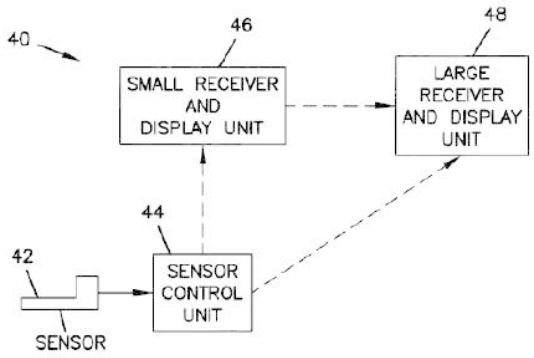
93. In my opinion, *Say* discloses and/or suggests the features of claims 1, 7-10, and 14 of the '233 patent. Below, I address each of these claims and their respective limitations.

1. Claim 1

94. As described below, *Say* discloses and/or suggests the features of claim 1.

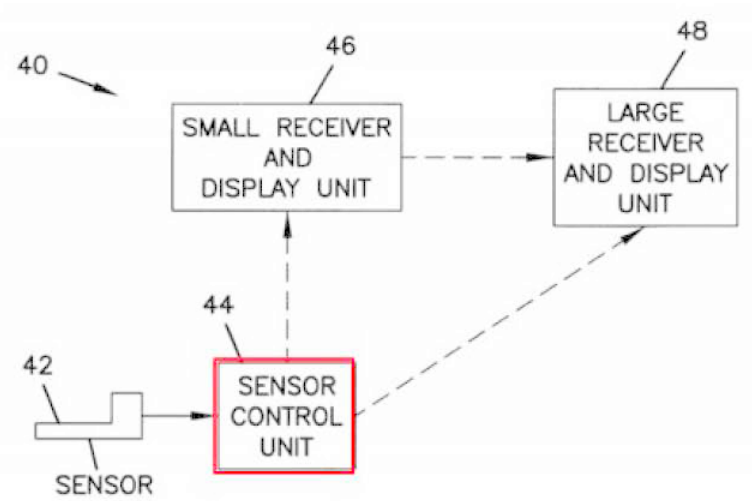
[1p] A bi-directional wireless communication system comprising:

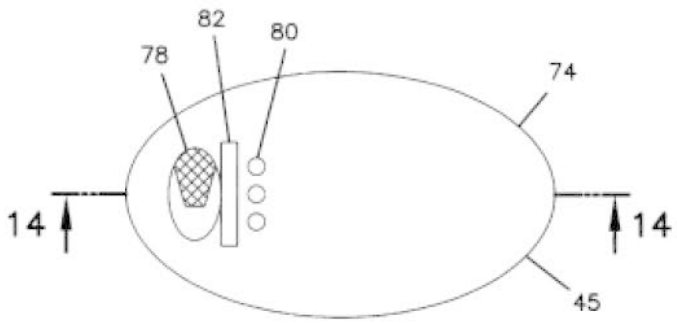
Claim Language	*Say*
A bi-directional wireless communication system comprising:	For purposes of this analysis, I assume the preamble is limiting. *Say* discloses a bi-directional wireless communication

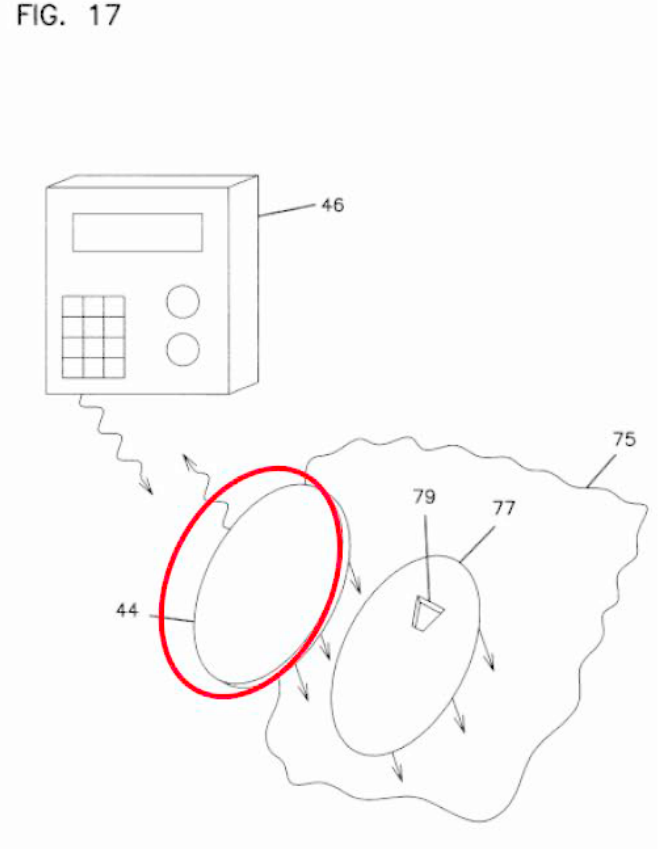
Claim Language	*Say*
	system. *Say*'s "**analyte monitoring system 40**" is illustrated in Figure 1: FIG. 1  Ex. 1006, FIG. 1, 3:63-65, 6:52-7:12. This system includes a "sensor 42 [] coupled to the sensor control unit 44 which is typically attached to the skin of a patient." *Id.* at 6:59-61. The sensor control unit 44 communicates with one or more "receiver/display units 46, 48." *Id.* at 6:64-7:6. As I explain in more detail below, the **sensor control unit 44 ("first personal device**") and the **receiver/display units 46, 48 ("second device**") engage in wireless bi-directional communications. *See e.g. id.* at 36:61-37:4, 37:26-35, 41:27-53, 43:21-35, 47:49-48:17, 52:46-55. Therefore, *Say* discloses the claimed bi-directional wireless communication system.

Claim Language	*Say*
	Thus, in my opinion, a POSITA would have understood that *Say* discloses this claim element. *See also* my discussions in section VIII.B and for claim elements 1[a]-[h], which are relevant and incorporated here.

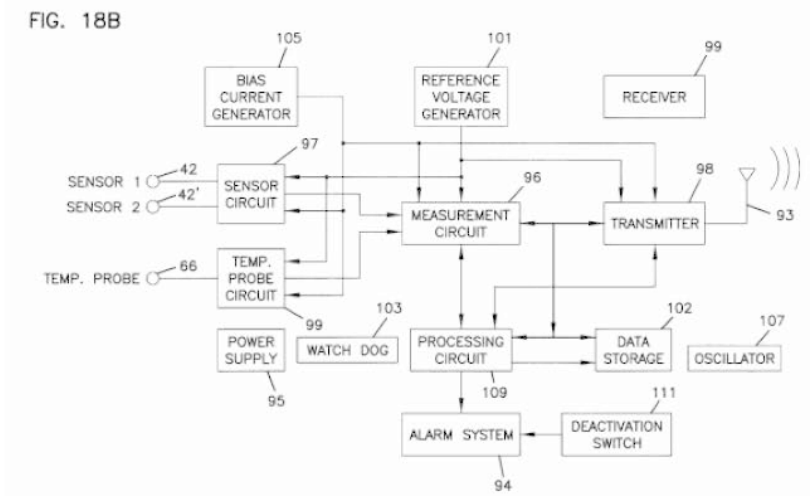
[1a] (a) a first personal device, the first personal device further comprising:

Claim Language	*Say*
(a) a first personal device, the first personal device further comprising	*Say* discloses a first personal device ("sensor control unit 44"). *Say* discloses a wearable "**sensor control unit 44**" which comprises all characteristics of claim 1's "**first personal device**." Figure 1 illustrates this device as a component of *Say*'s analyte monitoring system 40: 

Claim Language	*Say*
	Ex 1006, FIG. 1, 1:63-65, 6:52-7:12. The sensor control unit 44 is configured to be placed on the skin of a patient and may have a thin oval shape (*id.* at 29:28-40, 31:63- 32:5), like the example of the sensor control unit 44 depicted in Figures 15 and 17 (top view and perspective view, respectively, of the same sensor control unit 44: FIG. 15 

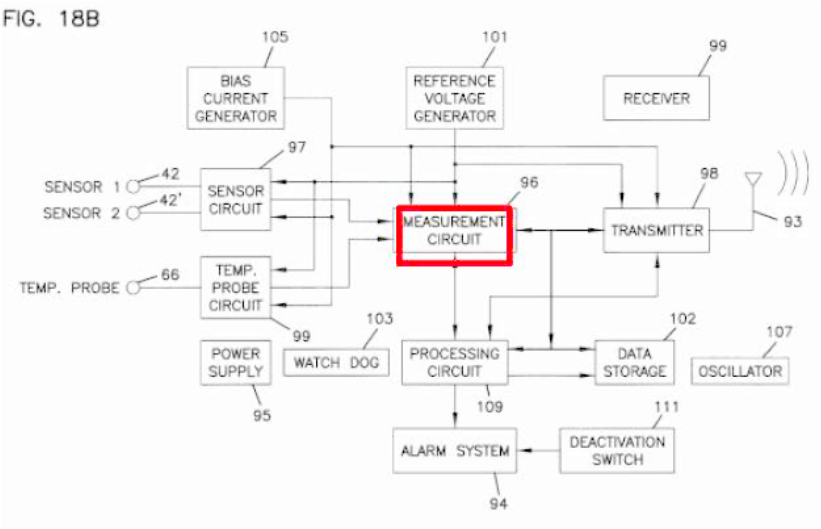
Claim Language	*Say*
	FIG. 17  *Id.* at FIGS. 15, 17, 4:28-33, 29:27-32:5. *Say* generally describes this device: "The on-skin sensor control unit 44 is configured to be placed on the skin of a patient. The on-skin sensor control unit 44 is optionally formed in a shape that is comfortable to the patient and which may permit concealment, for example, under a patient's clothing. The thigh, leg, upper arm, shoulder, or abdomen are convenient parts of the patient's body for placement of the on-skin sensor control unit 44 to maintain

Claim Language	*Say*
	concealment. However, the on-skin sensor control unit 44 may be positioned on other portions of the patient's body." *Id.* at 29:28-40. "The on-skin sensor control unit 44 includes a housing 45, as illustrated in FIGS. 14-16. The housing 45 is typically formed as a single integral unit that rests on the skin of the patient. The housing 45 typically contains most or all of the electronic components, described below, of the on-skin sensor control unit 44. The on-skin sensor control unit 44 usually includes no additional cables or wires to other electronic components or other devices. If the housing includes two or more parts, then those parts typically fit together to form a single integral unit." *Id.* at 29:55-64. Figure 18B provides a block diagram of an exemplary sensor control unit 44:

Claim Language	*Say*
	 *Id.* at FIGS. 18B, 4:36-37. This block diagrams provide detail regarding the components of the relevant embodiment of the on-skin sensor control unit 44, which will be discussed in more detail below. Thus, in my opinion, a POSITA would have understood that *Say* discloses this claim element. See also my discussions in section VIII.B, which are relevant and incorporated here.

[1b] (i) a processor;

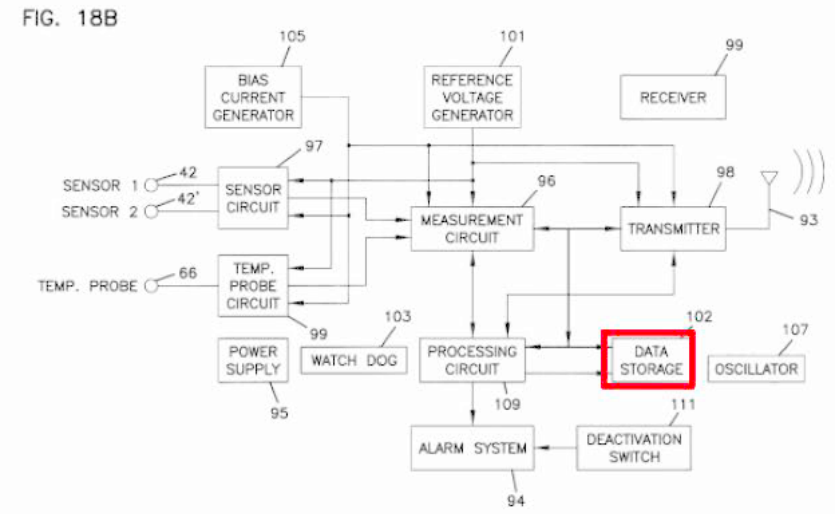
Claim Language	*Say*
(i) a processor;	*Say* discloses a first personal device ("sensor control unit 44") containing a processor. *Say's* **"sensor control unit 44"** contains a processor. Figure 18B provides a diagram of an

Claim Language	*Say*
	"exemplary on-skin sensor control unit 44" which includes "**processing circuit 109**":  Ex. 1006, FIGS. 18B, 4:36-37, 36:40-60, 37:26-35. *Say* describes potential functions carried out by processing circuit 109: "The processing circuit 109 may have one or more of the following functions: 1) transfer the signals from the measurement circuit 96 to the transmitter 98, 2) transfer signals from the measurement circuit 96 to the data storage circuit 102, 3) convert the information-carrying characteristic of the signals from one characteristic to another (when, for example, that has not been done by the measurement circuit 96), using, for example, a current-to-voltage converter, a current-to- frequency

Claim Language	*Say*
	converter, or a voltage-to-current converter, 4) modify the signals from the sensor circuit 97 using calibration data and/or output from the temperature probe circuit 99, 5) determine a level of an analyte in the interstitial fluid, 6) determine a level of an analyte in the bloodstream based on the sensor signals obtained from interstitial fluid, 7) determine if the level, rate of change, and/or acceleration in the rate of change of the analyte exceeds or meets one or more threshold values, 8) activate an alarm if a threshold value is met or exceeded, 9) evaluate trends in the level of an analyte based on a series of sensor signals, 10) determine a dose of a medication, and 11) reduce noise and/or errors, for example, through signal aver aging or comparing readings from multiple working electrodes 58." *Id.* at 39:53-40:16. *Say* explains that "[t]he processing circuit 109 may be simple and perform only one or a small number of these functions or the processing circuit 109 may be more sophisticated and perform all or most of these functions." *Id.* at 40:17-27; see also *id.* at 40:43- 41:3 ("Returning to the processing circuit 109, in some embodiments processing circuit 109 is more sophisticated and is capable of determining the analyte concentration or some measure representative of the analyte concentration, such as a current or

Claim Language	*Say*
	voltage value. . . The processing circuit 109 may also incorporate calibration data which has been received from an external source or has been incorporated into the processing circuit 109, both of which are described below, to correct the signal or analyzed data from the working electrode 58. Additionally, the processing circuit 109 may include a correction algorithm for converting interstitial analyte level to blood analyte level.") A POSITA would have understood in context that processing circuit 109 necessarily included a processor, given *Say*'s explanation of its "sophisticated" processing functions. Moreover, at least once, *Say* refers to a "**processor circuit 109** of the on-skin sensor control unit 44." A POSITA would have understood a processor circuit to contain a processor. Thus, in my opinion, a POSITA would have understood that *Say* discloses this claim element. See also my discussions in section VIII.B, which are relevant and incorporated here.

