(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
13 December 2012 (13.12.2012)

WIPO | PCT

(10) International Publication Number
WO 2012/170586 A2

(51) International Patent Classification:
B29C 45/14 (2006.01) *B29C 45/76* (2006.01)

(21) International Application Number:
PCT/US2012/041175

(22) International Filing Date:
6 June 2012 (06.06.2012)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

13/158,372	10 June 2011 (10.06.2011)	US
61/495,997	11 June 2011 (11.06.2011)	US
61/495,994	11 June 2011 (11.06.2011)	US
61/495,996	11 June 2011 (11.06.2011)	US
13/158,416	11 June 2011 (11.06.2011)	US
61/495,995	11 June 2011 (11.06.2011)	US
13/180,000	11 July 2011 (11.07.2011)	US
13/180,320	11 July 2011 (11.07.2011)	US
13/181,495	12 July 2011 (12.07.2011)	US
13/181,511	12 July 2011 (12.07.2011)	US
13/361,919	30 January 2012 (30.01.2012)	US
13/433,208	28 March 2012 (28.03.2012)	US

(71) **Applicant** *(for all designated States except US)*: **ALIPHCOM** [US/US]; Third Floor, 99 Rhode Island Street, San Francisco, California 94103 (US).

(72) **Inventor; and**
(71) **Applicant** : **UTTER II, Max Everett** [US/US]; 1045 Mission Street, #466, San Francisco, California 94103 (US).

(74) **Agents**: **KOKKA & BACKUS, PC** et al.; 703 High Street, Palo Alto, California 94301 (US).

(81) **Designated States** *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD,

[Continued on next page]

(54) Title: SLEEP MANAGEMENT METHOD AND APPARATUS FOR A WELLNESS APPLICATION USING DATA FROM A DATA-CAPABLE BAND

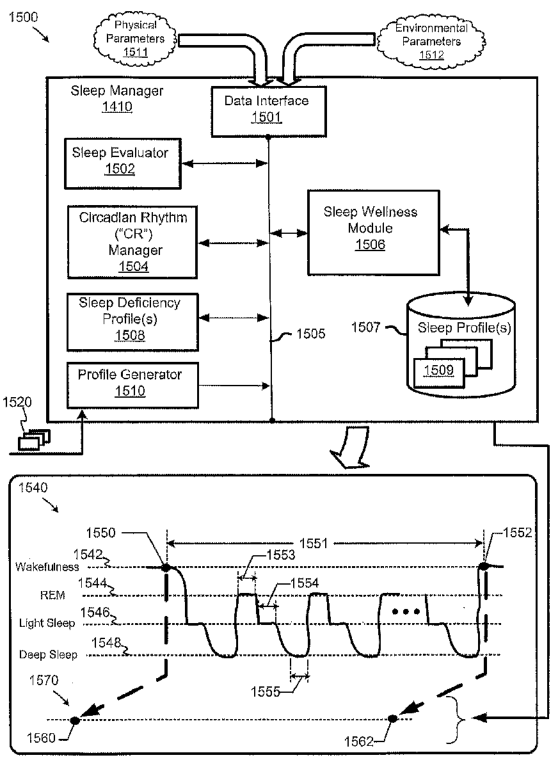


FIG. 15

(57) Abstract: Sleep management techniques and devices are configured for use with a data-capable personal worn or carried device. In one embodiment, a method includes receiving data representing a sleep profile defining parameters upon which a target score is established, and acquiring data representing acquired parameters associated with sleep activity. The method also includes determining a first score for a first acquired parameter, determining a second score for a second acquired parameter, and calculating at a processor a sleep score based on data in a memory including the first score and the second score. Further, the method includes causing presentation of a representation of the sleep score to indicate either an attainment of the target score or a deviation therefrom.

WO 2012/170586 A2

SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*

SLEEP MANAGEMENT METHOD AND APPARATUS FOR A WELLNESS APPLICATION USING DATA FROM A DATA-CAPABLE BAND

FIELD

The present invention relates generally to electrical and electronic hardware, computer software, wired and wireless network communications, and computing devices. More specifically, sleep management techniques and devices for use with a data-capable personal worn or carried device are described.

BACKGROUND

With the advent of greater computing capabilities in smaller personal and/or portable form factors and an increasing number of applications (i.e., computer and Internet software or programs) for different uses, consumers (i.e., users) have access to large amounts of personal data. Information and data are often readily available, but poorly captured using conventional data capture devices. Conventional devices typically lack capabilities that can capture, analyze, communicate, or use data in a contextually-meaningful, comprehensive, and efficient manner. Further, conventional solutions are often limited to specific individual purposes or uses, demanding that users invest in multiple devices in order to perform different activities (e.g., a sports watch for tracking time and distance, a GPS receiver for monitoring a hike or run, a cyclometer for gathering cycling data, and others). Although a wide range of data and information is available, conventional devices and applications fail to provide effective solutions that comprehensively capture data for a given user across numerous disparate activities.

Some conventional solutions combine a small number of discrete functions. Functionality for data capture, processing, storage, or communication in conventional devices such as a watch or timer with a heart rate monitor or global positioning system ("GPS") receiver are available conventionally, but are expensive to manufacture and purchase. Other conventional solutions for combining personal data capture facilities often present numerous design and manufacturing problems such as size restrictions, specialized materials requirements, lowered tolerances for defects such as pits or holes in coverings for water-resistant or waterproof devices, unreliability, higher failure rates, increased manufacturing time, and expense. Subsequently, conventional devices such as fitness watches, heart rate monitors, GPS-enabled fitness monitors, health monitors (e.g., diabetic blood sugar testing units), digital voice recorders, pedometers, altimeters, and other conventional personal data capture devices are generally manufactured for conditions that occur in a single or small groupings of activities. Problematically, though, conventional devices do not provide effective solutions to users in terms of providing a comprehensive view of one's overall health or wellness as a result of a combined analysis of data gathered. This is a limiting aspect of the commercial attraction of the various types of conventional devices listed above.

Generally, if the number of activities performed by conventional personal data capture devices increases, there is a corresponding rise in design and manufacturing requirements that results in significant consumer expense, which eventually becomes prohibitive to both investment and commercialization. Further, conventional manufacturing techniques are often limited and ineffective at meeting increased requirements to protect sensitive hardware, circuitry, and other components that are susceptible to damage, but which are required to perform various personal data capture activities. As a conventional example, sensitive electronic components such as printed circuit board assemblies ("PCBA"), sensors, and computer memory (hereafter "memory") can be significantly damaged or destroyed during manufacturing processes where overmoldings or layering of protective material occurs using techniques such as injection molding, cold molding, and others. Damaged or destroyed items subsequently raises the cost of goods sold and can deter not only investment and commercialization, but also innovation in data capture and analysis technologies, which are highly compelling fields of opportunity.

Thus, what is needed is a solution for data capture devices without the limitations of conventional techniques.

BRIEF DESCRIPTION OF THE DRAWINGS

Various embodiments or examples ("examples") of the invention are disclosed in the following detailed description and the accompanying drawings:

FIG. 1 illustrates an exemplary data-capable band system;

FIG. 2 illustrates a block diagram of an exemplary data-capable band;

FIG. 3 illustrates sensors for use with an exemplary data-capable band;

FIG. 4 illustrates an application architecture for an exemplary data-capable band;

FIG. 5A illustrates representative data types for use with an exemplary data-capable band;

FIG. 5B illustrates representative data types for use with an exemplary data-capable band in fitness-related activities;

FIG. 5C illustrates representative data types for use with an exemplary data-capable band in sleep management activities;

FIG. 5D illustrates representative data types for use with an exemplary data-capable band in medical-related activities;

FIG. 5E illustrates representative data types for use with an exemplary data-capable band in social media/networking-related activities;

FIG. 6 illustrates an exemplary communications device system implemented with multiple exemplary data-capable bands;

FIG. 7 illustrates an exemplary wellness tracking system for use with or within a distributed wellness application;

FIG. 8 illustrates representative calculations executed by an exemplary conversion module to determine an aggregate value for producing a graphical representation of a user's wellness;

FIG. 9 illustrates an exemplary process for generating and displaying a graphical representation of a user's wellness based upon the user's activities;

FIG. 10 illustrates an exemplary graphical representation of a user's wellness over a time period;

FIG. 11 illustrates another exemplary graphical representation of a user's wellness over a time period;

FIGS. 12A-12F illustrate exemplary wireframes of exemplary webpages associated with a wellness marketplace portal;

FIG. 13 illustrates an exemplary computer system suitable for implementation of a wellness application and use with a data-capable band;

FIG. 14 depicts an example of an aggregation engine, according to some examples;

FIG. 15 depicts an example of a sleep manager, according to some examples;

FIG. 16 is an example flow diagram for a technique of managing sleep using wearable devices, including sensors, according to some examples;

FIG. 17 is another example flow diagram for another technique of managing sleep using wearable devices, including sensors, according to some examples; and

FIG. 18 depicts a functional interaction between a sleep evaluator and score generator, according to some examples.