[1e] (ii) a memory;

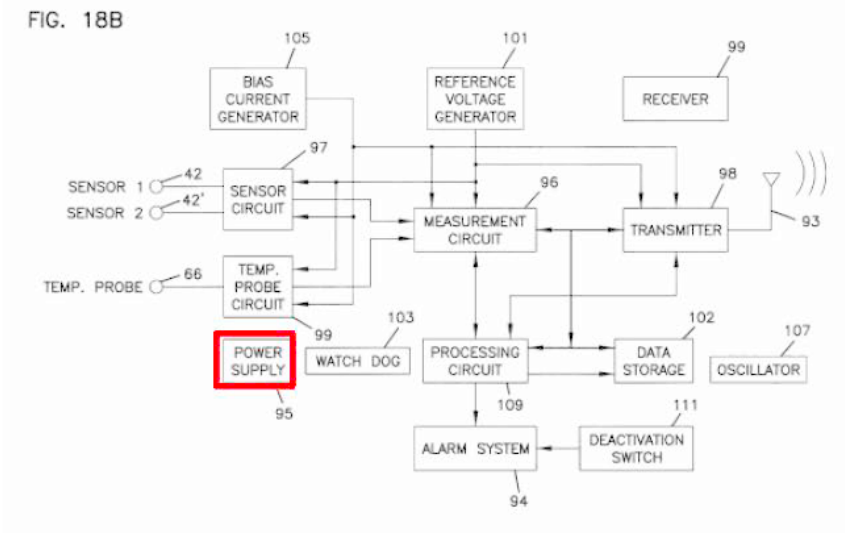
Claim Language	*Say*
(ii) a memory;	*Say* discloses a first personal device ("sensor control unit 44") containing a memory. *Say*'s "**sensor control unit 44**" contains "**data storage 102**." As I described above, Figure 18B provides a block diagram of an exemplary sensor control unit 44, which includes "data storage 102":  E x. 1006, FIG. 18B, 4:36-37, 36:61-37:4, 44:54-45:7. *Say* states: "The on-skin sensor control unit 44 may optionally contain a transmitter 98 for transmitting the sensor signals or processed data from the processing circuit 109 to a receiver/ display unit 46, 48; ***a data storage unit 102 for temporarily or permanently storing data*** from the processing circuit 109; a

Claim Language	*Say*
	temperature probe circuit 99 for receiving signals from and operating a temperature probe 66; a reference voltage generator 101 for providing a reference voltage for comparison with sensor-generated signals; and/or a watchdog circuit 103 that monitors the operation of the electronic components in the on-skin sensor control unit 44." *Id.* at 36:61-37:4. The on-skin sensor unit 44' s data storage unit 102 "typically includes a readable/writeable memory storage device and typically also includes the hardware and/or software to write to and/or read the memory storage device." *Id.* at 45:4-7. *Say* describes the functions of the data storage unit 102: "The on-skin sensor control unit 44 may include an optional data storage unit 102 which may be used to hold data (*e.g.*, measurements from the sensor or processed data) from the processing circuit 109 permanently or, more typically, temporarily. The data storage unit 102 may hold data so that the data can be used by the processing circuit 109 to analyze and/or predict trends in the analyte level, including, for example, the rate and/or acceleration of analyte level increase or decrease. The data storage unit 102 may also or alternatively be used to store data during periods in which a receiver/ display unit 46, 48 is not

Claim Language	*Say*
	within range. The data storage unit 102 may also be used to store data when the transmission rate of the data is slower than the acquisition rate of the data." *Id.* at 44:54-45:7. Thus, in my opinion, a POSITA would have understood that *Say* discloses this claim element. See also my discussions in section VIII.B, which are relevant and incorporated here.

[1d] (iii) a power supply;

Claim Language	*Say*
(iii) a power supply;	*Say* discloses a first personal device ("sensor control unit 44") containing a power supply. *Say*'s "**sensor control unit 44**" contains "**power supply 95**." As I described above, Figure 18B provides an exemplary block diagram of the sensor control unit 44, which includes "power supply 95":

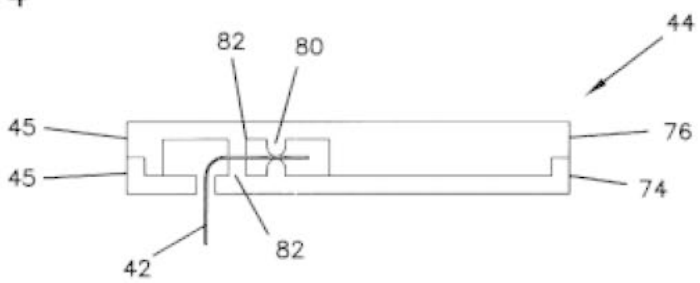
Claim Language	*Say*
	FIG. 18B  Ex. 1006, FIGS. 18B, 4:36-37, 36:61-37:4, 37:45-58. *Say* states: "***The electronic components of the on-skin sensor control unit 44 typically include a power supply 95*** for operating the on-skin control unit 44 and the sensor 42, a sensor circuit 97 for obtaining signals from and operating the sensor 42, a measurement circuit 96 that converts sensor signals to a desired format, and a processing circuit 109 that, at minimum, obtains signals from the sensor circuit 97 and/or measurement circuit 96 and provides the signals to an optional transmitter 98." *Id.* at 36:40-60. This power supply operates the electronics in the on-skin sensor control. *Id.* at 37:45-58. At various places in the disclosure, *Say* specifically refers to "power supply 95" as both a "voltage source" (*id.* at 34:66-35:5 ("Each pin 84 also has a proximal end

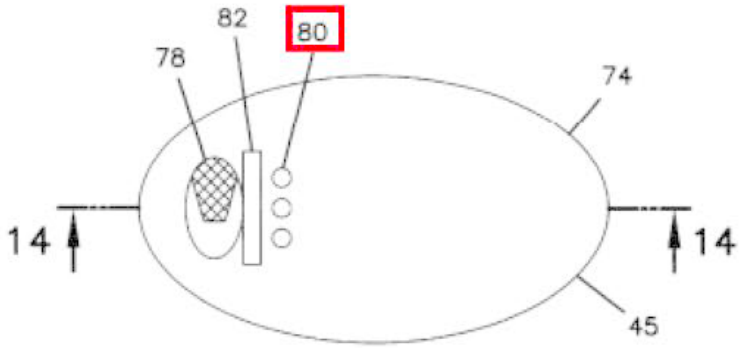
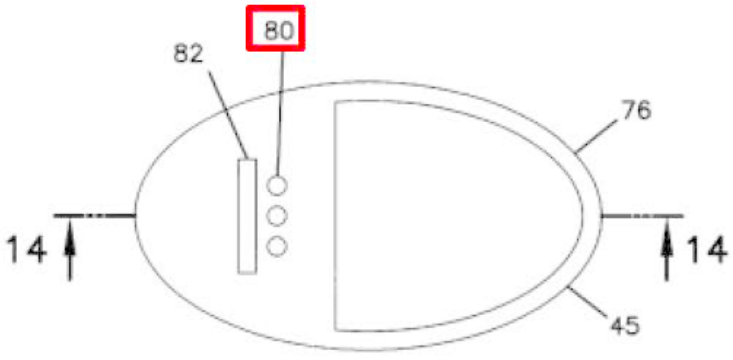
Claim Language	*Say*
	that is coupled to a wire or other conductive strip that is, in turn, coupled to the rest of the electronic components (*e.g.,* the voltage source 95 and measurement circuit 96 of FIGS. 18A and 18B) within the on-skin sensory control unit 44")) and a "battery" (*id.* at 37:45-58 ("One example of a suitable power supply 95 is a battery, for example, a thin circular battery, such as those used in many watches, hearing aids, and other small electronic devices"). Batteries were known to provide power to devices. Thus, in my opinion, a POSITA would have understood that *Say* discloses this claim element. See also my discussions in section VIII.B, which are relevant and incorporated here.

[1e] (iv) at least one detector input; and

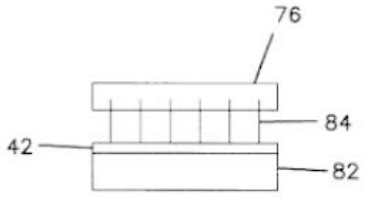
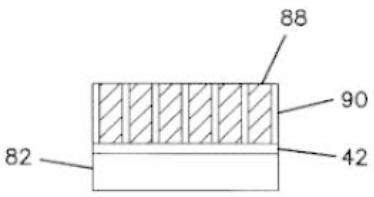
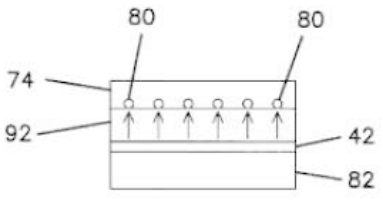
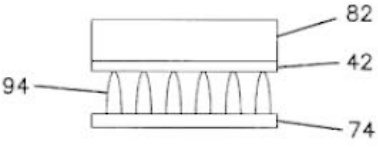
Claim Language	*Say*
(iv) at least one detector input; and	*Say* discloses a first personal device ("sensor control unit 44") containing at least one detector input. The '233 patent illustrates "detector inputs 140" in FIG. 2 and states: "In one embodiment, PMD 100 includes connections to detectors 140. Detectors 140 may be any sensor of bodily or physiological parameters such as, but not limited to: temperate, motion, respiration, blood

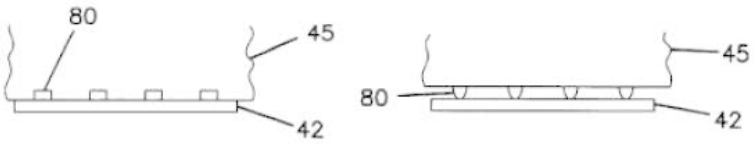
Claim Language	*Say*
	oxygen content, electrocardiogram (ECG), electroencephalogram (EEG), and other measurements." Ex. 1001, 3:29-33. *Say*'s "**sensor control unit 44**" contains connections to sensors (detectors). Specifically, *Say* discloses the sensor control unit 44 **containing "conductive contacts 80**" which provide a connection to "sensor 42" via sensor 42's "contact pads 49." Ex. 1006, 2:13-32, 3:43-51, 14:9-15:15, 30:33-38, 31:41-62, 34:28-42 *Say* discloses that the on-skin sensor control unit contains "conductive contacts 80" which allow it to be connected to one or more sensors. *Id.* at 2:20-25 ("The sensor control unit includes two or more conductive contacts disposed on the housing and configured for coupling to two or more contact pads on the sensor"), 3:43-51 ("A sensor is inserted into a skin of a patient and a sensor control unit is attached to the skin of the patient. Two or more conductive contacts on the sensor control unit are coupled to contact pads on the sensor"), 30:33- 38 ("In some embodiments, the housing 45 of the on-skin sensor control unit 44 is a single piece. The conductive contacts 80 may be formed on the exterior of the housing 45 or on the interior of the housing 45 provided there is a port 78 in the housing 45 through which the sensor 42 can be

Claim Language	*Say*
	directed to access the conductive contacts 80"), 31:59-62 ("Once the sensor 42 is implanted in the patient, the sensor control unit 44 is placed over the sensor 42 with the conductive contacts 80 in contact with the contact pads 49 of the sensor 42"), 34:28-42 ("The sensor 42 and the electronic components within the on-skin sensor control unit 44 are coupled via conductive contacts 80, as shown in FIGS. 14-16 ... The placement of the conductive contacts 80 is such that they are in contact with the contact pads 49 on the sensor 42 when the sensor 42 is properly positioned within the on- skin sensor control unit 44.") These conductive contacts 80 are shown on the sensor control unit 44 depicted in Figures 14-16. Figure 14 provides a cross-sectional view of the sensor control unit 44 with conductive contacts 80: FIG. 14  *Id.* at FIG. 14, 4:25-26. Figure 15 provides a top view of the sensor control

Claim Language	*Say*
	unit 44 with conductive contacts 80: FIG. 15  *Id.* at FIG. 15, 4:27-28 Figure 16 provides a bottom view of the sensor control unit 44 with conductive contacts 80: FIG. 16  *Id.* at FIG. 16, 4:29-31 Specifically, in reference to Figures 14-16, *Say* explains: "The sensor 42 and the electronic components within the on-skin sensor control unit 44 are coupled via conductive

Claim Language	*Say*
	contacts 80, as shown in FIGS. 14-16. The one or more working electrodes 58, counter electrode 60 (or counter/reference electrode), optional reference electrode 62, and optional temperature probe 66 are attached to individual conductive contacts 80. In the illustrated embodiment of FIGS. 14-16, the conductive contacts 80 are provided on the interior of the on-skin sensor control unit 44. Other embodiments of the on-skin sensor control unit 44 have the conductive contacts disposed on the exterior of the housing 45. The placement of the conductive contacts 80 is such that they are in contact with the contact pads 49 on the sensor 42 when the sensor 42 is properly positioned within the on-skin sensor control unit 44. In the illustrated embodiment of FIGS. 14-16, the base 74 and cover 76 of the on-skin sensor control unit 44 are formed such that, when the sensor 42 is within the on-skin sensor control unit 44 and the base 74 and cover 76 are fitted together, the sensor 42 is bent. In this manner, the contact pads 49 on the sensor 42 are brought into contact with the conductive contacts 80 of the on-skin sensor control unit 44. The on-skin sensor control unit 44 may optionally contain a support structure 82 to hold, support, and/or guide the sensor 42 into the correct position." *Id.* at 34:28-52

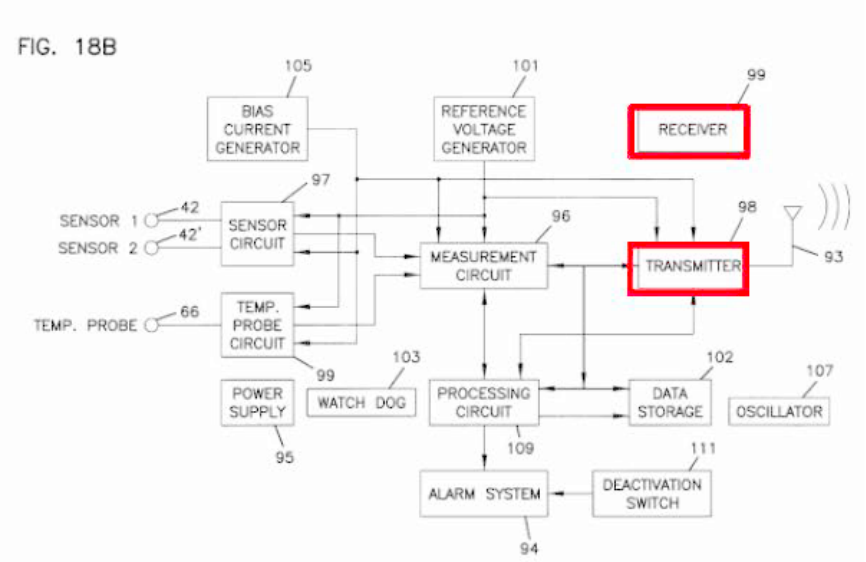
Claim Language	*Say*
	In Figures 19A-F, *Say* provides illustrations of different embodiments of the on-skin sensor control unit 44's conductive contacts. The conductive contacts may be located on the interior of the on-skin sensor control unit 44 (Figures 19A-D) or the exterior of the on-skin sensor control unit 44 (Figures 19E-F). *Id.* at 30:14-18 ("In some embodiments, conductive contacts 80 are provided on the exterior of the housing 45. In other embodiments, the conductive contacts 80 are provided on the interior of the housing 45, for example, within a hollow or recessed region.") FIG. 19A  FIG. 19B  FIG. 19C  FIG. 19D  *Id.* at FIGS. 19A-D

Claim Language	*Say*
	FIG. 19E FIG. 19F  *Id.* at FIGS. 19E-F. *Say* provides more detail regarding these different embodiments at 34:53-35:47. If the conductive contacts are provided on the interior of the on-skin sensor control unit 44's housing, as depicted in FIGS. 19A-D (above), there must also be a "**port 78**" in the housing through which the sensor(s) "can be directed to access the conductive contacts." *Id.* at 30:33-38; see also *id.* at 33:35-45 ("In one embodiment, the on-skin sensor control unit 44 includes a sensor port 78 through which the sensor 42 enters the subcutaneous tissue of the patient, as shown in FIGS. 14 to 16. The sensor 42 may be inserted into the subcutaneous tissue of the patient through the sensor port 78. The on-skin sensor control unit 44 may then be placed on the skin of the patient with the sensor 42 being threaded through the sensor port 78. If the housing 45 of the sensor 42 has, for example, a base 74 and a cover 76, then the cover 76 may be removed to allow the patient to guide the sensor 42

Claim Language	*Say*
	into the proper position for contact with the conductive contacts 80"). Thus, the sensor control unit 44's **conductive contacts 80 (and potentially also sensor port 78**) provide an input for the sensor 42 to connect to the sensor control unit 44. Therefore, sensor 42 is a "detector" within the disclosure of the '233 patent (which I described in more detail for claims 7-9 below) and the sensor control unit 44' s conductive contacts 80 (and potentially also sensor port 78) comprise a "detector input" within the disclosure of the '233 patent. Thus, in my opinion, a POSITA would have understood that *Say* discloses this claim element. See also my discussions in section VIII.B, which are relevant and incorporated here.

[1f] (v) a short-range bi-directional wireless communications module;

Claim Language	*Say*
(v) a short-range bi-directional wireless communications module;	*Say* discloses a first personal device ("sensor control unit 44") including a short-range bi-directional wireless communications module. *Say*'s "**sensor control unit 44**" contains a "**transceiver 98**" and "**receiver 99**" (or just a "transceiver") that

Claim Language	*Say*
	engages in short-range bi-directional wireless communications. As I explained above, Figure 18B depicts an exemplary sensor control unit 44, which contains both a transmitter and receiver:  Ex. 1006, 4:36-37, 36:40-60, 37:26-35, 43:21-35. As I describe in more detail for claim element [lg] below, *Say* discloses that the sensor control unit 44' s transmitter/receiver(or, transceiver) engages in short-range bi-directional wireless communications with a "receiver/display unit 46, 48." Specifically, the sensor control unit 44 evaluates signals received from the sensor and provides them to the "transmitter 98." *Id.* at 36:40-60 ("The electronic components of the on-skin sensor control unit 44 typically include ...a sensor circuit 97 for obtaining

Claim Language	*Say*
	signals from and operating the sensor 42, a measurement circuit 96 that converts sensor signals to a desired format, and a processing circuit 109 that, at minimum, ***obtains signals from the sensor circuit 97 and/or measurement circuit 96 and provides the signals to an optional transmitter 98. In some embodiments, the processing circuit 109 may also partially or completely evaluate the signals from the sensor 42 and convey the resulting data to the optional transmitter 98*** and/or activate an optional alarm system 94 (see FIG. 18B) if the analyte level exceeds a threshold.") This transmitter 98 transmits data from the sensor control unit 44 to a "receiver/display unit 46, 48." *Id.* at 6:63-7:2 ("The sensor control unit 44 may evaluate the signals from the sensor 42 and/or transmit the signals to one or more optional receiver/display units 46, 48 for evaluation"), 36:61-64 ("The on-skin sensor control unit 44 may optionally contain ***a transmitter 98 for transmitting the sensor signals or processed data from the processing circuit 109 to a receiver/ display unit 46, 48***"), 40: 28-42 ('The output data may then be sent to a transmitter 98 that then transmits this data to at least one receiver/display device 46,48"), 41:10-15 ("However, in many embodiments, the data (e.g., a current signal, a converted voltage or frequency signal, or fully or partially analyzed data) from processing circuit 109 is transmitted to one or more receiver/display units

Claim Language	*Say*
	46, 48 using a transmitter 98 in the on-skin sensor control unit 44. The transmitter has an antenna 93"), 41:27-29 ("The transmitter 98 may send a variety of different signals to the receiver/display units 46, 48, typically, depending on the sophistication of the processing circuit 109"). The sensor control unit 44 also contains a "receiver 99" which receives signals from the receiver/display units 46, 48. *Id.* at 37:26-35 ("FIG. 18B illustrates a block diagram of another exemplary on-skin control unit 44 that also includes optional components such as a ***receiver 99*** to receive, for example, calibration data; a calibration storage unit 100 to hold, for example, factory-set calibration data, calibration data obtained via the receiver 99 and/or ***operational signals received, for example, from a receiver/display unit 46, 48*** or other external device; an alarm system 104 for warning the patient; and a deactivation switch 111 to tum off the alarm system"), 43:21-35 ("The receiver 99 may be used to receive calibration data for the sensor 42. The calibration data may be used by the processing circuit 109 to correct signals from the sensor 42. This calibration data may be transmitted by the receiver/display unit 46, 48 or from some other source such as a control unit in a doctor's office. In addition, the optional ***receiver 99 may be used***

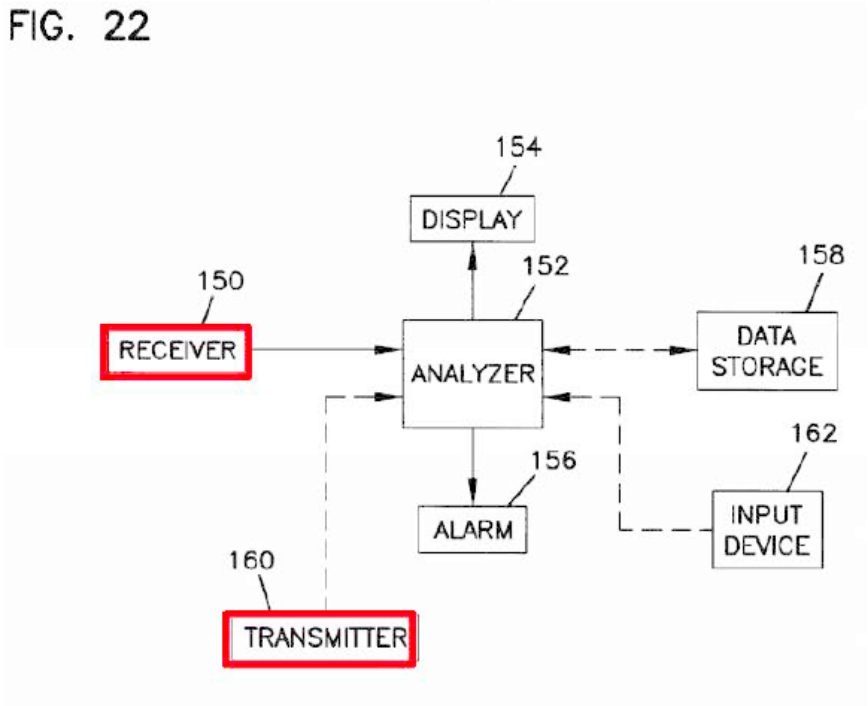
Claim Language	*Say*
	to receive a signal from the receiver/display units 46, 48, as described above, to direct the transmitter 98, for example, to change frequencies or frequency bands, to activate or deactivate the optional alarm system 94 (as described below), and/or to direct the transmitter 98 to transmit at a higher rate"). *Say* also discloses that instead of a separate transmitter and receiver, the sensor control unit 44' s "transmitter 98 is a transceiver, operating as both a transmitter and a receiver." *Id.*, 43:21-24. The transmitter/receiver or transceiver of the sensor control unit 44 is a short-range wireless communications module because the sensor control unit 44 uses this module to engage in short-range wireless communications with the receiver/display units 46, 48. *Say* explains that the communications may be RF (*id.* at 52:44-65) and the distance between which the sensor control unit 44 and receiver/display unit 46, 48 can communicate depends on whether the receiver/display unit is "small" (receiver/display unit 46) or "large" (receiver/display unit 48). *Id.* at 41:10-26 ("The transmitter 98 is typically designed to transmit a signal up to about 2 meters or more, preferably up to about 5 meters or more, and more preferably up to about 10

Claim Language	*Say*
	meters or more, when transmitting to a small receiver/display unit 46, such as a palm-size, belt worn receiver. The effective range is longer when transmitting to a unit with a better antenna, such as a bedside receiver"), 48:49-62 ("The small receiver/display unit 46 can typically receive a signal from an on-skin sensor control unit 44 that is up to 2 meters, preferably up to 5 meters, and more preferably up to 10 meters or more, away. A large receiver/display unit 48, such as a bedside unit, can typically receive a signal from an on-skin sensor control unit 44 that is up to 5 meters distant, preferably up to 10 meters distant, and more preferably up to 20 meters distant or more.") However, even the longest distance mentioned (20 meters) would still be classified as "short-range communications" within the context of the '233 patent. Ex. 1001, 5:35-38 ("According to one definition, and subject to the vagaries of radio design and environmental factors, short-range may refer to systems designed primarily for use in and around a premises and thus, the range generally is below a mile.") Thus, the sensor control unit 44's transmitter 98 and receiver 99 (or, just transceiver) is a short-range bi-directional wireless communications module. Thus, in my opinion, a POSITA would have understood that *Say* discloses this claim element. See also my

Claim Language	*Say*
	discussions in section VIII.B, which are relevant and incorporated here.

[1g] (b) a second device communicating with the first device, the second device having a short-range bi-directional wireless communications module compatible with the short-range bi-directional wireless communications module of the first device; and

Claim Language	*Say*
(b) a second device communicating with the first device, the second device having a short-range bi-directional wireless communications module compatible with the short-range bi- directional wireless communications module of the first device; and	*Say* discloses and/or suggests a second device ("receiver/display unit 46, 48") communicating with the first device ("sensor control unit 44"), the second device having a short-range bi-directional wireless communications module compatible with the short-range bi-directional wireless communications module of the first device. *Say* discloses the claimed "**second device**" as the "**receiver/display unit 46, 48**." The receiver/display unit 46, 48 contains a "**transmitter 160**" and "**receiver 150**":

Claim Language	*Say*
	 Ex. 1006, FIG. 22, 4:53-54, 48:4-17. *Say* explains that receiver 150 is "tuned or tunable to the frequency or frequency band of the transmitter 98 in the on-skin sensor control unit 44" (*id.* at 48:49-62) and transmitter 160 transmits data to the sensor control unit 44's "receiver 99" (*id.* at 43:21-35, 50:32-51, 52:44-65). As I discussed above, communications between the sensor control unit 44 and receiver/display unit are short-range wireless transmissions. Collectively, the transmitter 160 and receiver 150 is a bi-directional communications module as in the context of *Say*, that work together to provide communications to/from sensor control unit 44. *Id.* at 48:49-49:14, 52:44-65. Thus, *Say* discloses a second device ("receiver/display unit 46, 48") communicating

Claim Language	*Say*
	with the first personal device ("sensor control unit 44"), the second device having a short-range bi-directional wireless communications module (transmitter 160/receiver150) compatible with the short- range bi-directional wireless communications module of the first device (receiver 150 is tuned to the frequency of transmitter 98 of unit 44, which is a transceiver or part of the collective communications module with receiver 99). Moreover, even if transmitter 160 and receiver 150 are not expressly labeled in *Say* as one communications module, but rather are depicted as individual components in Figure 22, a POSITA would have been motivated to configure such components as a transceiver in light of a *Say*'s disclosure and the knowledge of such a POSITA at the time of the alleged invention. Having considered *Say*'s disclosure and a POSITA's knowledge at the time of the alleged invention, I believe a POSITA would have been motivated to implement the above-described modification because configuring transmitter and receiver circuitry together as a transceiver was well known and would have involved combining known prior art elements (receivers/transmitters) according to known methods (known use of transceivers) to yield predictable results (a component to send and

Claim Language	*Say*
	receive data, as described by *Say*). *Say* discloses the use of transmitters, receivers, and transceivers. *Id.* at FIGS. 18B, 22, 4:36-37, 36:40-37:4, 37:26-35, 40:28-41:3, 41:10-53, 43:21-35, 48:49-62, 52:44-65. And, *Say* explicitly discloses using a transceiver instead of a transmitter/receiver in the context of the sensor control unit 44. *Id.* at 43:21-24. Thus, the elements of the proposed modification were known, as was the method for substituting them. And, a POSITA would have recognized that such a modification would have resulted in a foreseeable and predictable result: *Say*'s receiver/display unit would have been able to engage in short-range RF communications just as it would have with a separate transmitter and receiver. *Say*'s explicit disclosure to substitute a transceiver for a transmitter/receiver pair would have led a POSITA to make the above modification without detracting from the communication capabilities of the receiver/display unit 46, 48, especially in light of the knowledge of such technologies at the time (as expressly disclosed by *Say*). A POSITA would have recognized that modifying *Say* would have also involved a simple substitution of one known element for another to obtain predictable results. As discussed above, *Say* discloses transmitter, receivers, and transceivers, and also discloses the choice to substitute

Claim Language	*Say*
	a transmitter/receiver for a transceiver. Thus, replacing the receiver/display unit 46, 48' s transmitter/receiver for a transceiver would have involved merely substituting one type of short-range communications component(s) for another. A POSITA would have considered and had the knowledge, skill, capability, and reasons to implement such a modification and done so with the expectation that the resulting modification would successfully operate as intended in the context of *Say*'s system. Thus, in my opinion, a POSITA would have understood that *Say* discloses and/or suggests this claim element. *See also* my discussions in section VIII.B, which are relevant and incorporated here.

[1h] (c) a security mechanism governing information transmitted between the first personal device and the second device.