DETAILED DESCRIPTION

Various embodiments or examples may be implemented in numerous ways, including as a system, a process, an apparatus, a user interface, or a series of program instructions on a computer readable medium such as a computer readable storage medium or a computer network where the program instructions are sent over optical, electronic, or wireless communication links. In general, operations of disclosed processes may be performed in an arbitrary order, unless otherwise provided in the claims.

A detailed description of one or more examples is provided below along with accompanying figures. The detailed description is provided in connection with such examples, but is not limited to any particular example. The scope is limited only by the claims and numerous alternatives, modifications, and equivalents are encompassed. Numerous specific details are set forth in the following description in order to provide a thorough understanding. These details are provided for the purpose of example and the described techniques may be practiced according to the claims without some or all of these specific details. For clarity, technical material that is known in the technical fields related to the examples has not been described in detail to avoid unnecessarily obscuring the description.

FIG. 1 illustrates an exemplary data-capable band system. Here, system 100 includes network

102, bands 104-112, server 114, mobile computing device 116, mobile communications device 118, computer 120, laptop 122, and distributed sensor 124. Bands 104-112 may be implemented as data-capable device that may be worn as a strap or band around an arm, leg, ankle, or other bodily appendage or feature. In other examples, bands 104-112 may be attached directly or indirectly to other items, organic or inorganic, animate, or static. In still other examples, bands 104-112 may be used differently.

As described above, bands 104-112 may be implemented as wearable personal data or data capture devices (e.g., data-capable devices) that are worn by a user around a wrist, ankle, arm, ear, or other appendage, or attached to the body or affixed to clothing. One or more facilities, sensing elements, or sensors, both active and passive, may be implemented as part of bands 104-112 in order to capture various types of data from different sources. Temperature, environmental, temporal, motion, electronic, electrical, chemical, or other types of sensors (including those described below in connection with FIG. 3) may be used in order to gather varying amounts of data, which may be configurable by a user, locally (e.g., using user interface facilities such as buttons, switches, motion-activated/detected command structures (e.g., accelerometer-gathered data from user-initiated motion of bands 104-112), and others) or remotely (e.g., entering rules or parameters in a website or graphical user interface ("GUI") that may be used to modify control systems or signals in firmware, circuitry, hardware, and software implemented (i.e., installed) on bands 104-112). Bands 104-112 may also be implemented as data-capable devices that are configured for data communication using various types of communications infrastructure and media, as described in greater detail below. Bands 104-112 may also be wearable, personal, non-intrusive, lightweight devices that are configured to gather large amounts of personally relevant data that can be used to improve user health, fitness levels, medical conditions, athletic performance, sleeping physiology, and physiological conditions, or used as a sensory-based user interface ("UI") to signal social-related notifications specifying the state of the user through vibration, heat, lights or other sensory based notifications. For example, a social-related notification signal indicating a user is on-line can be transmitted to a recipient, who in turn, receives the notification as, for instance, a vibration.

Using data gathered by bands 104-112, applications may be used to perform various analyses and evaluations that can generate information as to a person's physical (e.g., healthy, sick, weakened, or other states, or activity level), emotional, or mental state (e.g., an elevated body temperature or heart rate may indicate stress, a lowered heart rate and skin temperature, or reduced movement (e.g., excessive sleeping), may indicate physiological depression caused by exertion or other factors, chemical data gathered from evaluating outgassing from the skin's surface may be analyzed to determine whether a person's diet is balanced or if various nutrients are lacking, salinity detectors may be evaluated to determine if high, lower, or proper blood sugar levels are present for diabetes management, and others). Generally, bands 104-112 may be configured to gather from sensors locally and remotely.

As an example, band 104 may capture (i.e., record, store, communicate (i.e., send or receive), process, or the like) data from various sources (i.e., sensors that are organic (i.e., installed, integrated, or otherwise implemented with band 104) or distributed (e.g., microphones on mobile computing device 116, mobile communications device 118, computer 120, laptop 122, distributed sensor 124, global positioning system ("GPS") satellites, or others, without limitation)) and exchange data with one or more of bands 106-112, server 114, mobile computing device 116, mobile communications device 118, computer 120, laptop 122, and distributed sensor 124. As shown here, a local sensor may be one that is incorporated, integrated, or otherwise implemented with bands 104-112. A remote or distributed sensor (e.g., mobile computing device 116, mobile communications device 118, computer 120, laptop 122, or, generally, distributed sensor 124) may be sensors that can be accessed, controlled, or otherwise used by bands 104-112. For example, band 112 may be configured to control devices that are also controlled by a given user (e.g., mobile computing device 116, mobile communications device 118, computer 120, laptop 122, and distributed sensor 124). For example, a microphone in mobile communications device 118 may be used to detect, for example, ambient audio data that is used to help identify a person's location, or an ear clip (e.g., a headset as described below) affixed to an ear may be used to record pulse or blood oxygen saturation levels. Additionally, a sensor implemented with a screen on mobile computing device 116 may be used to read a user's temperature or obtain a biometric signature while a user is interacting with data. A further example may include using data that is observed on computer 120 or laptop 122 that provides information as to a user's online behavior and the type of content that she is viewing, which may be used by bands 104-112. Regardless of the type or location of sensor used, data may be transferred to bands 104-112 by using, for example, an analog audio jack, digital adapter (e.g., USB, mini-USB), or other, without limitation, plug, or other type of connector that may be used to physically couple bands 104-112 to another device or system for transferring data and, in some examples, to provide power to recharge a battery (not shown). Alternatively, a wireless data communication interface or facility (e.g., a wireless radio that is configured to communicate data from bands 104-112 using one or more data communication protocols (e.g., IEEE 802.11a/b/g/n (WiFi), WiMax, ANT™, ZigBee®, Bluetooth®, Near Field Communications ("NFC"), and others)) may be used to receive or transfer data. Further, bands 104-112 may be configured to analyze, evaluate, modify, or otherwise use data gathered, either directly or indirectly.

In some examples, bands 104-112 may be configured to share data with each other or with an intermediary facility, such as a database, website, web service, or the like, which may be implemented by server 114. In some embodiments, server 114 can be operated by a third party providing, for example, social media-related services. Bands 104-112 and other related devices may exchange data with each other directly, or bands 104-112 may exchange data via a third party server, such as a third party like Facebook®, to provide social-media related services. Examples of other third party servers include those implemented by social networking services, including, but not limited to, services such as Yahoo! IM™, GTalk™, MSN Messenger™, Twitter® and other private or public social networks. The exchanged data may include personal physiological data and data derived from sensory-based user interfaces ("UI"). Server 114, in some examples, may be implemented using one or more processor-based computing devices or networks, including computing clouds, storage area networks ("SAN"), or the like. As shown, bands 104-112 may be used as a personal data or area network (e.g., "PDN" or "PAN") in which data relevant to a given user or band (e.g., one or more of bands 104-112) may be shared. As shown here, bands 104 and 112 may be configured to exchange data with each other over network 102 or indirectly using server 114. Users of bands 104 and 112 may direct a web browser hosted on a computer (e.g., computer 120, laptop 122, or the like) in order to access, view, modify, or perform other operations with data captured by bands 104 and 112. For example, two runners using bands 104 and 112 may be geographically remote (e.g., users are not geographically in close proximity locally such that bands being used by each user are in direct data communication), but wish to share data regarding their race times (pre, post, or in-race), personal records (i.e., "PR"), target split times, results, performance characteristics (e.g., target heart rate, target VO2 max, and others), and other information. If both runners (i.e., bands 104 and 112) are engaged in a race on the same day, data can be gathered for comparative analysis and other uses. Further, data can be shared in substantially real-time (taking into account any latencies incurred by data transfer rates, network topologies, or other data network factors) as well as uploaded after a given activity or event has been performed. In other words, data can be captured by the user as it is worn and configured to transfer data using, for example, a wireless network connection (e.g., a wireless network interface card, wireless local area network ("LAN") card, cell phone, or the like). Data may also be shared in a temporally asynchronous manner in which a wired data connection (e.g., an analog audio plug (and associated software or firmware) configured to transfer digitally encoded data to encoded audio data that may be transferred between bands 104-112 and a plug configured to receive, encode/decode, and process data exchanged) may be used to transfer data from one or more bands 104-112 to various destinations (e.g., another of bands 104-112, server 114, mobile computing device 116, mobile communications device 118, computer 120, laptop 122, and distributed sensor 124). Bands 104-112 may be implemented with various types of wired and/or wireless communication facilities and are not intended to be limited to any specific technology. For example, data may be transferred from bands 104-112 using an analog audio plug (e.g., TRRS, TRS, or others). In other examples, wireless communication facilities using various types of data communication protocols (e.g., WiFi, Bluetooth®, ZigBee®, ANT™, and others) may be implemented as part of bands 104-112, which may include circuitry, firmware, hardware, radios, antennas, processors, microprocessors, memories, or other electrical, electronic, mechanical, or physical elements configured to enable data communication capabilities of various types and characteristics.

As data-capable devices, bands 104-112 may be configured to collect data from a wide range of sources, including onboard (not shown) and distributed sensors (e.g., server 114, mobile computing device 116, mobile communications device 118, computer 120, laptop 122, and distributed sensor 124) or other bands. Some or all data captured may be personal, sensitive, or confidential and various techniques for providing secure storage and access may be implemented. For example, various types of security protocols and algorithms may be used to encode data stored or accessed by bands 104-112. Examples of security protocols and algorithms include authentication, encryption, encoding, private and public key infrastructure, passwords, checksums, hash codes and hash functions (e.g., SHA, SHA-1, MD-5, and the like), or others may be used to prevent undesired access to data captured by bands 104-112. In other examples, data security for bands 104-112 may be implemented differently.

Bands 104-112 may be used as personal wearable, data capture devices that, when worn, are configured to identify a specific, individual user. By evaluating captured data such as motion data from an accelerometer, biometric data such as heart rate, skin galvanic response, and other biometric data, and using long-term analysis techniques (e.g., software packages or modules of any type, without limitation), a user may have a unique pattern of behavior or motion and/or biometric responses that can be used as a signature for identification. For example, bands 104-112 may gather data regarding an individual person's gait or other unique biometric, physiological or behavioral characteristics. Using, for example, distributed sensor 124, a biometric signature (e.g., fingerprint, retinal or iris vascular pattern, or others) may be gathered and transmitted to bands 104-112 that, when combined with other data, determines that a given user has been properly identified and, as such, authenticated. When bands 104-112 are worn, a user may be identified and authenticated to enable a variety of other functions such as accessing or modifying data, enabling wired or wireless data transmission facilities (i.e., allowing the transfer of data from bands 104-112), modifying functionality or functions of bands 104-112, authenticating financial transactions using stored data and information (e.g., credit card, PIN, card security numbers, and the like), running applications that allow for various operations to be performed (e.g., controlling physical security and access by transmitting a security code to a reader that, when authenticated, unlocks a door by turning off current to an electromagnetic lock, and others), and others. Different functions and operations beyond those described may be performed using bands 104-112, which can act as secure, personal, wearable, data-capable devices. The number, type, function, configuration, specifications, structure, or other features of system 100 and the above-described elements may be varied and are not limited to the examples provided.

FIG. 2 illustrates a block diagram of an exemplary data-capable band. Here, band 200 includes bus 202, processor 204, memory 206, notification facility 208, accelerometer 210, sensor 212, battery 214, and communications facility 216. In some examples, the quantity, type, function, structure, and configuration of band 200 and the elements (e.g., bus 202, processor 204, memory 206, notification facility 208, accelerometer 210, sensor 212, battery 214, and communications facility 216) shown may be varied and are not limited to the examples provided. As shown, processor 204 may be implemented as logic to provide control functions and signals to memory 206, notification facility 208, accelerometer 210, sensor 212, battery 214, and communications facility 216. Processor 204 may be implemented using any type of processor or microprocessor suitable for packaging within bands 104-112 (FIG. 1). Various types of microprocessors may be used to provide data processing capabilities for band 200 and are not limited to any specific type or capability. For example, a MSP430F5528-type microprocessor manufactured by Texas Instruments of Dallas, Texas may be configured for data communication using audio tones and enabling the use of an audio plug-and-jack system (e.g., TRRS, TRS, or others) for transferring data captured by band 200. Further, different processors may be desired if other functionality (e.g., the type and number of sensors (e.g., sensor 212)) are varied. Data processed by processor 204 may be stored using, for example, memory 206.

In some examples, memory 206 may be implemented using various types of data storage technologies and standards, including, without limitation, read-only memory ("ROM"), random access memory ("RAM"), dynamic random access memory ("DRAM"), static random access memory ("SRAM"), static/dynamic random access memory ("SDRAM"), magnetic random access memory ("MRAM"), solid state, two and three-dimensional memories, Flash®, and others. Memory 206 may also be implemented using one or more partitions that are configured for multiple types of data storage technologies to allow for non-modifiable (i.e., by a user) software to be installed (e.g., firmware installed on ROM) while also providing for storage of captured data and applications using, for example, RAM. Once captured and/or stored in memory 206, data may be subjected to various operations performed by other elements of band 200.

Notification facility 208, in some examples, may be implemented to provide vibratory energy, audio or visual signals, communicated through band 200. As used herein, "facility" refers to any, some, or all of the features and structures that are used to implement a given set of functions. In some examples, the vibratory energy may be implemented using a motor or other mechanical structure. In some examples, the audio signal may be a tone or other audio cue, or it may be implemented using different sounds for different purposes. The audio signals may be emitted directly using notification facility 208, or indirectly by transmission via communications facility 216 to other audio-capable devices (e.g., headphones (not shown), a headset (as described below with regard to FIG. 12), mobile computing device 116, mobile communications device 118, computer 120, laptop 122, distributed sensor 124, etc.). In some examples, the visual signal may be implemented using any available display technology, such as lights, light-emitting diodes (LEDs), interferometric modulator display (IMOD), electrophoretic ink (E Ink), organic light-emitting diode (OLED), or other display technologies. As an example, an application stored on memory 206 may be configured to monitor a clock signal from processor 204 in order to provide timekeeping functions to band 200. For example, if an alarm is set for a desired time, notification facility 208 may be used to provide a vibration or an audio tone, or a series of vibrations or audio tones, when the desired time occurs. As another example, notification facility 208 may be coupled to a framework (not shown) or other structure that is used to translate or communicate vibratory energy throughout the physical structure of band 200. In other examples, notification facility 208 may be implemented differently.

Power may be stored in battery 214, which may be implemented as a battery, battery module, power management module, or the like. Power may also be gathered from local power sources such as solar panels, thermo-electric generators, and kinetic energy generators, among others that are alternatives power sources to external power for a battery. These additional sources can either power the system directly or can charge a battery, which, in turn, is used to power the system (e.g., of a band). In other words, battery 214 may include a rechargeable, expendable, replaceable, or other type of battery, but also circuitry, hardware, or software that may be used in connection with in lieu of processor 204 in order to provide power management, charge/recharging, sleep, or other functions. Further, battery 214 may be implemented using various types of battery technologies, including Lithium Ion ("LI"), Nickel Metal Hydride ("NiMH"), or others, without limitation. Power drawn as electrical current may be distributed from battery via bus 202, the latter of which may be implemented as deposited or formed circuitry or using other forms of circuits or cabling, including flexible circuitry. Electrical current distributed from battery 204 and managed by processor 204 may be used by one or more of memory 206, notification facility 208, accelerometer 210, sensor 212, or communications facility 216.

As shown, various sensors may be used as input sources for data captured by band 200. For example, accelerometer 210 may be used to gather data measured across one, two, or three axes of motion. In addition to accelerometer 210, other sensors (i.e., sensor 212) may be implemented to provide temperature, environmental, physical, chemical, electrical, or other types of sensed inputs. As presented here, sensor 212 may include one or multiple sensors and is not intended to be limiting as to the quantity or type of sensor implemented. Data captured by band 200 using accelerometer 210 and sensor 212 or data requested from another source (i.e., outside of band 200) may also be exchanged, transferred, or otherwise communicated using communications facility 216. For example, communications facility 216 may include a wireless radio, control circuit or logic, antenna, transceiver, receiver, transmitter, resistors, diodes, transistors, or other elements that are used to transmit and receive data from band 200. In some examples, communications facility 216 may be implemented to provide a "wired" data communication capability such as an analog or digital attachment, plug, jack, or the like to allow for data to be transferred. In other examples, communications facility 216 may be implemented to provide a wireless data communication capability to transmit digitally encoded data across one or more frequencies using various types of data communication protocols, without limitation. In still other examples, band 200 and the above-described elements may be varied in function, structure, configuration, or implementation and are not limited to those shown and described.

FIG. 3 illustrates sensors for use with an exemplary data-capable band. Sensor 212 may be implemented using various types of sensors, some of which are shown. Like-numbered and named elements may describe the same or substantially similar element as those shown in other descriptions. Here, sensor 212 (FIG. 2) may be implemented as accelerometer 302, altimeter/barometer 304, light/infrared ("IR") sensor 306, pulse/heart rate ("HR") monitor 308, audio sensor (e.g., microphone, transducer, or others) 310, pedometer 312, velocimeter 314, GPS receiver 316, location-based service sensor (e.g., sensor for determining location within a cellular or micro-cellular network, which may or may not use GPS or other satellite constellations for fixing a position) 318, motion detection sensor 320, environmental sensor 322, chemical sensor 324, electrical sensor 326, or mechanical sensor 328.