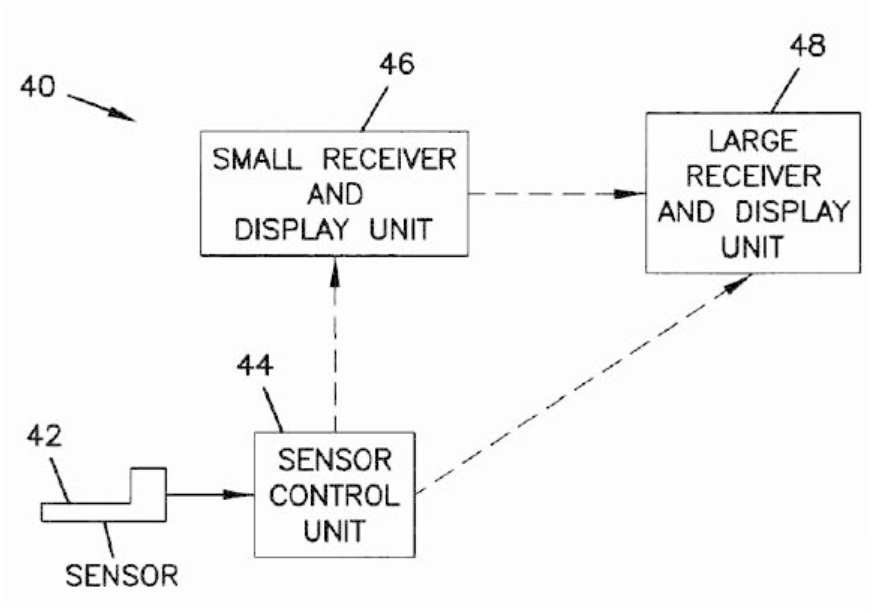
Claim Language	*Say*
(c) a security mechanism governing information transmitted between the first personal device and the second device.	*Say* discloses a security mechanism governing information transmitted between the first personal device ("sensor control unit 44') and the second device ("receiver/display unit 46, 48"). The '233 patent's specification includes a section titled "Security." In this section, the '233 specification provides a list of "possible embodiments of security" which is "not

Claim Language	*Say*
	meant to be exclusive." Ex. 1001, 13:24, 13:41-42. Some examples are: "data transmitted to and from the personal device 100 may be encrypted by standard encryption algorithms," "voice and visual channels of transmission may be controlled for activation by the personal device 100 or by an authorized entity, but may not necessarily be encrypted," and "the user of the personal device 100 may have a security key that he can enter to release the information or access to authorized parties." *Id.* at 13:41-54. Dependent claims 2 and 4 also provides that the claimed "security mechanism" can be encryption or "a key entered by a user of the first personal device." *Id.* at 15:11-17. *Say* discloses both of these security mechanisms governing information transmitted between the sensor control unit 44 and the receiver/display unit 46, 48. *Say* discloses that the sensor control unit 44' s transmitter may "transmit a code to indicate, for example, the beginning of a transmission and/or to identify, preferably using a unique identification code, the particular on-skin sensor control unit 44" and that this "identification code may be selected by the patient and communicated to the sensor control unit 44 via [] an input device coupled to" the unit. Ex. 1006, 49:15-37. *Say* also discloses that the sensor control unit 44' s transmitter "may use **encryption techniques** to encrypt

Claim Language	*Say*
	the data stream from the transmitter" and the "receiver/display unit 46, 48 contains [a] key to decipher the encrypted data signal." *Id.* at 49:38-67. Both of these security techniques govern information transmitted between the sensor control unit 44 and the receiver/display unit 46, 48. Thus, *Say*'s communications between the sensor control unit 44 and receiver/display unit 46, 48 involve encryption or a "key entered by a user of the first personal device," just like the '233 patent' s "security mechanism." As such, *Say*' s bi-directional wireless communication system (the analyte monitoring system 40 depicted in Figure 1) includes a security mechanism governing information transmitted, as claimed. Thus, in my opinion, a POSITA would have understood that *Say* discloses this claim element. *See also* my discussions in section VIII.B, which are relevant and incorporated here.

2. Claim 7

95. As described below, *Say* discloses and/or suggests the features of claim 7.

Claim Language	*Say*
4. The system of claim 1, further comprising a detector connected to the at least one detector input.	*Say* discloses the system of claim 1, further comprising a detector connected to the at least one detector input. As I discussed in claim 1, *Say* discloses at least one "**sensor 42**" with "contact pad 49" which is **connected to the "conductive contacts 80" (and possibly also through "port 78") of the "sensor control unit 44**". Figure 1 depicts the sensor 42 in relation to the system as a whole:  Ex. 1006, FIG. 1; *see also id.*, 2:13-61, 3:63-65. In reference to Figure 1, *Say* describes: "One embodiment of the analyte monitoring system 40 for use with an

Claim Language	*Say*
	implantable sensor 42, and particularly for use with a subcutaneously implantable sensor, is illustrated in block diagram form in FIG. I. The analyte monitoring system 40 includes, at minimum, a sensor 42, a portion of which is configured for implantation (e.g., subcutaneous, venous, or arterial implantation) into a patient, and a sensor control unit 44. ***The sensor 42 is coupled to the sensor control unit 44 which is typically attached to the skin of a patient***. The sensor control unit 44 operates the sensor 42, including, for example, providing a voltage across the electrodes of the sensor 42 and collecting signals from the sensor 42. The sensor control unit 44 may evaluate the signals from the sensor 42 and/or transmit the signals to one or more optional receiver/display units 46, 48 for evaluation." *Id.* at 6:52-7:12. Thus, *Say*'s analyte monitoring system 40 includes a detector (sensor 42) that is connected to the at least one detector input (conductive contacts 80 of the sensor unit 44, which I described for claim 1). Thus, in my opinion, a POSITA would have understood that *Say* discloses and/or suggests this claim. *See also* my discussions in section VIII.B, which are relevant and incorporated here.

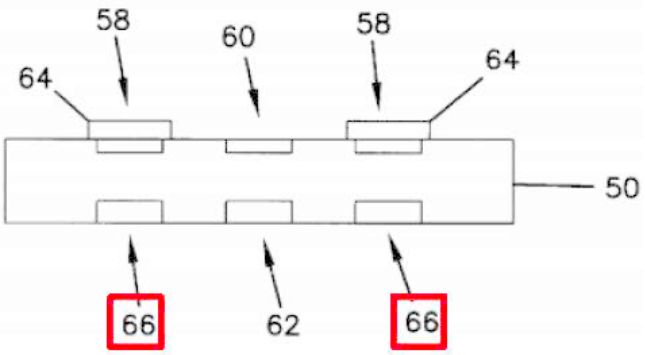
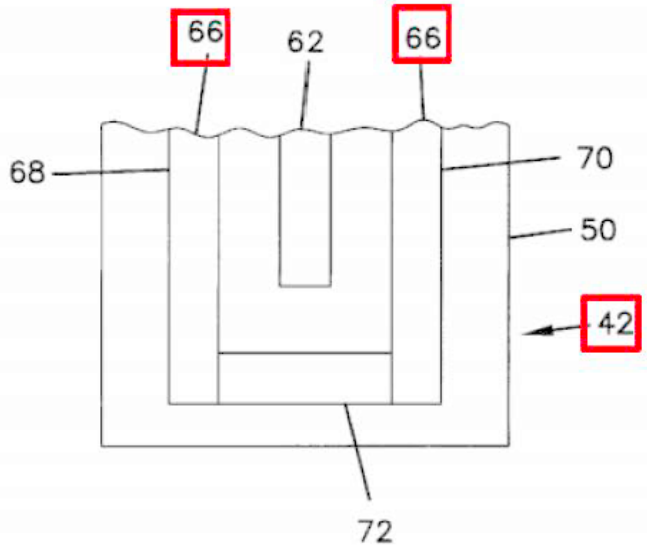
3. Claim 8

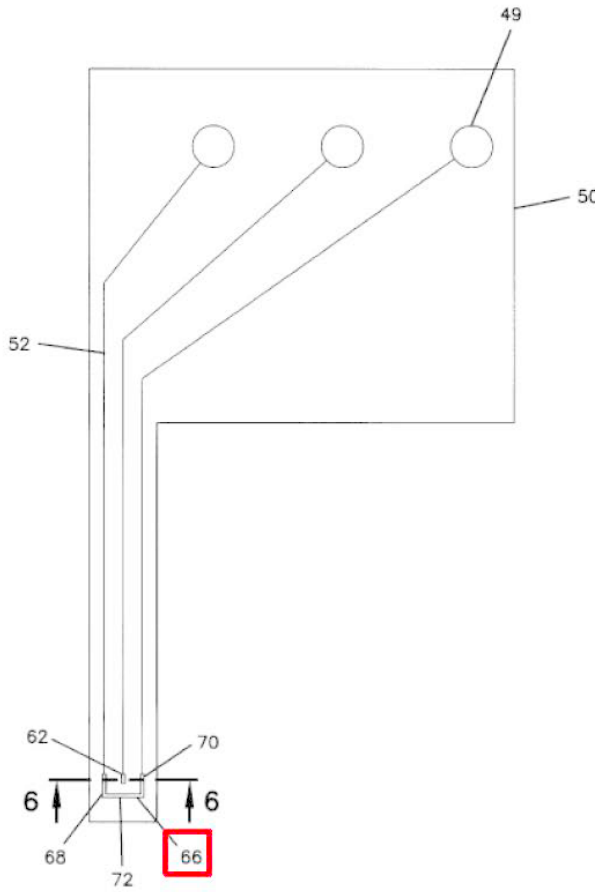
96. As described below, *Say* discloses and/or suggests the features of claim 8.

Claim Language	*Say*
8. The system of claim 7, wherein the detector senses body or physiological parameters.	*Say* discloses the system of claim 1, wherein the detector ("sensor 42") senses body or physiological parameters. As discussed in claim 7, *Say* discloses at least one "sensor 42" with "contact pad 49" which is connected to the "conductive contacts 80" of the "sensor control unit 44". *Say* discloses that sensor 42 may sense numerous body and physiological parameters, such as temperature and oxygen saturation. *Say* discloses an "analyte monitoring system 40" which includes **sensor 42** (Ex. 1006, 6:52-7:12) that **senses concentrations of analytes in a bodily fluid**: "The present invention is applicable to an analyte monitoring system using an implantable sensor for the in vivo determination of a concentration of an analyte. Such as glucose or lactate, in a flu*id.* The sensor can be, for example, subcutaneously implanted in a patient for the continuous or periodic monitoring an analyte in a patient's interstitial flu*id.* This can then be used to infer the glucose level in the patient's bloodstream. Other in vivo analyte sensors can be made, according to the invention, for

Claim Language	*Say*
	insertion into a vein, artery, or other portion of the body containing flu*id.* The analyte monitoring system is typically configured for monitoring the level of the analyte over a time period which may range from days to weeks or longer." *Id.* at 5:25-37. The **sensor may also contain a "temperature probe 66**" for sensing the temperature of bodily fluid. *Id.* at FIGS. 6, 8, 11, 2:32-41 (The sensor may also include optional components. Such as, for example, a counter electrode, a counter/reference electrode, a reference electrode, and a ***temperature probe***. Other components and options for the sensor are described below"), 7:58-64 ("In addition to the electrodes 58, 60, 62 and the sensing layer 64, the sensor 42 may also include a ***temperature probe 66*** (*see* FIGS. 6 and 8), a mass transport limiting layer 74 (*see* FIG.9), a biocompatible layer 75 (*see* FIG.9), and/or other optional components, as described below"), 24:11-24 ("For proper operation of the temperature probe 66, the temperature-dependent element 72 of the temperature probe 66 cannot be shorted by conductive material formed between the two probe leads 68, 70. In addition, to prevent conduction between the two probe leads 68, 70 by ionic species within the body or sample fluid, a covering may be provided over the temperature-dependent element 72, and preferably over the portion of the probe leads 68, 70 that

Claim Language	*Say*
	is implanted in the patient"), 24:25-41 ("Another method for eliminating or reducing conduction by ionic species in the body or sample fluid is to use an ac voltage source connected to the probe leads 68, 70. In this way, the positive and negative ionic species are alternately attracted and repelled during each half cycle of the ac voltage. This results in no net attraction of the ions in the body or sample fluid to the temperature probe 66"), 24:41-55 ("Typically, the conductivity of an electrolyte-containing solution is dependent on the temperature of the solution, assuming that the concentration of electrolytes is relatively constant. Blood, interstitial fluid, and other bodily fluids arc solutions with relatively constant levels of electrolytes. Thus, a sensor 42 can include two or more conductive traces (not shown) which are spaced apart by a known distance. A portion of these conductive traces is exposed to the solution and the conductivity between the exposed portions of the conductive traces is measured using known techniques (e.g., application of a constant or known current or potential and measurement of the resulting potential or current, respectively, to determine the conductivity)" This temperature probe 66 is depicted on the analyte sensor 42 illustrated in Figures 6, 8, and 11 (different view of the same sensor 42, *see id.* at 2:32-41):

Claim Language	*Say*
	FIG. 6  FIG. 8 

Claim Language	*Say*
	FIG. 11  *Id.* at FIGS. 6, 8, 11 2:32-41, 4:11-12, 4:14-16, 7:58-64. *Say* explains how the temperature probe 66 works: "Typically, a signal (e.g., a current) having an amplitude or other property that is a function of the temperature can be obtained by providing a potential across the two probe leads 68, 70 of the temperature probe 66. As the temperature changes, the temperature-dependent characteristic of the temperature-dependent element 72 increases or decreases with a corresponding

Claim Language	*Say*
	change in the signal amplitude. The signal from the temperature probe 66 (e.g., the amount of current flowing through the probe) may be combined with the signal obtained from the working electrode 58 by, for example, scaling the temperature probe signal and then adding or subtracting the scaled temperature probe signal from the signal at the working electrode 58. In this manner, the temperature probe 66 can provide a temperature adjustment for the output from the working electrode 58 to offset the temperature dependence of the working electrode 58." *Id.* at 23:42-57. In addition to sensing bodily temperature, sensor 42 also detects the "in vivo determination of a concentration of an analyte" in a bodily fluid, "such as oxygen" in the "bloodstream." *Id.* at 5:25-37, 6:37-39, 15:50-65, 16:53-62, 20:42-44. Temperature and oxygen concentration are body or physiological parameters just like that described in the '233 patent, and as claimed here. Ex. 1001, 3:29- 33, 15:28-31. Thus, in my opinion, a POSITA would have understood that *Say* discloses and/or suggests this

Claim Language	*Say*
	claim. See also my discussions in section VIII.B, which are relevant and incorporated here.

4. Claim 9

97. As described below, *Say* discloses and/or suggests the features of claim 9.

Claim Language	*Say*
9. The system of claim, wherein the body or physiological parameters are selected from the group consisting of temperature, motion respiration, blood oxygen content, and electroencephalogram.	*Say* discloses the system of claim 8, wherein the body or Physiological parameters are selected from the group consisting of temperature, motion respiration, blood oxygen content, and electroencephalogram. As discussed in claim 8, *Say* discloses that sensor 42 detects at least temperature and blood oxygen content. Thus, for the same reasons *Say* discloses claim 8, *Say* discloses claim 9. Thus, in my opinion, a POSITA would have understood that *Say* discloses and/or suggests this claim. See also my discussions in section VIII.B, which are relevant and incorporated here.

5. Claim 10

98. As described below, *Say* discloses and/or suggests the features of claim 10.

Claim Language	***Say***
10. The system of claim 1, wherein the first personal device further comprises a user interface module.	*Say* discloses the system of claim 1, wherein the first personal device ("sensor control unit 44") further comprises a user interface module. The '233 patent states: "Optionally, PMD 100 includes a User Interface Module (UIM) 200. The UIM 200 may allow users to view or enter data, conduct voice communications, use a camera to transmit images, or view a screen for graphical images." Ex. 1001, 3:50-53. *Say* explains the sensor control unit 44 ("first personal device") "may ***display or otherwise communicate" information to the user*** and "may indicate to the patient, via, for example, an audible, visual, or other sensory-stimulating alarm[.]" Ex. 1006, 5:52-7:12, 44:8-19. By "display[ing]" "visual" information to a user, the sensor control unit 44 "allows users to view" information, which the '233 patent gives as an example of a user interface. Ex. 1001, 3:51-53. *Say* also discloses the sensor control unit 44 including an "**input device**" that allows users to input data. Ex. 1006, 43:45-57. The '233 patent provides further example of a user interface that "allow[s] users to ... enter data." Ex. 1001, 3:51-53.