As shown, accelerometer 302 may be used to capture data associated with motion detection along 1, 2, or 3-axes of measurement, without limitation to any specific type of specification of sensor. Accelerometer 302 may also be implemented to measure various types of user motion and may be configured based on the type of sensor, firmware, software, hardware, or circuitry used. As another example, altimeter/barometer 304 may be used to measure environment pressure, atmospheric or otherwise, and is not limited to any specification or type of pressure-reading device. In some examples, altimeter/barometer 304 may be an altimeter, a barometer, or a combination thereof. For example, altimeter/barometer 304 may be implemented as an altimeter for measuring above ground level ("AGL") pressure in band 200, which has been configured for use by naval or military aviators. As another example, altimeter/barometer 304 may be implemented as a barometer for reading atmospheric pressure for marine-based applications. In other examples, altimeter/barometer 304 may be implemented differently.

Other types of sensors that may be used to measure light or photonic conditions include light/IR sensor 306, motion detection sensor 320, and environmental sensor 322, the latter of which may include any type of sensor for capturing data associated with environmental conditions beyond light. Further, motion detection sensor 320 may be configured to detect motion using a variety of techniques and technologies, including, but not limited to comparative or differential light analysis (e.g., comparing foreground and background lighting), sound monitoring, or others. Audio sensor 310 may be implemented using any type of device configured to record or capture sound.

In some examples, pedometer 312 may be implemented using devices to measure various types of data associated with pedestrian-oriented activities such as running or walking. Footstrikes, stride length, stride length or interval, time, and other data may be measured. Velocimeter 314 may be implemented, in some examples, to measure velocity (e.g., speed and directional vectors) without limitation to any particular activity. Further, additional sensors that may be used as sensor 212 include those configured to identify or obtain location-based data. For example, GPS receiver 316 may be used to obtain coordinates of the geographic location of band 200 using, for example, various types of signals transmitted by civilian and/or military satellite constellations in low, medium, or high earth orbit (e.g., "LEO," "MEO," or "GEO"). In other examples, differential GPS algorithms may also be implemented with GPS receiver 316, which may be used to generate more precise or accurate coordinates. Still further, location-based services sensor 318 may be implemented to obtain location-based data including, but not limited to location, nearby services or items of interest, and the like. As an example, location-based services sensor 318 may be configured to detect an electronic signal, encoded or otherwise, that provides information regarding a physical locale as band 200 passes. The electronic signal may include, in some examples, encoded data regarding the location and information associated therewith. Electrical sensor 326 and mechanical sensor 328 may be configured to include other types (e.g., haptic, kinetic, piezoelectric, piezomechanical, pressure, touch, thermal, and others) of sensors for data input to band 200, without limitation. Other types of sensors apart from those shown may also be used, including magnetic flux sensors such as solid-state compasses and the like, including gyroscopic sensors. While the present illustration provides numerous examples of types of sensors that may be used with band 200 (FIG. 2), others not shown or described may be implemented with or as a substitute for any sensor shown or described.

FIG. 4 illustrates an application architecture for an exemplary data-capable band. Here, application architecture 400 includes bus 402, logic module 404, communications module 406, security module 408, interface module 410, data management 412, audio module 414, motor controller 416, service management module 418, sensor input evaluation module 420, and power management module 422. In some examples, application architecture 400 and the above-listed elements (e.g., bus 402, logic module 404, communications module 406, security module 408, interface module 410, data management 412, audio module 414, motor controller 416, service management module 418, sensor input evaluation module 420, and power management module 422) may be implemented as software using various computer programming and formatting languages such as Java, C++, C, and others. As shown here, logic module 404 may be firmware or application software that is installed in memory 206 (FIG. 2) and executed by processor 204 (FIG. 2). Included with logic module 404 may be program instructions or code (e.g., source, object, binary executables, or others) that, when initiated, called, or instantiated, perform various functions.

For example, logic module 404 may be configured to send control signals to communications module 406 in order to transfer, transmit, or receive data stored in memory 206, the latter of which may be managed by a database management system ("DBMS") or utility in data management module 412. As another example, security module 408 may be controlled by logic module 404 to provide encoding, decoding, encryption, authentication, or other functions to band 200 (FIG. 2). Alternatively, security module 408 may also be implemented as an application that, using data captured from various sensors and stored in memory 206 (and accessed by data management module 412) may be used to provide identification functions that enable band 200 to passively identify a user or wearer of band 200. Still further, various types of security software and applications may be used and are not limited to those shown and described.

Interface module 410, in some examples, may be used to manage user interface controls such as switches, buttons, or other types of controls that enable a user to manage various functions of band 200. For example, a 4-position switch may be turned to a given position that is interpreted by interface module 410 to determine the proper signal or feedback to send to logic module 404 in order to generate a particular result. In other examples, a button (not shown) may be depressed that allows a user to trigger or initiate certain actions by sending another signal to logic module 404. Still further, interface module 410 may be used to interpret data from, for example, accelerometer 210 (FIG. 2) to identify specific movement or motion that initiates or triggers a given response. In other examples, interface module 410 may be used to manage different types of displays (e.g., LED, IMOD, E Ink, OLED, etc.). In other examples, interface module 410 may be implemented differently in function, structure, or configuration and is not limited to those shown and described.

As shown, audio module 414 may be configured to manage encoded or unencoded data gathered from various types of audio sensors. In some examples, audio module 414 may include one or more codecs that are used to encode or decode various types of audio waveforms. For example, analog audio input may be encoded by audio module 414 and, once encoded, sent as a signal or collection of data packets, messages, segments, frames, or the like to logic module 404 for transmission via communications module 406. In other examples, audio module 414 may be implemented differently in function, structure, configuration, or implementation and is not limited to those shown and described. Other elements that may be used by band 200 include motor controller 416, which may be firmware or an application to control a motor or other vibratory energy source (e.g., notification facility 208 (FIG. 2)). Power used for band 200 may be drawn from battery 214 (FIG. 2) and managed by power management module 422, which may be firmware or an application used to manage, with or without user input, how power is consumer, conserved, or otherwise used by band 200 and the above-described elements, including one or more sensors (e.g., sensor 212 (FIG. 2), sensors 302-328 (FIG. 3)). With regard to data captured, sensor input evaluation module 420 may be a software engine or module that is used to evaluate and analyze data received from one or more inputs (e.g., sensors 302-328) to band 200. When received, data may be analyzed by sensor input evaluation module 420, which may include custom or "off-the-shelf" analytics packages that are configured to provide application-specific analysis of data to determine trends, patterns, and other useful information. In other examples, sensor input module 420 may also include firmware or software that enables the generation of various types and formats of reports for presenting data and any analysis performed thereupon.

Another element of application architecture 400 that may be included is service management module 418. In some examples, service management module 418 may be firmware, software, or an application that is configured to manage various aspects and operations associated with executing software-related instructions for band 200. For example, libraries or classes that are used by software or applications on band 200 may be served from an online or networked source. Service management module 418 may be implemented to manage how and when these services are invoked in order to ensure that desired applications are executed properly within application architecture 400. As discrete sets, collections, or groupings of functions, services used by band 200 for various purposes ranging from communications to operating systems to call or document libraries may be managed by service management module 418. Alternatively, service management module 418 may be implemented differently and is not limited to the examples provided herein. Further, application architecture 400 is an example of a software/system/application-level architecture that may be used to implement various software-related aspects of band 200 and may be varied in the quantity, type, configuration, function, structure, or type of programming or formatting languages used, without limitation to any given example.

FIG. 5A illustrates representative data types for use with an exemplary data-capable band. Here, wearable device 502 may capture various types of data, including, but not limited to sensor data 504, manually-entered data 506, application data 508, location data 510, network data 512, system/operating data 514, and user data 516. Various types of data may be captured from sensors, such as those described above in connection with FIG. 3. Manually-entered data, in some examples, may be data or inputs received directly and locally by band 200 (FIG. 2). In other examples, manually-entered data may also be provided through a third-party website that stores the data in a database and may be synchronized from server 114 (FIG. 1) with one or more of bands 104-112. Other types of data that may be captured including application data 508 and system/operating data 514, which may be associated with firmware, software, or hardware installed or implemented on band 200. Further, location data 510 may be used by wearable device 502, as described above. User data 516, in some examples, may be data that include profile data, preferences, rules, or other information that has been previously entered by a given user of wearable device 502. Further, network data 512 may be data is captured by wearable device with regard to routing tables, data paths, network or access availability (e.g., wireless network access availability), and the like. Other types of data may be captured by wearable device 502 and are not limited to the examples shown and described. Additional context-specific examples of types of data captured by bands 104-112 (FIG. 1) are provided below.

FIG. 5B illustrates representative data types for use with an exemplary data-capable band in fitness-related activities. Here, band 519 may be configured to capture types (i.e., categories) of data such as heart rate/pulse monitoring data 520, blood oxygen saturation data 522, skin temperature data 524, salinity/emission/outgassing data 526, location/GPS data 528, environmental data 530, and accelerometer data 532. As an example, a runner may use or wear band 519 to obtain data associated with his physiological condition (i.e., heart rate/pulse monitoring data 520, skin temperature, salinity/emission/outgassing data 526, among others), athletic efficiency (i.e., blood oxygen saturation data 522), and performance (i.e., location/GPS data 528 (e.g., distance or laps run), environmental data 530 (e.g., ambient temperature, humidity, pressure, and the like), accelerometer 532 (e.g., biomechanical information, including gait, stride, stride length, among others)). Other or different types of data may be captured by band 519, but the above-described examples are illustrative of some types of data that may be captured by band 519. Further, data captured may be uploaded to a website or online/networked destination for storage and other uses. For example, fitness-related data may be used by applications that are downloaded from a "fitness marketplace" or "wellness marketplace," where athletes, or other users, may find, purchase, or download applications, products, information, etc., for various uses, as well as share information with other users. Some applications may be activity-specific and thus may be used to modify or alter the data capture capabilities of band 519 accordingly. For example, a fitness marketplace may be a website accessible by various types of mobile and non-mobile clients to locate applications for different exercise or fitness categories such as running, swimming, tennis, golf, baseball, football, fencing, and many others. When downloaded, applications from a fitness marketplace may also be used with user-specific accounts to manage the retrieved applications as well as usage with band 519, or to use the data to provide services such as online personal coaching or targeted advertisements. More, fewer, or different types of data may be captured for fitness-related activities.

In some examples, applications may be developed using various types of schema, including using a software development kit or providing requirements in a proprietary or open source software development regime. Applications may also be developed by using an application programming interface to an application marketplace in order for developers to design and build applications that can be downloaded on wearable devices (e.g., bands 104-106 (FIG. 1)). Alternatively, application can be developed for download and installation on devices that may be in data communication over a shared data link or network connection, wired or wireless. For example, an application may be downloaded onto mobile computing device 116 (FIG. 1) from server 114 (FIG.1), which may then be installed and executed using data gathered from one or more sensors on band 104. Analysis, evaluation, or other operations performed on data gathered by an application downloaded from server 114 may be presented (i.e., displayed) on a graphical user interface (e.g., a micro web browser, WAP web browser, Java/Java-script-based web browser, and others, without limitation) on mobile computing device 116 or any other type of client. Users may, in some examples, search, find, retrieve, download, purchase, or otherwise obtain applications for various types of purposes from an application marketplace. Applications may be configured for various types of purposes and categories, without limitation. Examples of types of purposes include running, swimming, trail running, diabetic management, dietary, weight management, sleep management, caloric burn rate tracking, activity tracking, and others, without limitation. Examples of categories of applications may include fitness, wellness, health, medical, and others, without limitation. In other examples, applications for distribution via a marketplace or other download website or source may be implemented differently and is not limited to those described.

FIG. 5C illustrates representative data types for use with an exemplary data-capable band in sleep management activities. Here, band 539 may be used for sleep management purposes to track various types of data, including heart rate monitoring data 540, motion sensor data 542, accelerometer data 544, skin resistivity data 546, user input data 548, clock data 550, and audio data 552. In some examples, heart rate monitor data 540 may be captured to evaluate rest, waking, or various states of sleep. Motion sensor data 542 and accelerometer data 544 may be used to determine whether a user of band 539 is experiencing a restful or fitful sleep. For example, some motion sensor data 542 may be captured by a light sensor that measures ambient or differential light patterns in order to determine whether a user is sleeping on her front, side, or back. Accelerometer data 544 may also be captured to determine whether a user is experiencing gentle or violent disruptions when sleeping, such as those often found in afflictions of sleep apnea or other sleep disorders. Further, skin resistivity data 546 may be captured to determine whether a user is ill (e.g., running a temperature, sweating, experiencing chills, clammy skin, and others). Still further, user input data may include data input by a user as to how and whether band 539 should trigger notification facility 208 (FIG. 2) to wake a user at a given time or whether to use a series of increasing or decreasing vibrations or audio tones to trigger a waking state. Clock data (550) may be used to measure the duration of sleep or a finite period of time in which a user is at rest. Audio data may also be captured to determine whether a user is snoring and, if so, the frequencies and amplitude therein may suggest physical conditions that a user may be interested in knowing (e.g., snoring, breathing interruptions, talking in one's sleep, and the like). More, fewer, or different types of data may be captured for sleep management-related activities.

FIG. 5D illustrates representative data types for use with an exemplary data-capable band in medical-related activities. Here, band 539 may also be configured for medical purposes and related-types of data such as heart rate monitoring data 560, respiratory monitoring data 562, body temperature data 564, blood sugar data 566, chemical protein/analysis data 568, patient medical records data 570, and healthcare professional (e.g., doctor, physician, registered nurse, physician's assistant, dentist, orthopedist, surgeon, and others) data 572. In some examples, data may be captured by band 539 directly from wear by a user. For example, band 539 may be able to sample and analyze sweat through a salinity or moisture detector to identify whether any particular chemicals, proteins, hormones, or other organic or inorganic compounds are present, which can be analyzed by band 539 or communicated to server 114 to perform further analysis. If sent to server 114, further analyses may be performed by a hospital or other medical facility using data captured by band 539. In other examples, more, fewer, or different types of data may be captured for medical-related activities.

FIG. 5E illustrates representative data types for use with an exemplary data-capable band in social media/networking-related activities. Examples of social media/networking-related activities include activities related to Internet-based Social Networking Services ("SNS"), such as Facebook®, Twitter®, etc. Here, band 519, shown with an audio data plug, may be configured to capture data for use with various types of social media and networking-related services, websites, and activities. Accelerometer data 580, manual data 582, other user/friends data 584, location data 586, network data 588, clock/timer data 590, and environmental data 592 are examples of data that may be gathered and shared by, for example, uploading data from band 519 using, for example, an audio plug such as those described herein. As another example, accelerometer data 580 may be captured and shared with other users to share motion, activity, or other movement-oriented data. Manual data 582 may be data that a given user also wishes to share with other users. Likewise, other user/friends data 584 may be from other bands (not shown) that can be shared or aggregated with data captured by band 519. Location data 586 for band 519 may also be shared with other users. In other examples, a user may also enter manual data 582 to prevent other users or friends from receiving updated location data from band 519. Additionally, network data 588 and clock/timer data may be captured and shared with other users to indicate, for example, activities or events that a given user (i.e., wearing band 519) was engaged at certain locations. Further, if a user of band 519 has friends who are not geographically located in close or near proximity (e.g., the user of band 519 is located in San Francisco and her friend is located in Rome), environmental data can be captured by band 519 (e.g., weather, temperature, humidity, sunny or overcast (as interpreted from data captured by a light sensor and combined with captured data for humidity and temperature), among others). In other examples, more, fewer, or different types of data may be captured for medical-related activities.

FIG. 6 illustrates an exemplary communications device system implemented with multiple exemplary data-capable bands. The exemplary system 600 shows exemplary lines of communication between some of the devices shown in FIG. 1, including network 102, bands 104-110, mobile communications device 118, and laptop 122. In FIG. 6, examples of both peer-to-peer communication and peer-to-hub communication using bands 104-110 are shown. Using these avenues of communication, bands worn by multiple users or wearers (the term "wearer" is used herein to describe a user that is wearing one or more bands) may monitor and compare physical, emotional, mental states among wearers (e.g., physical competitions, sleep pattern comparisons, resting physical states, etc.).

Peer-to-hub communication may be exemplified by bands 104 and 108, each respectively communicating with mobile communications device 118 or laptop 122, exemplary hub devices. Bands 104 and 108 may communicate with mobile communications device 118 or laptop 122 using any number of known wired communication technologies (e.g., Universal Service Bus (USB) connections, TRS/TRRS connections, telephone networks, fiber-optic networks, cable networks, etc.). In some examples, bands 104 and 108 may be implemented as lower power or lower energy devices, in which case mobile communications device 118, laptop 122 or other hub devices may act as a gateway to route the data from bands 104 and 108 to software applications on the hub device, or to other devices. For example, mobile communications device 118 may comprise both wired and wireless communication capabilities, and thereby act as a hub to further communicate data received from band 104 to band 110, network 102 or laptop 122, among other devices. Mobile communications device 118 also may comprise software applications that interact with social or professional networking services ("SNS") (e.g., Facebook®, Twitter®, LinkedIn®, etc.), for example via network 102, and thereby act also as a hub to further share data received from band 104 with other users of the SNS. Band 104 may communicate with laptop 122, which also may comprise both wired and wireless communication capabilities, and thereby act as a hub to further communicate data received from band 104 to, for example, network 102 or laptop 122, among other devices. Laptop 122 also may comprise software applications that interact with SNS, for example via network 102, and thereby act also as a hub to further share data received from band 104 with other users of the SNS. The software applications on mobile communications device 118 or laptop 122 or other hub devices may further process or analyze the data they receive from bands 104 and 108 in order to present to the wearer, or to other wearers or users of the SNS, useful information associated with the wearer's activities.