Claim Language	*Say*
	Therefore, the sensor control unit 44's "**input device" and/or the component that allow it to "display or otherwise communicate" information to users** is its user interface module. Thus, in my opinion, a POSITA would have understood that *Say* discloses and/or suggests this claim. *See also* my discussions in section VIII.B, which are relevant and incorporated here.

6. Claim 14

99. As described below, *Say* discloses and/or suggests the features of claim 14.

Claim Language	*Say*
14. The system of claim 1, wherein the first personal device further comprises a data input/output port, the second device further comprises a data input/output port, and wherein the second device communicates with	*Say* discloses the system of claim 1, wherein the first personal device ("sensor control unit 44") further comprises a data input/output port, the second device ("receiver/display unit 46, 48") further comprises a data input/output port, and wherein the second device communicated with the first personal device using the data input/output ports. As I described for claim 1 above (relevant and incorporated here), the receiver/display unit 46, 48 communicates with the sensor control unit 44 using its

the first personal device using the data input/output ports.	receiver 150/transmitter 160. Namely, receiver 150 receives "sensor signals or processed data" from the sensor control unit 44's transmitter 98 (or transceiver) (Ex. 1006, 36:61-37:4, 40:28-41:3, 41:27-53, 43:21-24, 48:49-62) and transmitter 160 transmits "stored data" to the sensor control unit 44's receiver 99 (or transceiver) (*id.* at 43:21-35, 48:49-62, 50:32-51, 52:44-65). Since *Say* discloses a transmitter/receiver (or transceiver) module in both the sensor control unit 44 and the receiver/display unit 46, 48 that are capable of sending and receiving data, a POSITA would have understood the disclosed transmitter / receiver / transceiver communication ports are data I/O ports used to facilitate communications between the sensor control unit 44 and the receiver/display unit 46, 48. And, as I described in claim 1, the receiver/display unit 46, 48 communicates with the sensor control unit 44 using these transmitter/receivers/transceivers(i.e., data I/O ports). Thus, in my opinion, a POSITA would have understood that *Say* discloses and/or suggests this claim. *See also* my discussions in section VIII.B, which are relevant and incorporated here.

C. Ground 3: Jacobsen in view of Say discloses and/or suggests the features of claims 1, 7-10, and 14 of the '233 patent

100. In my opinion, the combination of *Jacobsen* and *Say* discloses and/or suggests all of the features of claims 1, 7-10, and 14 of the '233 patent.

1. Claim 1

101. For the same reasons I provided and discussed in ground 1 (relevant and incorporated here), *Jacobsen* discloses all of the features of claim elements 1[a]-[g].

102. For the same reasons I provided and discussed in ground 1 (relevant and incorporated here), *Jacobsen* also discloses claim element 1[h]. However, to the extent *Jacobsen* is determined not to disclose the features of limitation 1[h], *Jacobsen* in view of *Say* discloses and/or suggests such features.

103. As I explained in ground 1 (relevant and incorporated here), *Jacobsen* discloses the wrist sensor/display unit 18 and soldier unit 50 operating only when users enter a correct password. Ex. 1005, 15:5-10. And, as I explained in ground 2 (relevant and incorporated here), *Say* discloses a bi-directional wireless communication system where numerous types of "security mechanisms governing information [are] transmitted between a first personal device and a second device," including but not limited to encrypting transmissions sent between these two devices. Ex. 1006, 49:15-67.

104. Given the disclosure of *Jacobsen* and *Say* and the knowledge of a POSITA at the time of the alleged invention, a POSITA would have been motivated to configure *Jacobsen's* security features implemented in its system to include mechanisms that use encryption to "govern[] information transmitted" between *Jacobsen's* wrist sensor/display unit 18 and vest/harness with soldier unit 50, similar to the mechanisms taught in *Say*.

105. A POSITA would have been motivated to implement such features in *Jacobsen's* system because it would have improved the security of communications between the wrist sensor/display unit 18 and soldier unit 50 by encrypting the data transmitted over the short-range wireless channels, thus minimizing opportunities for nefarious entities from intercepting and interpreting the transmitted data. A POSITA would have recognized and appreciated the benefits of such security given the applications that *Jacobsen* indicates its system can be implemented (*e.g.*, military environments). (*E.g.* Ex. 1005, 1:5-14) and its express disclosure regarding avoiding communication interception (*see id.* at 4:33- 39, 7:39-45). Having considered the disclosures of *Jacobsen* and *Say*, a POSITA would have recognized that incorporating the above-described modification would have required nothing more than implementing known components and technologies (known components to provide encrypted communications) according to known methods (encryption). A POSITA would have further recognized that such a modification would have

resulted in the foreseeable feature of providing secure communications between devices. The '233 patent, *Say*, and *Jacobsen* all show that security mechanisms governing information transmitted were well- known before the '233 patent's invention. For example, the '233 patent acknowledges that encryption is implemented using "standard" algorithms. Ex. 1001, 13:43-46; *see* section V.D. Consistent with this understanding, *Say* discloses before the '233 patent using "encryption techniques to encrypt the datastream" (Ex. 1006, 49:40-42), and *Jacobsen* discloses other security techniques, such as "software which requires the entry of a password or some other code" (Ex. 1005, 15:5-8). And, adding security mechanisms to personal health monitors was known in the art, as demonstrated by both *Jacobsen* and *Say*. Ex. 1005, 15:5-14; Ex. 1006, 49:15-67.

106. The resulting combination would have also been predictable, as encrypting data transmissions between a sensor device and another device was already disclosed in *Say* (Ex. 1006, 49:15-67), and securing communications, including between *Jacobsen's* wrist sensor/display unit 18 and soldier unit 50, was already disclosed in *Jacobsen* (Ex. 1005, 15:5-14). *Jacobsen's* and *Say*'s disclosures of providing data security would have led a POSITA to make the above modification without detracting from the communication capabilities of *Jacobsen's* system, especially in light of the knowledge of such technologies at the time (as expressly disclosed by *Say*).

107. Modifying *Jacobsen* in light of *Say* would have also involved a simple substitution of one known element for another to obtain foreseeable results. As I discussed above, different types of security mechanisms, including both encryption and passcodes, were known in the art. *See* Ex. 1001, 13:43-46; section V.D. And, a POSITA would have had the skill and capability to implement in *Jacobsen* encryption security mechanism techniques similar to those disclosed in *Say*, either instead of or in addition to the security mechanism techniques described in *Jacobsen*. And, as I already discussed, the result would have been foreseeable.

108. Additionally, combining *Say*'s data encryption with *Jacobsen's* system would have involved the use of a known technique to improve similar systems in the same way. As I discussed above, both *Say* and the '233 patent show that encrypting data transmission between devices was a known technique in the art. *See* Ex. 1001, 13:43-46; section V.D. And, the systems described in *Say* and *Jacobsen* are similar. *Jacobsen* and *Say* both disclose systems for portable health monitoring where a sensor device communicates with a second device. Compare Ex. 1005, Abstract, 6:45-49, 11:1-27 with Ex. 1006, Abstract, 2:13-3:56. *Say* describes one benefit of encryption was to "eliminate 'crosstalk' and to identify signals from the appropriate sensor control unit 44," which avoided problems due to the "presence of other devices" that "create[d] noise or interference within the frequency band of the transmitter[.]" Ex. 1006, 49:15-53. A POSITA would have recognized that, in

addition to the security benefits described above, avoiding crosstalk between devices would have benefitted *Jacobsen's* system in a manner similar to the benefits it provided the system described in *Say*. Indeed, *Jacobsen* describes soldiers wearing multiple devices in a field setting (Ex. 1005, 1:5-5:20) and teaches the importance of avoiding interference (*id.* at 2:62-65, 7:53-55), so it would have been likely that *Jacobsen's* system also encountered problems due to interference or noise from other devices. Therefore, methods of avoiding interference and crosstalk, including encryption techniques, such as those disclosed in *Say*, would have similarly benefitted *Jacobsen's* system.

109. The choice to implement encryption versus another security mechanism in *Jacobsen's* system would have been a design consideration for a POSITA based on various factors, including envisioned users, envisioned use of system, device type, display size, and system architecture. For example, as I described above, adding encryption to transmissions could have avoided problems associated with noise or interference from other devices.

110. Further, a POSITA would have had the knowledge, capability, and reasons to implement such a modification and done so with the expectation that the resulting modification would successfully operate as intended in the context of *Jacobsen*'s system. Thus, in my opinion, a POSITA would have understood that the proposed combination of *Jacobsen* and *Say* discloses and/or suggests this claim. *See*

also my discussions in sections VIII.A and VIII.B, which are relevant and incorporated here.

2. Claims 7-10 and 14

111. For the same reasons as I provided in ground 1 (relevant and incorporated here), *Jacobsen* discloses all of the additional features added by claims 7-10 and 14. Therefore, the combined *Jacobsen-Say* system I described above discloses and/or suggests claims 7-10 and 14. *See also* my discussions in sections VIII.A and VIII.B, which are relevant and incorporated here.

D. Ground 4: Jacobsen in view of Say and Quy discloses and/or suggests the features of claim 13 of '233 patent

112. In my opinion, the combination of *Jacobsen-Say* (which I described in ground 3 and incorporate here) and *Quy* discloses and/or suggests all of the features of claim 13 of the '233 patent.

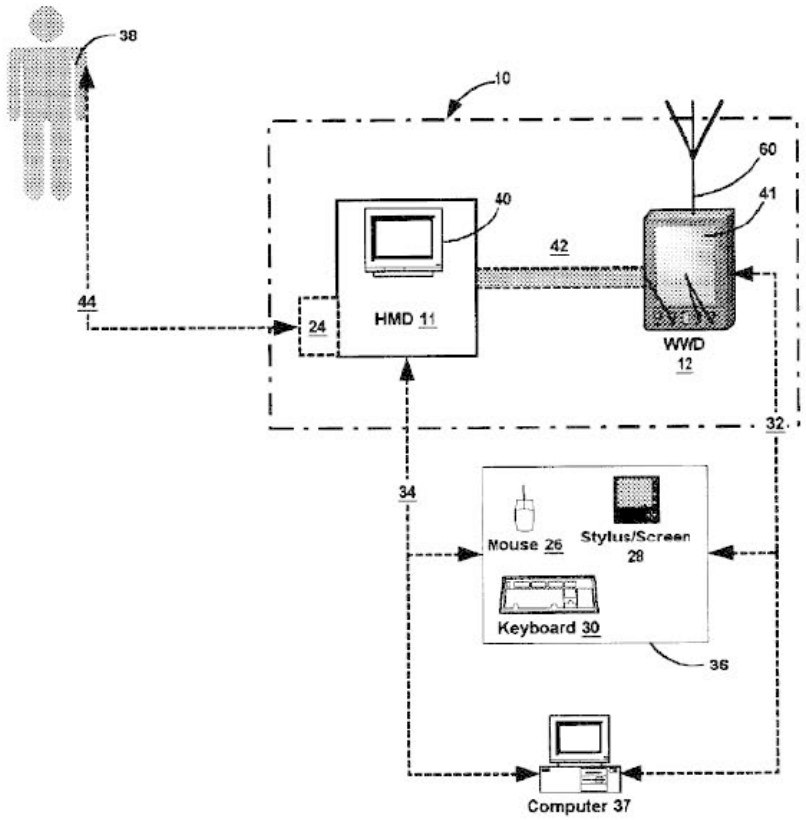
1. Claim 13

113. As described below, the combination of *Jacobsen-Say* (described in ground 3) and *Quy* discloses and/or suggests the features of claim 13:

Claim Language	***Jacobsen-Sav* and *Quy***
13. The system of claim 1, wherein the short-range wireless communications	As I discussed in ground 3 (relevant and incorporated here), the proposed *Jacobsen-Say* combination discloses and/or suggests the system of claim 1. While *Jacobsen-Say* discloses the use of short-range wireless communications, it does not disclose the use of Bluetooth technology to provide

Claim Language	*Jacobsen-Sav* and *Quy*
further comprises BLUETOOTH technology.	the short-range wireless communications implemented in the combined *Jacobsen-Say* system. However, the *Jacobsen-Say* system I described in ground 3 in light of *Quy* discloses and/or suggests these features. And, as I explain below, a POSITA would have been motivated to modify the proposed *Jacobsen-Say* system such that Bluetooth technology, like that described in *Quy*, was utilized to provide communications between the *Jacobsen-Say* system's wrist sensor/display unit 18 ("first personal device") and the vest/harness with soldier unit 50 ("second device") (i.e., within the system of claim 1). *Quy* discloses utilizing Bluetooth technology as a short-range wireless communications technique: "As for wireless techniques, infrared (IR), microwaves, radio frequency (RF), e.g., Bluetooth® or 802.11 protocols, optical techniques including lasers, and other such techniques may be used." Ex. 1007, 4:1-4; *see also id.* at 6:11-17. "The short range wireless communications schemes which may be employed include infrared, radio frequency including Bluetooth or 802.11, or other such schemes." *Id.* at 7:13-16.

Claim Language	*Jacobsen-Sav* and *Quy*
	"For radio frequency communications, protocols such as Bluetooth® or 802.11 may be advantageously employed." *Id.* at 12:42-44. "9. The system of claim 7, wherein the generic input/output port employs a wireless communications scheme, and wherein the wireless communications scheme employed uses the Bluetooth protocol." *Id.* at 14:56-59. In fact, *Quy* specifically discloses utilizing Bluetooth technology to transfer sensor data in a health monitoring system. *Quy* discloses a "wireless health-monitoring apparatus ('WHMA') 10" that includes a "health monitoring device (' HMD') 11" coupled to "wireless web device ('WWD') 12":

Claim Language	*Jacobsen-Say* and *Quy*
	 *FIG. 2* *Id.* at FIG. 2, 2:55-56, 3:3-4, 6:26-30. The HMD 11 includes "physiologic sensor 24" and transmits the measured physiological sensor data to WWD 12 "via wireless communication schemes, such as RF includes [sic] Bluetooth® or 802.11, infrared, optical, microwaves, etc." *Id.* at 6:44-45, 7:1-30; see also *id.* at 4:1-4, 6:11-17, 12:42-44, 14:56-59. Given the disclosure of *Jacobsen*, *Say*, and *Quy*, and the knowledge of a POSITA, a POSITA would have been motivated to configure the combined *Jacobsen-Say* system

Claim Language	*Jacobsen-Sav* and *Quy*
	(described in ground 3) to use Bluetooth technology to provide short-range wireless communications between the wrist sensor/display unit 18 and the soldier unit 50. In this combination, the communication scheme between the soldier unit 50 and wrist sensor/display unit 18 would have utilized Bluetooth technology, such as the Bluetooth technology disclosed in *Quy*. A POSITA would have recognized the benefits of using existing short-range wireless communication technologies (such as Bluetooth, as disclosed by *Quy*) in the combined *Jacobsen-Say* system because it would have enabled the system to be configured to operate using known standard communication technologies, thus allowing for improved versatility in design, programming, and implementations. As I described in section V, Bluetooth was (and still is) a well-known and widely adopted standard. See also Ex. 1012. And, POSITA would have had the knowledge, reasons, and capability to integrate the *Jacobsen-Say* system's encryption mechanisms (discussed above in ground 3) with the Bluetooth communications such that security of such communications were maintained. Indeed, having considered the disclosures of *Quy*, *Jacobsen*, *Say*, and the '233 patent, a POSITA would have appreciated that modifying *Jacobsen-Say* to include Bluetooth technology, similar to that described in *Quy*, in light of *Quy* would have

Claim Language	*Jacobsen-Sav* and *Quy*
	merely required implementing known components and technologies (known Bluetooth circuitry and components - *see generally* Ex. 1012) using known processes and known communication standards (Bluetooth processes and algorithms - *see generally* Ex. 1012). A POSITA would have further recognized that modifying *Jacobsen-Say* in this manner would have resulted in the foreseeable feature of providing wireless communications over a short-range. The '233 patent's disclosure (added through the '401 provisional filed on March 28, 2001) acknowledges that Bluetooth was already known, as refers to the already-developed Bluetooth standard. Ex. 1001, 4:49-5:19. And, *Quy* confirms this understanding. Ex. 1007, 7:17-30. Thus, utilizing Bluetooth in the health monitoring system described in *Jacobsen-Say*, would have involved combining elements according to known methods and processes. And, the result would have been foreseeable, as *Jacobsen-Say* already describe short-range wireless communications between the system's devices, including between the wrist sensor/display unit 18 and the vest/harness with soldier unit 50. Modifying *Jacobsen-Say* in light of *Quy* would have also involved a simple substitution of one known element for another to obtain foreseeable results. As I discussed in ground 1 and incorporated into ground 3 (relevant and incorporated here), *Jacobsen* discloses using body-LAN in

Claim Language	*Jacobsen-Sav* and *Quy*
	order to engage in short-range wireless communications. A POSITA would have considered and had the skill and capability to implement Bluetooth technology communications, like the Bluetooth communications disclosed in *Quy*, similar to the body- LAN wireless short-range communications disclosed in the *Jacobsen-Say* system. *Quy* itself admits the substitutability of Bluetooth technology, as it describes Bluetooth as just one of many short-range wireless communications schemes that could be used in a personal health monitoring system. Ex. 1007, 7:17-30. Additionally, a POSITA would have recognized that modifying *Jacobsen-Say* to utilize known Bluetooth technology similar to that disclosed in *Quy* would have led to the improvement of the *Jacobsen-Say* system in a similar way. As I described above, Bluetooth was known in the art, and *Jacobsen-Say* and *Quy* both disclose systems for personal health monitoring using a sensor device and another device, where the devices communicate using short-range wireless communications. Compare Ex. 1005, Abstract, 6:45-49, 11:1-27 with Ex. 1007, Abstract, 1:23-29, 7:17-30. A POSITA would have appreciated that Bluetooth was known to provide benefits as a lower-power standard. A lower power standard would have been particularly useful in communications between personal monitoring devices, such

Claim Language	*Jacobsen-Sav* and *Quy*
	as the wrist sensor/display unit 18 and vest/harness with soldier unit 50 described in *Jacobsen*. In fact, as I discuss below for ground 6 (relevant and incorporated here), *Jacobsen* discloses the importance of power management and saving for both the wrist sensor/display unit 50 and the soldier unit 50. This, coupled with the fact that at the time, Bluetooth was becoming (or had become) a widely-adopted short-range wireless standard, a POSITA would have had the reasons, capability and expectation of success in designing and configuring the combined *Jacobsen-Say* system to use Bluetooth communication technologies to provide communications between the wrist sensor/display unit 18 and the soldier unit 50 and done so using known technologies, such as an embedded chip and its developer kit. Thus, in my opinion, a POSITA would have understood that the *Jacobsen-Say* system combined with *Quy,* as described above, discloses and/or suggests claim 13. *See also* my discussions in sections VIII.A, VIII.B, and VIII.C, which are relevant and incorporated here.

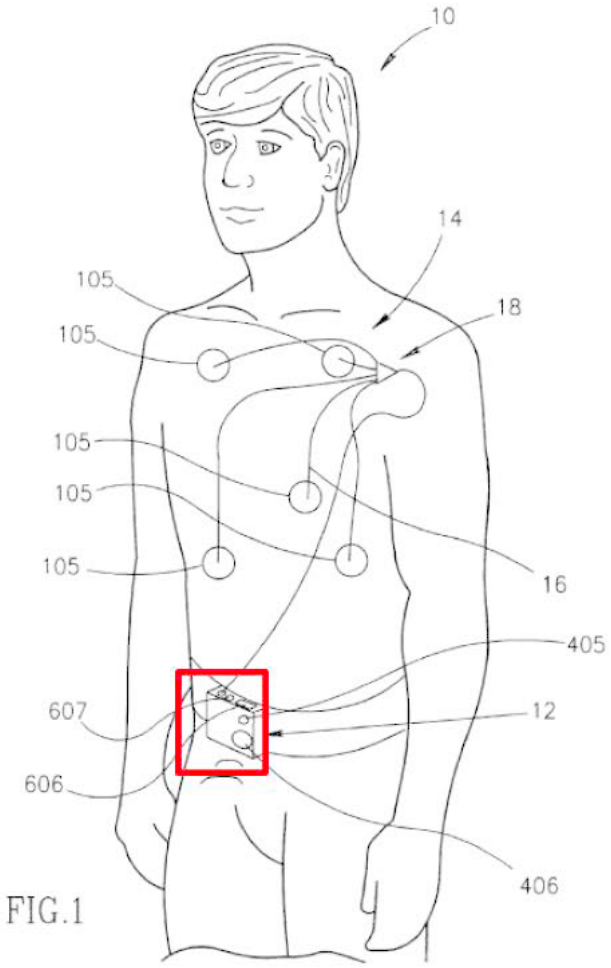
E. Ground 5: Jacobsen in view of Say and Geva discloses and/or suggests the features of claims 24-25 of the '233 patent

114. In my opinion, the combination of *Jacobsen-Say* (described in ground 3) and *Geva* discloses and/or suggests the features of claims 24-25 of the ‘233 patent.

1. Claim 24

115. As described below, the combination of *Jacobsen-Say* (described in ground 3) and *Geva* discloses and/or suggests the features of claim 24:

Claim Language	***Jacobsen-Sav* and *Quy***
24. The system of claim 1, wherein the first personal device further comprises a location determination personal device.	As I discussed in ground 3 (relevant and incorporated here), the proposed *Jacobsen-Say* combination discloses and/or suggests the system of claim 1. While *Jacobsen-Say* do not disclose that the system's first personal device ("wrist sensor/display unit 18") further comprises a location determination module that determines the geographical location of the first personal device, the *Jacobsen-Say* system in light *Geva* discloses and/or suggests these features. And, as I explain below, a POSITA would have been motivated to modify the proposed *Jacobsen-Say* system such that a location determination module that determines the geographical location of the first personal device, like that described in *Geva*, was included in the *Jacobsen-Say* system's wrist sensor/display unit 18 ("first personal device"). *Geva* discloses a "personal ambulatory cellular health monitor 12" which is which contains either "connected" and/or "built-in" "physiological data input devices." Ex. 1008, 5:25-63. Figure 1 illustrates this personal monitor 12 connected to various physiological sensors:

Claim Language	*Jacobsen-Sav* and *Quy*
	 FIG.1 *Id.* at FIG. 1. *Geva* further describes that this personal device 12 contains a "personal location subsystem (PLC) 200." *Id.* at 5:48-56. This is illustrated in Figure 2, which presents a "simplified block diagram illustration of the personal ambulatory cellular health monitor 12 of FIG. 1" (*id.* at 5:48-56):

Claim Language	*Jacobsen-Sav* and *Quy*

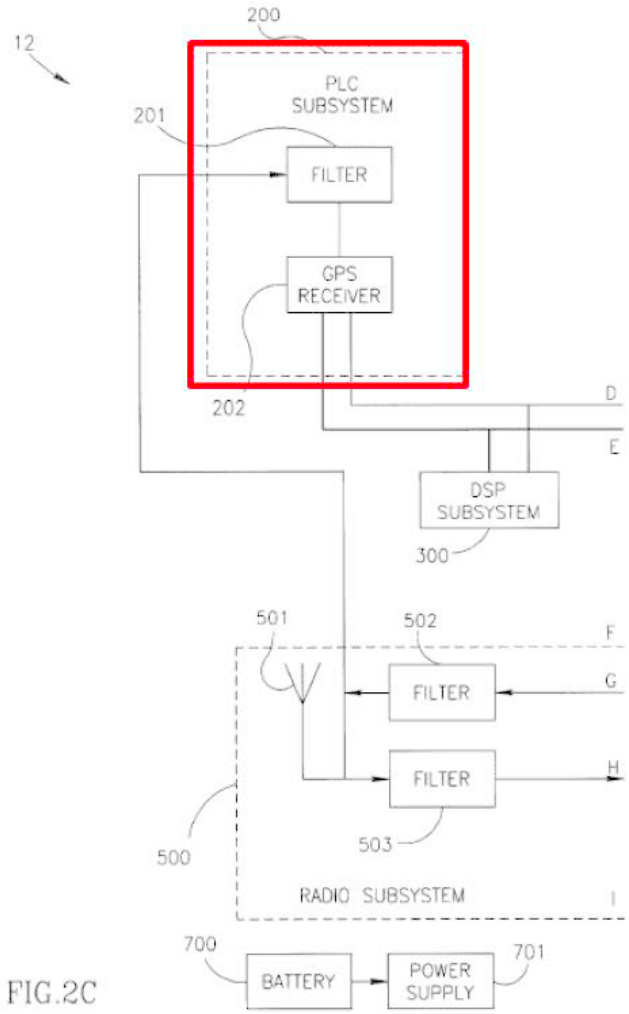
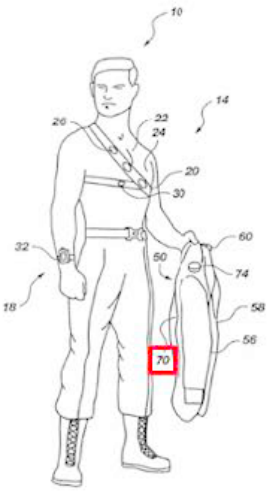
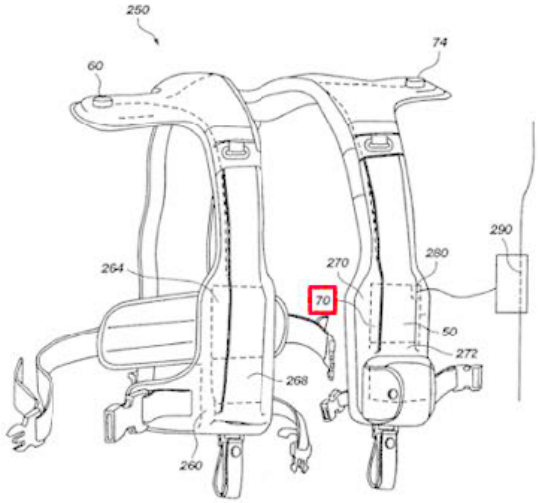


FIG.2C

Geva describes the PLC 200:

"The personal location subsystem (PLC) 200 determined the location of patient 10. PLC Subsystem 200 preferably includes known location determination circuitry such as GPS components including a GPS receiver 202 and a filter 201 which is tuned to a known GPS frequency for GPS satellite communication via a built-in antenna 501 typically shared by radio subsystem 500. PLC subsystem 200

Claim Language	*Jacobsen-Sav* and *Quy*
	preferably receives the pseudo range (PR) and pseudo range dot (PRD) from GPS satellites in communication range. The GPS receiver preferably operates in aided mode enabling "snapshot" operation as is known in GPS systems." *Id.* at 6:51-61. Given the disclosure of *Jacobsen*, *Say*, and *Geva*, and the knowledge of a POSITA, a POSITA would have been motivated to configure the wrist sensor/display unit 18 ("first personal device") in the combined *Jacobsen-Say* system to further include a module for determining the location of the wrist sensor/display unit 18 (and, by extension, the location of the user) similar to the GPS module features disclosed by *Geva*. A POSITA would have been motivated to implement such features because in context of *Jacobsen's* applications (which include systems used by military and first responders) (Ex. 1005, 1:5-12), a POSITA would have recognized and appreciated that including GPS-type features would have enabled the *Jacobsen-Say* system to provide important location information to allow the wearer of wrist sensor/display unit 18 to be located when needed. Indeed, *Jacobsen* already discloses monitoring the location of its soldiers (i.e., wearers of the system) using GPS, and describes the importance of doing this. Specifically,

Claim Language	*Jacobsen-Sav* and *Quy*
	Jacobsen discloses the vest/harness with soldier unit 50 (i.e., claim 1's "second device") contains " global positioning system 70" which "is used for geolocation of the soldier" and may include "GPS":  Fig. 1  Fig. 4 *Id.* at FIGS. 1, 4, 7:24-39, 9:58-10:3, 18:8-15. So, the proposed combination would have merely involved using similar types of GPS components (similar to those described in both *Jacobsen* and *Geva*) in another or different device (*e.g.*, in the wrist sensor/display unit 18 and vest/harness with soldier unit 50, or just in the wrist sensor/display unit 18 alone) in the *Jacobsen-Say* system. A POSITA would not have been deterred from implementing such a configuration despite the existing use of GPS on the vest/harness with soldier unit 50 because the vest/harness with soldier unit 50

Claim Language	*Jacobsen-Sav* and *Quy*
	may be separated from the soldier, whereas the wrist sensor/display unit 18 may stay with the soldier. Indeed, Figure 1 above illustrates this separation. Having considered the disclosures of *Jacobsen*, *Say*, *Geva*, and the '233 patent, a POSITA would have known and appreciated that modifying the combined *Jacobsen-Say* system as noted above in light of *Geva* (and the disclosures of *Jacobsen*) would have merely required implementing known components and technologies (known GPS components) using known processes and known communication standards (processes for collecting and sensing location information via GPS technologies). A POSITA would have further recognized that modifying *Jacobsen-Say* in this manner would have resulted in the foreseeable feature of providing location determining features, as described by *Jacobsen* and *Geva*. The '233 patent, *Geva*, and *Jacobsen* all show that GPS technology was well-known before the relevant timeframe. Ex. 1001, 12:63-65; Ex. 1005, 8:8-15; Ex. 1008, 2:2-4, 6:51-61. And, *Geva* and *Jacobsen* both indicate that the method and components for determining the current location of users by including GPS in wearable sensor devices was already known in the art. Ex. 1005, Abstract, FIGS. 1, 4, 7:24-39, 9:58-10:3, 18:8-15; Ex. 1008, FIG. 2C, 5:49-56, 6:51-61. Further, because *Jacobsen* already discloses users wearing