In other examples, bands 106 and 110 may also participate in peer-to-hub communications with exemplary hub devices such as mobile communications device 118 and laptop 122. Bands 106 and 110 may communicate with mobile communications device 118 and laptop 122 using any number of wireless communication technologies (e.g., local wireless network, near field communication, Bluetooth®, Bluetooth® low energy, ANT, etc.). Using wireless communication technologies, mobile communications device 118 and laptop 122 may be used as a hub or gateway device to communicate data captured by bands 106 and 110 with other devices, in the same way as described above with respect to bands 104 and 108. Mobile communications device 118 and laptop 122 also may be used as a hub or gateway device to further share data captured by bands 106 and 110 with SNS, in the same way as described above with respect to bands 104 and 108.

Peer-to-peer communication may be exemplified by bands 106 and 110, exemplary peer devices, communicating directly. Band 106 may communicate directly with band 110, and vice versa, using known wireless communication technologies, as described above. Peer-to-peer communication may also be exemplified by communications between bands 104 and 108 and bands 106 and 110 through a hub device, such as mobile communications device 118 or laptop 122.

Alternatively, exemplary system 600 may be implemented with any combination of communication capable devices, such as any of the devices depicted in FIG. 1, communicating with each other using any communication platform, including any of the platforms described above. Persons of ordinary skill in the art will appreciate that the examples of peer-to-hub communication provided herein, and shown in FIG. 6, are only a small subset of the possible implementations of peer-to-hub communications involving the bands described herein.

FIG. 7 illustrates an exemplary wellness tracking system for use with or within a distributed wellness application. System 700 comprises aggregation engine 710, conversion module 720, band 730, band 732, textual input 734, other input 736, and graphical representation 740. Bands 730 and 732 may be implemented as described above. In some examples, aggregation engine 710 may receive input from various sources. For example, aggregation engine 710 may receive sensory input from band 730, band 732, and/or other data-capable bands. This sensory input may include any of the above-described sensory data that may be gathered by data-capable bands. In other examples, aggregation engine 710 may receive other (e.g., manual) input from textual input 734 or other input 736. Textual input 734 and other input 736 may include information that a user types, uploads, or otherwise inputs into an application (e.g., a web application, an iPhone® application, etc.) implemented on any of the data and communications capable devices referenced herein (e.g., computer, laptop, computer, mobile communications device, mobile computing device, etc.). In some examples, aggregation engine 720 may be configured to process (e.g., interpret) the data and information received from band 730, band 732, textual input 734 and other input 736, to determine an aggregate value from which graphical representation 740 may be generated. In an example, system 700 may comprise a conversion module 720, which may be configured to perform calculations to convert the data received from band 730, band 732, textual input 734 and other input 736 into values (e.g., numeric values). Those values may then be aggregated by aggregation engine 710 to generate graphical representation 740. Conversion module 720 may be implemented as part of aggregation engine 710 (as shown), or it may be implemented separately (not shown). In some examples, aggregation engine 710 may be implemented with more or different modules. In other examples, aggregation engine 710 may be implemented with fewer or more input sources. In some examples, graphical representation 740 may be implemented differently, using different facial expressions, or any image or graphic according to any intuitive or predetermined set of graphics indicating various levels and/or aspects of wellness. As described in more detail below, graphical representation 740 may be a richer display comprising more than a single graphic or image (e.g., FIGS. 10 and 11).

In some examples, aggregation engine 710 may receive or gather inputs from one or more sources over a period of time, or over multiple periods of time, and organize those inputs into a database (not shown) or other type of organized form of information storage. In some examples, graphical representation 740 may be a simple representation of a facial expression, as shown. In other examples, graphical representation 740 may be implemented as a richer graphical display comprising inputs gathered over time (e.g., FIGS. 10 and 11 below).

FIG. 8 illustrates representative calculations executed by an exemplary conversion module to determine an aggregate value for producing a graphical representation of a user's wellness. In some examples, conversion module 820 may be configured to process data associated with exercise, data associated with sleep, data associated with eating or food intake, and data associated with other miscellaneous activity data (e.g., sending a message to a friend, gifting to a friend, donating, receiving gifts, etc.), and generate values from the data. For example, conversion module 820 may perform calculations using data associated with activities ("activity data") to generate values for types of exercise (e.g., walking, vigorous exercise, not enough exercise, etc.) (810), types of sleep (e.g., deep sleep, no sleep, not enough deep sleep, etc.) (812), types of meals (e.g., a sluggish/heavy meal, a good meal, an energizing meal, etc.) (814), or other miscellaneous activities (e.g., sending a message to a friend, gifting to a friend, donating, receiving gifts, etc.) (816). In some implementations, these values may include positive values for activities that are beneficial to a user's wellness and negative values for activities that are detrimental to a user's wellness, or for lack of activity (e.g., not enough sleep, too many minutes without exercise, etc.). In one example, the values may be calculated using a reference activity. For example, conversion module 820 may equate a step to the numerical value 0.0001, and then equate various other activities to a number of steps (810, 812, 814, 816). Note that while in this example types of sleep 812, types of meals 814, and miscellaneous activities 816 are expressed in numbers of steps, FIG. 8 is not intended to be limiting is one of numerous ways in which to express types of sleep 812, types of meals 814, and miscellaneous activities 816. For example, types of sleep 812, types of meals 814, and miscellaneous activities 816 can correspond to different point values of which one or more scores can be derived to determine aggregate value 830. Similarly, aggregate value 830 can be expressed in terms of points or a score. In some examples, these values may be weighted according to the quality of the activity. For example, each minute of deep sleep equals a higher number of steps than each minute of other sleep (812). As described in more detail below (FIGS. 10 and 11), these values may be modulated by time. For example, positive values for exercise may be modulated by negative values for extended time periods without exercise (810). In another example, positive values for sleep or deep sleep may be modulated by time without sleep or not enough time spent in deep sleep (812). In some examples, conversion module 820 is configured to aggregate these values to generate an aggregate value 830. In some examples, aggregate value 830 may be used by an aggregation engine (e.g., aggregation engine 710 described above) to generate a graphical representation of a user's wellness (e.g., graphical representation 740 described above, FIGS. 10 and 11 described below, or others).

FIG. 9 illustrates an exemplary process for generating and displaying a graphical representation of a user's wellness based upon the user's activities. Process 900 may be implemented as an exemplary process for creating and presenting a graphical representation of a user's wellness. In some examples, process 900 may begin with receiving activity data from a source (902). For example, the source may comprise one of the data-capable bands described herein (e.g., band 730, band 732, etc.). In another example, the source may comprise another type of data and communications capable device, such as those described above (e.g., computer, laptop, computer, mobile communications device, mobile computing device, etc.), which may enable a user to provide activity data via various inputs (e.g., textual input 734, other input 736, etc.). For example, activity data may be received from a data-capable band. In another example, activity data may be received from data manually input using an application user interface via a mobile communications device or a laptop. In other examples, activity data may be received from sources or combinations of sources. After receiving the activity data, another activity data is received from another source (904). The another source also may be any of the types of sources described above. Once received, the activity data from the source, and the another activity data from another source, is then used to determine (e.g., by conversion module 720 or 730, etc.) an aggregate value (906). Once determined, the aggregate value is used to generate a graphical representation of a user's present wellness (908) (e.g., graphical representation 740 described above, etc.). The aggregate value also may be combined with other information, of the same type or different, to generate a richer graphical representation (e.g., FIGS. 10 and 11 described below, etc.).

In other examples, activity data may be received from multiple sources. These multiple sources may comprise a combination of sources (e.g., a band and a mobile communications device, two bands and a laptop, etc.) (not shown). Such activity data may be accumulated continuously, periodically, or otherwise, over a time period. As activity data is accumulated, the aggregate value may be updated and/or accumulated, and in turn, the graphical representation may be updated. In some examples, as activity data is accumulated and the aggregate value updated and/or accumulated, additional graphical representations may be generated based on the updated or accumulated aggregate value(s). In other examples, the above-described process may be varied in the implementation, order, function, or structure of each or all steps and is not limited to those provided.

FIG. 10 illustrates an exemplary graphical representation of a user's wellness over a time period. Here, exemplary graphical representation 1000 shows a user's wellness progress over the course of a partial day. Exemplary graphical representation 1000 may comprise a rich graph displaying multiple vectors of data associated with a user's wellness over time, including a status 1002, a time 1004, alarm graphic 1006, points progress line 1008, points gained for completion of activities 1012-1016, total points accumulated 1010, graphical representations 1030-1034 of a user's wellness at specific times over the time period, activity summary data and analysis over time (1018-1022), and an indication of syncing activity 1024. Here, status 1002 may comprise a brief (e.g., single word) general summary of a user's wellness. In some examples, time 1004 may indicate the current time, or in other examples, it may indicate the time that graphical representation 1000 was generated or last updated. In some other examples, time 1004 may be implemented using different time zones. In still other examples, time 1004 may be implemented differently. In some examples, alarm graphic 1006 may indicate the time that the user's alarm rang, or in other examples, it may indicate the time when a band sensed the user awoke, whether or not an alarm rang. In other examples, alarm graphic 1006 may indicate the time when a user's band began a sequence of notifications to wake up the user (e.g., using notification facility 208, as described above), and in still other examples, alarm graphic 1006 may represent something different. As shown here, graphical representation 1000 may include other graphical representations of the user's wellness at specific times of the day (1030, 1032, 1034), for example, indicating a low level of wellness or low energy level soon after waking up (1030) and a more alert or higher energy or wellness level after some activity (1032, 1034). Graphical representation 1000 may also include displays of various analyses of activity over time. For example, graphical representation may include graphical representations of the user's sleep (1018), including how many total hours slept and the quality of sleep (e.g., bars may represent depth of sleep during periods of time). In another example, graphical representation may include graphical representations of various aspects of a user's exercise level for a particular workout, including the magnitude of the activity level (1020), duration (1020), the number of steps taken (1022), the user's heart rate during the workout (not shown), and still other useful information (e.g., altitude climbed, laps of a pool, number of pitches, etc.). Graphical representation 1000 may further comprise an indication of syncing activity (1024) showing that graphical representation 1000 is being updated to include additional information from a device (e.g., a data-capable band) or application. Graphical representation 1000 may also include indications of a user's total accumulated points 1010, as well as points awarded at certain times for certain activities (1012, 1014, 1016). For example, shown here graphical representation 1000 displays the user has accumulated 2,017 points in total (e.g., over a lifetime, over a set period of time, etc.) (1010).

In some examples, points awarded may be time-dependent or may expire after a period of time. For example, points awarded for eating a good meal may be valid only for a certain period of time. This period of time may be a predetermined period of time, or it may be dynamically determined. In an example where the period of time is dynamically determined, the points may be valid only until the user next feels hunger. In another example where the period of time is dynamically determined, the points may be valid depending on the glycemic load of the meal (e.g., a meal with low glycemic load may have positive effects that meal carry over to subsequent meals, whereas a meal with a higher glycemic load may have a positive effect only until the next meal). In some examples, a user's total accumulated points 1010 may reflect that certain points have expired and are no longer valid.

In some examples, these points may be used for obtaining various types of rewards, or as virtual or actual currency, for example, in an online wellness marketplace, as described herein (e.g., a fitness marketplace). For example, points may be redeemed for virtual prizes (e.g., for games, challenges, etc.), or physical goods (e.g., products associated with a user's goals or activities, higher level bands, which may be distinguished by different colors, looks and/or features, etc.). In some examples, the points may automatically be tracked by a provider of data-capable bands, such that a prize (e.g., higher level band) is automatically sent to the user upon reaching a given points threshold without any affirmative action by the user. In other examples, a user may redeem a prize (e.g., higher level band) from a store. In still other examples, a user may receive deals. These deals or virtual prizes may be received digitally via a data-capable band, a mobile communications device, or otherwise.

FIG. 11 illustrates another exemplary graphical representation of a user's wellness over a time period. Here, exemplary graphical representation 1100 shows a summary of a user's wellness progress over the course of a week. Exemplary graphical representation 1100 may comprise a rich graph displaying multiple vectors of data associated with a user's wellness over time, including a status 1102, a time 1104, summary graphical representations 1106-1116 of a user's wellness on each days, points earned each day 1120-1130, total points accumulated 1132, points progress line 1134, an indication of syncing activity 1118, and bars 1136-1140. Here, as with status 1002 in FIG. 10, status 1102 may comprise a brief (e.g., single word) general summary of a user's wellness. In some examples, time 1104 may indicate the current time, or in other examples, it may indicate the time that graphical representation 1100 was generated or last updated. In some other examples, time 1104 may be implemented using different time zones. In still other examples, time 1104 may be implemented differently. As shown here, graphical representation 1100 may include summary graphical representations 1106-1116 of the user's wellness on each day, for example, indicating a distress or tiredness on Wednesday (1110) or a positive spike in wellness on Friday (1116). In some examples, summary graphical representations 1106-1116 may indicate a summary wellness for that particular day. In other examples, summary graphical representations 1106-1116 may indicate a cumulative wellness, e.g., at the end of each day. Graphical representation 1100 may further comprise an indication of syncing activity 1118 showing that graphical representation 1100 is being updated to include additional information from a device (e.g., a data-capable band) or application. Graphical representation 1100 may also include indications of a user's total accumulated points 1132, as well as points earned each day 1120-1130. For example, shown here graphical representation 1100 displays the user has accumulated 2,017 points thus far, which includes 325 points earned on Saturday (1130), 263 points earned on Friday (1128), 251 points earned on Thursday (1126), and so on. As described above, these points may be used for obtaining various types of rewards, or as virtual or actual currency, for example, in an online wellness marketplace (e.g., a fitness marketplace as described above). In some examples, graphical representation 1100 also may comprise bars 1136-1140. Each bar may represent an aspect of a user's wellness (e.g., food, exercise, sleep, etc.). In some examples, the bar may display the user's daily progress toward a personal goal for each aspect (e.g., to sleep eight hours, complete sixty minutes of vigorous exercise, etc.). In other examples, the bar may display the user's daily progress toward a standardized goal (e.g., a health and fitness expert's published guidelines, a government agency's published guidelines, etc.), or other types of goals.

FIGs. 12A-12F illustrate exemplary wireframes of exemplary webpages associated with a wellness marketplace. Here, wireframe 1200 comprises navigation 1202, selected page 1204A, sync widget 1216, avatar and goals element 1206, statistics element 1208, information ticker 1210, social feed 1212, check-in/calendar element 1214, deal element 1218, and team summary element 1220. As described above, a wellness marketplace may be implemented as a portal, website or application where users, may find, purchase, or download applications, products, information, etc., for various uses, as well as share information with other users (e.g., users with like interests). Here, navigation 1202 comprises buttons and widgets for navigating through various pages of the wellness marketplace, including the selected page 1204A-1204F (e.g., the Home page, Team page, Public page, Move page, Eat page, Live page, etc.) and sync widget 1216. In some examples, sync widget 1216 may be implemented to sync a data-capable band to the user's account on the wellness marketplace. In some examples, the Home page may include avatar and goals element 1206, which may be configured to display a user's avatar and goals. Avatar and goals element 1206 also may enable a user to create an avatar, either by selecting from predetermined avatars, by uploading a user's own picture or graphic, or other known methods for creating an avatar. Avatar and goals element 1206 also may enable a user to set goals associated with the user's health, eating/drinking habits, exercise, sleep, socializing, or other aspects of the user's wellness. The Home page may further include statistics element 1208, which may be implemented to display statistics associated with the user's wellness (e.g., the graphical representations described above). As shown here, in some examples, statistics element 1208 may be implemented as a dynamic graphical, and even navigable, element (e.g., a video or interactive graphic), wherein a user may view the user's wellness progress over time. In other examples, the statistics element 1208 may be implemented as described above (e.g., FIGS. 10 and 11). The Home page may further include information ticker 1210, which may stream information associated with a user's activities, or other information relevant to the wellness marketplace. The Home page may further include social feed 1212, which may be implemented as a scrolling list of messages or information (e.g., encouragement, news, feedback, recommendations, comments, etc.) from friends, advisors, coaches, or other users. The messages or information may include auto-generated encouragement, comments, news, recommendations, feedback, achievements, opinions, actions taken by teammates, or other information, by a wellness application in response to data associated with the user's wellness and activities (e.g., gathered by a data-capable band). In some examples, social feed 1212 may be searchable. In some examples, social feed 1212 may enable a user to filter or select the types of messages or information that shows up in the feed (e.g., from the public, only from the team, only from the user, etc.). Social feed 1212 also may be configured to enable a user to select an action associated with each feed message (e.g., cheer, follow, gift, etc.). In some examples, check-in/calendar element 1214 may be configured to allow a user to log their fitness and nutrition. In some examples, check-in/calendar element 1214 also may be configured to enable a user to maintain a calendar. Deal element 1218 may provide a daily deal to the user. The daily deal may be featured for the marketplace, it may be associated with the user's activities, or it may be generated using a variety of known advertising models. Team summary element 1220 may provide summary information about the user's team. As used herein, the term "team" may refer to any group of users that elect to use the wellness marketplace together. In some examples, a user may be part of more than one team. In other examples, a group of users may form different teams for different activities, or they may form a single team that participates in, tracks, and shares information regarding, more than one activity. A Home page may be implemented differently than described here.

Wireframe 1230 comprises an exemplary Team page, which may include a navigation 1202, selected page 1204B, sync widget 1216, team manager element 1228, leaderboard element 1240, comparison element 1242, avatar and goals element 1206A, statistics element 1208A, social feed 1212A, and scrolling member snapshots element 1226. Avatar and goals element 1206A and statistics element 1208A may be implemented as described above with regard to like-numbered or corresponding elements. Navigation 1202, selected page 1204B and sync widget 1216 also may be implemented as described above with regard to like-numbered or corresponding elements. In some examples, team manager element 1228 may be implemented as an area for displaying information, or providing widgets, associated with team management. Access to team manager element 1228 may be restricted, in some examples, or access may be provided to the entire team. Leaderboard element 1240 may be implemented to display leaders in various aspects of an activity in which the team is participating (e.g., various sports, social functions (e.g., clubs), drinking abstinence, etc.). In some examples, leaderboard element 1240 may be implemented to display leaders among various groupings (e.g., site-wide, team only, other users determined to be "like" the user according to certain criteria (e.g., similar activities), etc.). In other examples, leaderboard element 1240 may be organized or filtered by various parameters (e.g., date, demographics, geography, activity level, etc.). Comparison element 1242 may be implemented, in some examples, to provide comparisons regarding a user's performance with respect to an activity, or various aspects of an activity, with the performance of the user's teammates or with the team as a whole (e.g., team average, team median, team favorites, etc.). Scrolling member snapshots element 1226 may be configured to provide brief summary information regarding each of the members of the team in a scrolling fashion. A Team page may be implemented differently than described here.