Claim Language	*Jacobsen-Sav* and *Quy*
	location determination devices, a POSITA would have found implementing the above modification a foreseeable implementation of known technologies according to known techniques, which would have not deterred the operation of *Jacobsen's* system (as modified in view of *Say*), but in fact *Jacobsen* would have benefited from the design by providing an additional or alternative way of positioning GPS modules in the system. And, as I described above, the effect of this combination would have been foreseeable: *Jacobsen's* system would have operated as usual by determining the current location of its users. *Jacobsen's* disclosure of personal location monitoring, and the importance of personal location monitoring, also provides a teaching, suggestion, or motivation that would have led a POSITA to include a type of location determination module in its system. A POSITA would have also recognized that modifying *Jacobsen-Say* in light of *Geva* would have involved a simple substitution of one known element for another to obtain foreseeable results. As I discussed above, GPS modules were well-known and *Jacobsen* already discloses a wearable device (the vest/harness with soldier unit 50) including GPS components and functionality. A POSITA would have considered and had the skill and capability to include GPS components in a wearable sensor device, like

Claim Language	*Jacobsen-Sav* and *Quy*
	the GPS-enabled sensor device described in *Geva*, similar to the GPS-enabled vest/harness described in *Jacobsen*. And, a POSITA would have recognized that modifying *Jacobsen-Say* to include GPS components in the wrist sensor/display unit 18 would have led to the improvement of *Jacobsen-Say* and *Geva* both disclose systems for personal health and location monitoring. Compare Ex. 1005, Abstract, 6:45-49, 11:1-27 with Ex. 1008, Abstract, 1:5-8, 1:49-4:39. And, *Geva* describes the importance of providing a system that both allows for patient mobility and allows for patent location monitoring (Ex. 1008, 1:43-46) which would have complimented *Jacobsen's* goals of monitoring a user's current location (Ex. 1005, 1:14-25, 1:38-46, 2:3-10). Finally, the choice to include GPS components in *Jacobsen's* wrist sensor/display unit 18 (as modified in view of *Say* in the manner described in ground 3) would have been a design consideration for a POSITA based on various factors, including envisioned users, envisioned use of system, device type, display size, and system architecture. For example, including a GPS module in the wrist sensor/display device 18 would have been beneficial because, as described in *Geva*, it was important to track a user's location but also allow for patient mobility (Ex. 1008, 1:43-46) and in the application contemplated by *Jacobsen*,

Claim Language	***Jacobsen-Sav* and *Quy***
	knowledge of a wearer's location was similarly important (Ex. 1005, 7:24-39, 9:58-10:3, 18:8-15). Thus, in my opinion, a POSITA would have understood that the *Jacobsen-Say* system combined with *Geva*, as described above, discloses and/or suggests claim 24. *See also* my discussions in sections VIII.A, VIII.B, and VIII.D, which are relevant and incorporated here.

2. Claim 25

116. As described below, the combination of *Jacobsen-Say* (described in ground 3) and *Geva* discloses and/or suggests the features of claim 25:

Claim Language	***Jacobsen-Sav and Geva***
25. The system of claim 24, wherein the location determination module further comprises a GPS receiver.	For the same reasons I discussed above for claim 24 (relevant and incorporated here), the combination of *Jacobsen-Say* and *Geva* discloses and/or suggests the location determination module comprising a GPS receiver. Indeed, as I discussed above, the combined *Jacobsen-Say-Geva* system would have integrated in wrist sensor/display unit 18 a GPS module including a GPS receiver, to provide GPS functionalities as disclosed by *Jacobsen* and *Geva*. Thus, in my opinion, a POSITA would have understood that the *Jacobsen-Say* system combined with *Geva*, as described above, discloses and/or suggests claim 22. *See also* my

Claim Language	*Jacobsen-Sav and Geva*
	discussions in sections VIII.A, VIII.B, and VIII.D, which are relevant and incorporated here.

F. Ground 6: Jacobsen in view of Say and Reber discloses and/or suggests the features of claim 26 of the '233 patent

117. In my opinion, the combination of *Jacobsen-Say* (described in ground 3) and *Reber* discloses and/or suggests all of the features of claim 26 of the '233 patent.

1. Claim 26

118. As described below, the combination of *Jacobsen-Say* and *Reber* discloses and/or suggests the features of claim 26.

Claim Language	*Jacobsen-Sav* and *Reber*
26. The system of claim 1, wherein the bi- directional communications module has a powered- down state and a powered-up state, and further comprising a means for signaling the bi-directional communications module to transition	As I discussed in ground 3 (relevant and incorporated here), the proposed *Jacobsen-Say* combination discloses and/or suggests the system of claim 1. To the extent *Jacobsen-Say* do not disclose that the wrist sensor/display unit 18 and/or soldier unit 50's bi-directional communications module (*e.g.*, "communications mechanism 224" modified with *Say*) has powered up and down states and further comprises a "means for signaling the bi-directional communications module to transition from the powered-down state to the powered-up state," the *Jacobsen-Say* system in light of *Reber* discloses and/or suggests these features. And, as I explain below, a POSITA would have been motivated to

Claim Language	***Jacobsen-Sav* and *Reber***
from the powered-down state to the powered-up state.	modify the proposed *Jacobsen-Say* system such that the wrist sensor/display unit 18's communications mechanism 224 had a powered-up and powered-down state and comprised a means for signaling the communications mechanism to transition from the powered-down state to the powered-up state. The '233 patent describes that "a number of mechanisms for doing [the claimed] signaling are possible," including with "a mechanical signal, such as throwing a switch or applying pressure to a pad." Ex. 1001, 14:34-43. *Reber* discloses a power button that can be pressed (i.e., mechanical signal applied) in order to power up/down the components, including a transceiver, in a sensor device. Specifically, *Reber* discloses a "noninvasive apparatus" that includes a "biosensor," a communication "interface," which may comprise a "radio frequency transceiver," a "power source," and a "power button":

Claim Language	*Jacobsen-Sav* and *Reber*

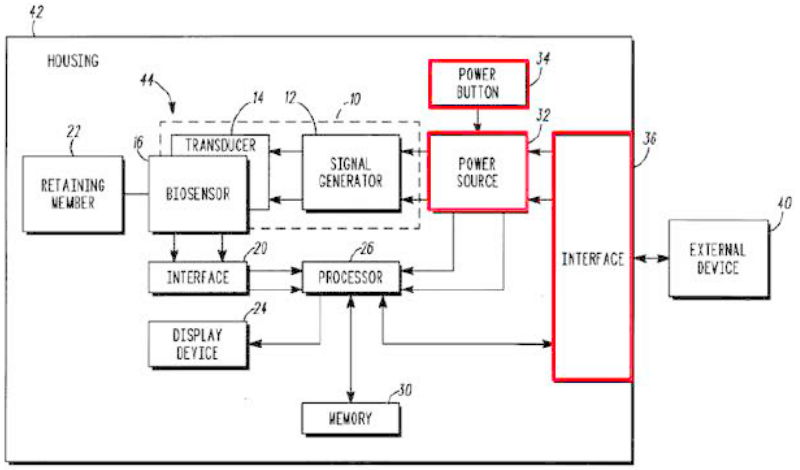


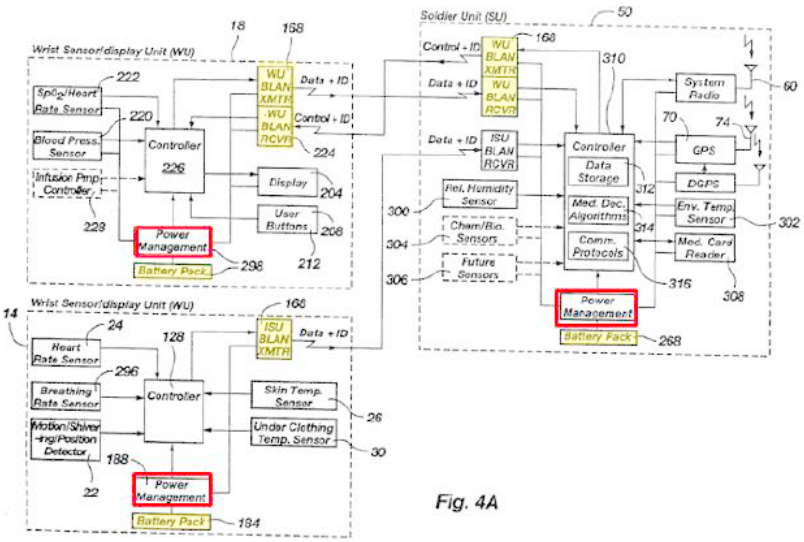
FIG.1

Ex. 1020, FIG. 1, 2:20-5:3. *Reber* discloses that, "[i]n response to [] user-initiated input," the "power button 34" causes "power source 32" to "selectively power[]" "various components of the apparatus," including the communication module ("interface 36"). *Id.* at 4:19-30.

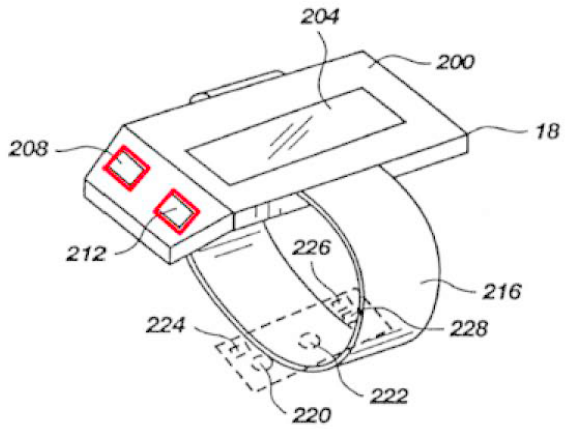
Specifically, *Reber* discloses that "[i]n response to a first user-initiated input received by a power button 34" (i.e., "means for signaling" comprising "applying pressure to a pad"), "the power source powers various components to activate the apparatus" (i.e., transition from powered-down state to powered-up state). *Id.* at 4:20-24. Here, the claimed "powered-down state" occurs when *Reber*' s apparatus is unpowered, before the user presses the power button. And, the claimed "powered-up state" occurs after the user presses the button, as the apparatus receives power from power source 32. A POSITA would

Claim Language	*Jacobsen-Sav* and *Reber*
	have known that an apparatus entirely powered-down would have powered-down components, including the transceiver, and an apparatus that becomes powered-up would then contain powered components, including the transceiver. Thus, when *Reber*'s apparatus entered a powered-up state, its components, including the communications module ("interface") necessarily would have also entered a powered-up state. *Reber* even mentions that when the power source 32 powers the device, it "powers various components to activate the apparatus." *Id.* at 4:20-24. Since *Reber*' s invention includes the apparatus engaging in communications using its communications module "interface 36," which may be an RF transceiver (*id.* at 4:56-63), " activat[ing] the apparatus" would have included activating the interface 36. Given the disclosure of *Jacobsen*, *Say*, and *Reber*, and the knowledge of a POSITA, a POSITA would have been motivated to modify the wrist sensor/display unit 18 in the combined *Jacobsen-Say* system to further include a power control mechanism (e.g., such as a button or similar mechanisms) that would, when activated (e.g., pressed) enable the *Jacobsen-Say* wrist sensor/display unit 18, including its "communication mechanism 224," to transition from a powered-down

Claim Language	*Jacobsen-Say* and *Reber*
	state to a powered-up state. The powered-downstate of the communications mechanism 224 would occur when the wrist sensor/display unit 18 was powered-off, and the communications mechanism 224's transition to a powered-up state would occur when the wrist sensor/display unit 18 was powered-on, such as through the mechanical signal resulting from a push of a power button, similar to the features disclosed in *Reber*. This combination would have involved the *Jacobsen-Say* wrist sensor/display unit 18 with the added features that users could power up/down (transition from powered-down state to powered-down state) the wrist sensor/display unit 18 (and, by extension, its communications mechanism 224) by pushing a button. Having considered the disclosures of *Jacobsen*, *Say*, *Reber*, and the '233 patent, a POSITA would have recognized and appreciated that modifying the combined *Jacobsen-Say* system as I described above in light of *Reber* would have involved implementing known components and technologies (known power control circuitry and mechanisms) using known processes and known communication standards (processes for providing power control to system or to components of a system). A POSITA would have further recognized that modifying *Jacobsen-Say* in this manner would have

Claim Language	*Jacobsen-Sav* and *Reber*
	resulted in the foreseeable feature of providing power conserving and/or control features to the wrist sensor/display unit 18 and its communications module. Indeed, *Jacobsen*, *Reber*, and the '233 patent all show that power management techniques were known in the art. For example, *Jacobsen* discloses its devices, including the wrist sensor/display unit 18, comprising "power management" blocks between the devices' "battery pack" and communications modules:  Fig. 4A Ex. 1005, FIG. 4A, 6:67-7:7, 7:40-42, 9:8-20, 11:1-4, 12:11-20. *Jacobsen* explains that the devices "will be programmed to draw power from the battery during predetermined periods only to prolong battery life." *Id.* at 9:8-20. The effect of this is the other system components would have been powered only periodically: "[f]or example, the sensors may be powered for 2 seconds of

Claim Language	*Jacobsen-Sav* and *Reber*
	every minute, thereby allowing updating of physiological data with little consumption of power." *Id.* And, as discussed above, *Reber* shows the method of adding a user-manipulatable power button that controls power supply to a sensor device was known. Ex. 1020, FIG.I, 4:19-29. Further, the '233 patent also acknowledges that implementations for the claimed "means for signaling" were "already being used" in various "applications" in the prior art. Ex. 1001, 14:34-47. Accordingly, a POSITA would have considered such power control mechanisms (similar to that disclosed by *Reber*) to further the power conservation aspects suggested by *Jacobsen* and discussed by *Reber*. Doing so would have provided the foreseeable result of providing user-controlled mechanisms for mechanically controlling the power state of wrist sensor/display unit 18 (or components thereof, including communications mechanism 224). The disclosures by *Jacobsen* regarding "power management" would have led a POSITA to consider features like those disclosed by *Reber* to implement a power button (or switch, etc.) in the wrist sensor/display unit 18 that when activated would power down components, such as communications mechanism 224, so as to minimize the drain of the battery of the wrist sensor/display unit 18 when communications

Claim Language	*Jacobsen-Sav* and *Reber*
	between the wrist sensor/display unit 18 and soldier unit 50 were not needed. A POSITA would have understood that implementing the above-modification in light of *Reber* would have also involved a simple substitution of one known element for another to obtain foreseeable results. *Jacobsen* discloses "control buttons 208 and 212" on the wrist sensor/display unit 18:  *Fig. 3* Ex. 1005, FIG. 3, 9:20-33. These buttons allow users to control the wrist sensor/display unit 18's display. *Id.* at 9:29-32. Combining the concepts and technologies suggested and relating to *Reber*' s power button would have thus involved merely the reconfiguration of the buttons already present in wrist sensor/display unit 18 to perform other features facilitated by the power management components present in wrist sensor/display

Claim Language	*Jacobsen-Sav* and *Reber*
	unit 18, as disclosed by *Jacobsen*. And, a POSITA would have recognized that implementing features similar to those described by *Reber* with the *Jacobsen-Say* combined system would have involved the use of a known technique to improve similar systems in the same way. As I discussed above, adding power buttons on sensor devices was known in the art. And, *Jacobsen-Say* and *Reber* disclose similar systems for personal health monitoring using a sensor device and another device, where the devices communicate using short-range wireless communications. Compare Ex. 1005, Abstract, FIGS. l-4A, 2:49-5:19, 8:65-9:7 with Ex. 1020, Abstract, FIGS. 1-3, 1:28-60, 2:51-3:17, 4:30-67. APOSITA would have appreciated that the advantages of saving power would have been equally applicable to the portable health devices described in both *Jacobsen* and *Reber*. *Jacobsen's* disclosure even explicitly describes these advantages. Ex. 1005, FIG. 4A, 9:8-20, 12:11-20 ("[t]o maximize battery life") Finally, the choice to include a power control button would have been a design consideration for a POSITA based on various factors, including envisioned users, envisioned use of system, device type, display size, and system architecture. The advantage of a power control button would have been apparent to a POSITA such that

Claim Language	*Jacobsen-Sav* and *Reber*
	users could have determined when the wrist sensor/display unit 18 (or components thereof, such as communication mechanism 224) need not be active and could then have turned it off and save power. This feature would have been especially important for a "field" device, like *Jacobsen's* wrist/sensor display unit 18, because its users may not have had access to a charging station for long periods of time. Thus, in my opinion, a POSITA would have understood that the *Jacobsen-Say* system combined with *Reber*, as described above, discloses and/or suggests claim 26. See also my discussions in sections VIII.A, VIII.B, and VIII.E, which are relevant and incorporated here.

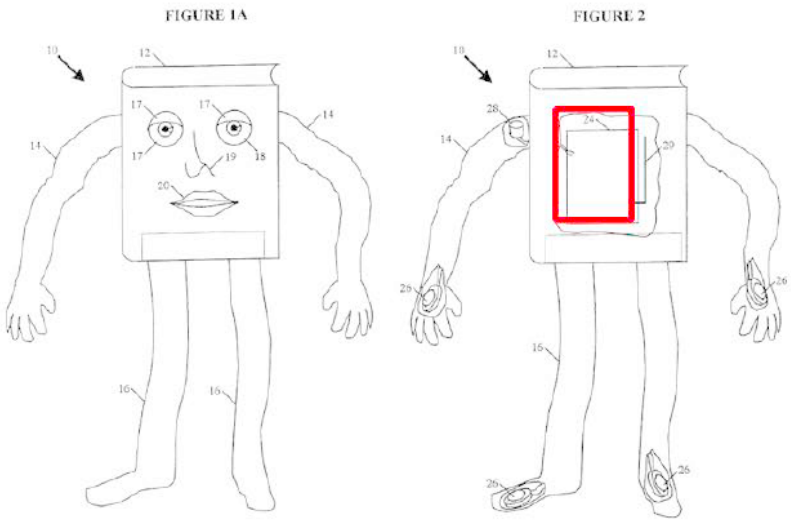
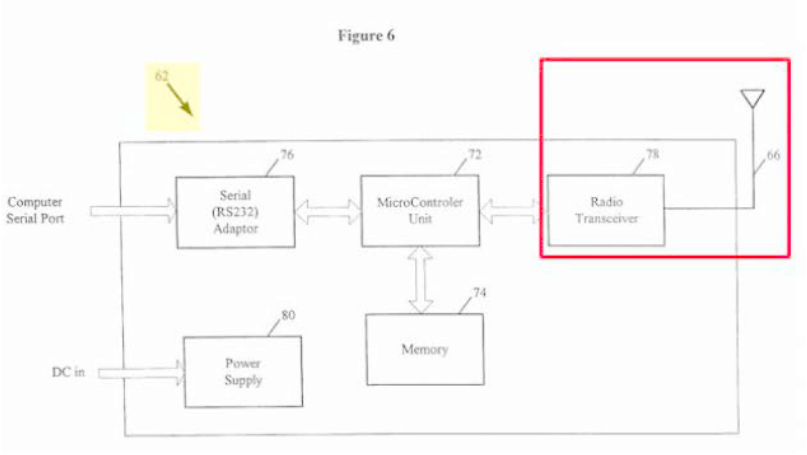
G. Ground 7: Say in view of Gabai discloses and/or suggests the features of claims 15-16 and 22 of the '233 patent

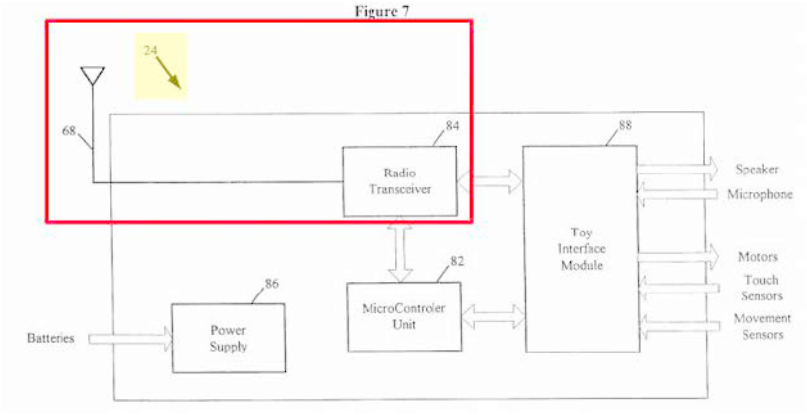
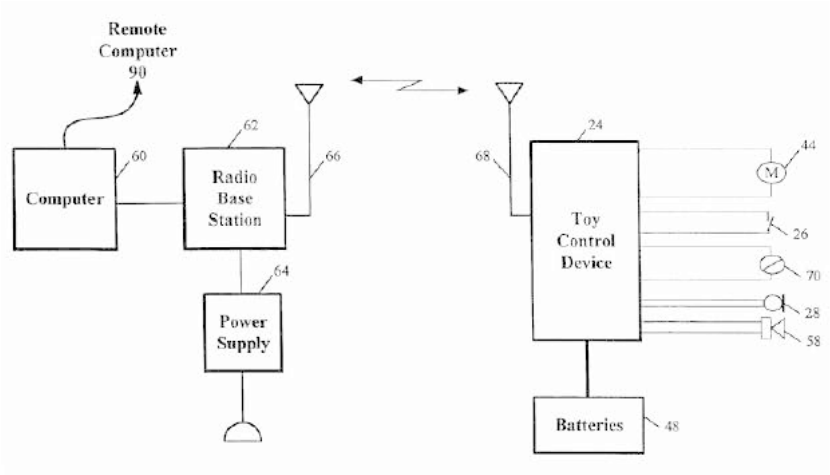
119. In my opinion, the combination of *Say* (described in ground 2) and *Gabai* discloses and/or suggests all of the features of claims 15-16 and 22 of the '233 patent.

1. Claim 15

120. As described below, the combination of *Say* and *Gabai* discloses and/or suggests the features of claim 15:

Claim Language	***Say and Gabai***
15. The system of claim 1, further comprising a central communications base station communicating with the first personal device using short-range wireless communications	The combination of *Say* and *Gabai* discloses and/or suggests this claim. As I discussed in ground 2 (relevant and incorporated here), *Say* discloses and/or suggests the system of claim 1. And, as I discussed in ground 2, Say discloses and/or suggests a first personal device ("sensor control unit 44") communicating with a second device ("receiver/display units 46, 48") using short-range wireless communications. To the extent *Say's* system does not further comprise a central communications base station communicating with the sensor control unit 44 and providing an Internet connection, *Say's* system in light of *Gabai* discloses and/or suggests these features. And, as I explain below, a POSITA would have been motivated to modify the *Say* system such that a central communications base station providing an Internet connection, similar to as described in *Gabai*, engaged in short-range communications with *Say's* sensor control unit 44 ("first personal device") *Gabai* discloses a "toy 1O" comprising "toy control device 24" and "any multitude of known sensors and input devices":

Claim Language	*Say and Gabai*
	 Ex. 1040, FIGS. l A, 2, 7:16-24, 9:22-59. Toy control device 24 further comprises a "radio transceiver 84" and "antenna 68" that allow it to engage in bi-directional wireless communications with the "radio transceiver 78" and "antenna 66" of a "base communication unit 62": 

Claim Language	*Say and Gabai*
	 Id. at FIGS. 6-7, 11:65-12:18. Base communication 62 is further in communication with a "computer 60," as illustrated in Figure 5:  Id. at FIG. 5, 10:23-43. Computer 60 provides an Internet connection. Id. at 11:8-20 ("Computer 60 may be in communication with one or more other computers, such as a remote computer by various known means such as by fixed or dial-up connection to a BBS or to the Internet"). Thus, Gabai discloses a sensor device in wireless bi-directional communication

Claim Language	*Say and Gabai*
	with a base station, which further provides a connection to the Internet. Given the disclosure of *Say* and *Gabai*, and the knowledge of a POSITA, a POSITA would have been motivated to configure *Say's* system such that *Say's* sensor control unit 44 engaged in short-range communications with a base station providing an Internet connection, such as the "radio base station 62" disclosed in *Gabai*. This combination would have involved *Say's* system operating as described in ground 2 (relevant and incorporated here), with the added feature that the sensor control unit 44 could utilize its short-range wireless communications capability to communicate with a central communications base station that provided an Internet connection. A POSITA would have been motivated to implement such features because a POSITA would have recognized the benefits of including a central communications base station providing an Internet connection (as disclosed in *Gabai*) to the *Say* system. Adding such a base station providing an Internet connection would have enabled *Say's* system to access remote resources, thus allowing for *Say's* sensor control unit 44 to access Internet databases and other

Claim Language	*Say and Gabai*
	information. A POSITA would have further had the knowledge, reasons, and capability to integrate *Say's* system to include a base station providing for an Internet connection, such as that described in *Gabai*. Indeed, having considered the disclosures of *Say* and *Gabai*, a POSITA would have appreciated that modifying *Say* as noted above in light of *Gabai* would have merely involved implementing known component and technologies (known base station providing Internet connection) using known processes (utilizing short-range wireless communications). A POSITA would have further recognized that modifying *Say* in this manner would have resulted in the foreseeable feature of providing an Internet connection to the sensor control unit 44. Additionally, *Say* provides a teaching, suggestion, or motivation that would have led a POSITA to the proposed *Say*-*Gabai* combination. *Say* already describes its receiver/display unit 46, 48 providing a long-range communication connection. Specifically, *Say* discloses that one of the receiver/display units "may optionally have one-way or two-way paging capabilities." Ex. 1006, 47:57-62. *Say* also discloses that its system may employ a "repeater unit ...to boost a signal from an on-skin sensor control unit 44" so that

Claim Language	*Say and Gabai*
	the device can engage in more remote communications, such as with a doctor's office. Id. at 48:62-49:14. Clearly, *Say* recognized the potential importance of allowing the sensor control unit to access remote resources, which could have included Internet servers. Therefore, a POSITA would have been motivated to add *Gabai's* base station providing a remote Internet connection to *Say's* system. And, a POSITA would have recognized that modifying *Say's* system to include a central communications base station providing an Internet connection and in communication with the sensor control unit 44 would have involved the use of a known technique to improve similar systems in the same way. As described above, the technique of providing a mobile device access to the Internet via a base station was already known in the art, and products to achieve this were already being widely produced by companies such as DEC and widely used at the time. *See e.g.*, Ex. 1009, Exs. 1018-1019 (describing DEC's RoamAbout system). And, *Gabai* and *Say* both describe similar systems where a sensor device engages in wireless communications with another device. Compare Ex. 1006, 2:13-3:57 with Ex. 1040, 9:22-12:17. The advantage of adding an Internet access point to personal health monitoring

Claim Language	*Say and Gabai*
	devices was known and was already described in the prior art. Ex. 1009, 4 ("The WLAN market currently aims at four categories of applications [WOZ96]: healthcare industry, factory floors, banking industry, and educational institutions. In the healthcare market, in addition to traditional equipment such as laptops, notebooks, and hand-held terminals, special wireless services such as electronic thermometer and blood pressure monitoring devices are expected to be involved in wireless local communications. These devices are used to provide mobile access to clinical and pharmaceutical data bases for the physician as well as entering personal health data"). A POSITA would have recognized that this advantage would have applied similarly to *Say's* analyte monitoring system. If *Say's* sensor control unit 44 could have communicated with a base station providing an Internet connection, the sensor control unit 44 could have accessed online pharmaceutical databases and other relevant information important to the health monitoring context. Finally, the choice to include in *Say's* system a central communication base station communicating with the sensor control unit 44 and providing an Internet connection would have been a design consideration for a POSITA based on design incentives or other market

Claim Language	*Say and Gabai*
	forces, including envisioned users, envisioned use of system, device type, and system architecture. For example, as described above, it was known that providing Internet bridges in health monitoring systems, like the one described in *Say*, would have added useful features to these systems. Thus, in my opinion, a POSITA would have understood that the *Say* system combined with *Gabai*, as described above, discloses and/or suggests claim 15. *See also* my discussions in sections VIII.B, and VIII.F, which are relevant and incorporated here.

2. Claim 16

121. As described below, the combination of *Say* and *Gabai* discloses and/or suggests the features of claim 16:

Claim Language	*Sav* and *Gabai*
16. The system of claim 15, wherein the short-range wireless communications is selected from the group consisting of HomeRF ™, BLUETOOTH, and wireless LAN	The combination of *Say* and *Gabai* discloses and/or suggests this claim. As I discussed for claim 15 (relevant and incorporated here), the combination of *Say* and *Gabai* discloses and/or suggests the system of claim 15, wherein the central communications base station further comprises a connection to the Internet. And, as I discussed in ground 2 (relevant and incorporated here), *Say* discloses and/or suggests

	multiple devices ("sensor control unit 44" and "receiver/display unit 46, 48") communicating using short-range wireless RF communications. A POSITA would have understood that multiple devices communicating using short-range wireless communications results in a wireless local area network (wireless LAN). Indeed, the '233 patent describes local area wireless networks as networks where devices communicate using short-range wireless RF communications. *See* Ex. 1001, 4:45-6:16. A POSITA would have thus understood that *Say* discloses the first personal device's (sensor control unit 44's) and second device's (receiver/display unit 46, 48's) short-range wireless communications comprising a wireless local area network (wireless LAN). Therefore, the *Say* system configured to include a central communications base station providing an Internet connection (*see* claim 15 analysis above), such as the one described in *Gabai* would have resulted in the system of claim 15, wherein the short-range communications is wireless LAN. Thus, in my opinion, a POSITA would have understood that the *Say* system combined with *Gabai*, as described above, discloses and/or suggests claim 16. *See also* my discussions in sections VIII.B, and VIII.F, which are relevant and incorporated here.

3. Claim 22

122. As described below, the combination of *Say* and *Gabai* discloses and/or suggests the features of claim 22:

Claim Language	***Sav* and *Gabai***
22. The system of claim 15, wherein the central communications base station further comprises a connection to the Internet.	The combination of *Say* and *Gabai* discloses and/or suggests this claim. As I discussed for claim 15 (relevant and incorporated here), the combination of *Say* and *Gabai* discloses and/or suggests the system of claim 15, wherein the central communications base station further comprises a connection to the Internet. And, as I discussed for claim 15, POSITA would have been motivated to combine *Say* and *Gabai* to produce a system including these features. Thus, in my opinion, a POSITA would have understood that the *Say* system combined with *Gabai*, as described above, discloses and/or suggests claim 22. *See also* my discussions in sections VIII.B, and VIII.F, which are relevant and incorporated here.

X. CONCLUSION

123. I declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made With the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Dated: May 14, 2020

By: _____
Dr. Joseph Paradiso