Wireframe 1250 comprises an exemplary Public page, which may include navigation 1202, selected page 1204C, sync widget 1216, leaderboard element 1240A, social feed 1212B, statistics report engine 1254, comparison element 1242A, and challenge element 1256. Navigation 1202, selected page 1204C and sync widget 1216 may be implemented as described above with regard to like-numbered or corresponding elements. Leaderboard element 1240A also may be implemented as described above with regard to leaderboard element 1240, and in some examples, may display leaders amongst all of the users of the wellness marketplace. Social feed 1212B also may be implemented as described above with regard social feed 1212 and social feed 1212A. Comparison element 1242A may be implemented as described above with regard to comparison element 1242, and in some examples, may display comparisons of a user's performance of an activity against the performance of all of the other users of the wellness marketplace. Statistics report engine 1254 may generate and display statistical reports associated with various activities being monitored by, and discussed in, the wellness marketplace. In some examples, challenge element 1256 may enable a user to participate in marketplace-wide challenges with other users. In other examples, challenge element 1256 may display the status of, or other information associated with, ongoing challenges among users. A Public page may be implemented differently than described here.

Wireframe 1260 comprises an exemplary Move page, which may include navigation 1202, selected page 1204D, sync widget 1216, leaderboard element 1240B, statistics report engine 1254, comparison element 1242B, search and recommendations element 1272, product sales element 1282, exercise science element 1264, daily movement element 1266, maps element 1280 and titles element 1258. Navigation 1202, selected page 1204D, sync widget 1216, leaderboard element 1240B, statistics report engine 1254, and comparison element 1242B may be implemented as described above with regard to like-numbered or corresponding elements. The Move page may be implemented to include a search and recommendations element 1272, which may be implemented to enable searching of the wellness marketplace. In some examples, in addition to results of the search, recommendations associated with the user's search may be provided to the user. In other examples, recommendations may be provided to the user based on any other data associated with the user's activities, as received by, gathered by, or otherwise input into, the wellness marketplace. Product sales element 1282 may be implemented to display products for sale and provide widgets to enable purchases of products by users. The products may be associated with the user's activities or activity level. Daily movement element 1266 may be implemented to suggest an exercise each day. Maps element 1280 may be implemented to display information associated with the activity of users of the wellness marketplace on a map. In some examples, maps element 1280 may display a percentage of users that are physically active in a geographical region. In other examples, maps element 1280 may display a percentage of users that have eaten well over a particular time period (e.g., currently, today, this week, etc.). In still other examples, maps element 1280 may be implemented differently. In some examples, titles element 1258 may display a list of users and the titles they have earned based on their activities and activity levels (e.g., a most improved user, a hardest working user, etc.). A Move page may be implemented differently than described here.

Wireframe 1270 comprises an exemplary Eat page, which may include navigation 1202, selected page 1204E, sync widget 1216, leaderboard elements 1240C and 1240D, statistics report engine 1254, comparison element 1242C, search and recommendations element 1272, product sales element 1282, maps element 1280A, nutrition science element 1276, and daily food/supplement element 1278. Navigation 1202, selected page 1204E, sync widget 1216, leaderboard elements 1240C and 1240D, statistics report engine 1254, comparison element 1242C, search and recommendations element 1272, product sales element 1282, and maps element 1280A may be implemented as described above with regard to like-numbered or corresponding elements. The Eat page may be implemented to include a nutrition science element 1276, which may display, or provide widgets for accessing, information associated with nutrition science. The Eat page also may be implemented with a daily food/supplement element 1278, which may be implemented to suggest an food and/or supplement each day. An Eat page may be implemented differently than described here.

Wireframe 1280 comprises an exemplary Live page, which may include navigation 1202, selected page 1204F, sync widget 1216, leaderboard element 1240E, search and recommendations element 1272, product sales element 1282, maps element 1280B, social feed 1212C, health research element 1286, and product research element 1290. Navigation 1202, selected page 1204F, sync widget 1216, leaderboard element 1240E, search and recommendations element 1272, product sales element 1282, maps element 1280B and social feed 1212C may be implemented as described above with regard to like-numbered or corresponding elements. In some examples, the Live page may include health research element 1286 configured to display, or to enable a user to research, information regarding health topics. In some examples, the Live page may include product research element 1290 configured to display, or to enable a user to research, information regarding products. In some examples, the products may be associated with a user's particular activities or activity level. In other examples, the products may be associated with any of the activities monitored by, or discussed on, the wellness marketplace. A Live page may be implemented differently than described here.

FIG. 13 illustrates an exemplary computer system suitable for implementation of a wellness application and use with a data-capable band. In some examples, computer system 1300 may be used to implement computer programs, applications, methods, processes, or other software to perform the above-described techniques. Computer system 1300 includes a bus 1302 or other communication mechanism for communicating information, which interconnects subsystems and devices, such as processor 1304, system memory 1306 (e.g., RAM), storage device 1308 (e.g., ROM), disk drive 1310 (e.g., magnetic or optical), communication interface 1312 (e.g., modem or Ethernet card), display 1314 (e.g., CRT or LCD), input device 1316 (e.g., keyboard), and cursor control 1318 (e.g., mouse or trackball).

According to some examples, computer system 1300 performs specific operations by processor 1304 executing one or more sequences of one or more instructions stored in system memory 1306. Such instructions may be read into system memory 1306 from another computer readable medium, such as static storage device 1308 or disk drive 1310. In some examples, hard-wired circuitry may be used in place of or in combination with software instructions for implementation.

The term "computer readable medium" refers to any tangible medium that participates in providing instructions to processor 1304 for execution. Such a medium may take many forms, including but not limited to, non-volatile media and volatile media. Non-volatile media includes, for example, optical or magnetic disks, such as disk drive 1310. Volatile media includes dynamic memory, such as system memory 1306.

Common forms of computer readable media includes, for example, floppy disk, flexible disk, hard disk, magnetic tape, any other magnetic medium, CD-ROM, any other optical medium, punch cards, paper tape, any other physical medium with patterns of holes, RAM, PROM, EPROM, FLASH-EPROM, any other memory chip or cartridge, or any other medium from which a computer can read.

Instructions may further be transmitted or received using a transmission medium. The term "transmission medium" may include any tangible or intangible medium that is capable of storing, encoding or carrying instructions for execution by the machine, and includes digital or analog communications signals or other intangible medium to facilitate communication of such instructions. Transmission media includes coaxial cables, copper wire, and fiber optics, including wires that comprise bus 1302 for transmitting a computer data signal.

In some examples, execution of the sequences of instructions may be performed by a single computer system 1300. According to some examples, two or more computer systems 1300 coupled by communication link 1320 (e.g., LAN, PSTN, or wireless network) may perform the sequence of instructions in coordination with one another. Computer system 1300 may transmit and receive messages, data, and instructions, including program, i.e., application code, through communication link 1320 and communication interface 1312. Received program code may be executed by processor 1304 as it is received, and/or stored in disk drive 1310, or other non-volatile storage for later execution.

FIG. 14 depicts an example of an aggregation engine, according to some examples. Diagram 1400 depicts an aggregation engine 1410 including one or more of the following: a sleep manager 1430, an activity manager 1432, a nutrition manager 1434, a general health/wellness manager 1436, and a conversion module 1420. As described herein, aggregation engine 1410 is configured to process data, such as data representing parameters based on sensor measurements or the like, as well as derived parameters that can be derived (e.g., mathematically) based on data generated by one or more sensors. Aggregation engine 1410 also can be configured to determine an aggregate value (or score) from which a graphical representation or any other representation can be generated. Conversion module 1420 is configured to convert data or scores representing parameters into values or scores indicating relative states of sleep, activity, nutrition, or general fitness or health (e.g., based on combined states of sleep, activity, nutrition). Further, values or scores generated by conversion module 1420 can be based on team achievements (e.g., one or more other users' sensor data or parameters).

Sleep manager 1430 is configured to receive data representing parameters relating to sleep activities of a user, and configured to maintain data representing one or more sleep profiles. Parameters describe characteristics, factors or attributes of, for example, sleep, and can be formed from sensor data or derived based on computations. Examples of parameters include a sleep start time (e.g., in terms of Coordinated Universal Time, "UTC," or Greenwich Mean Time), a sleep end time, and a duration of sleep, which is derived from determining the difference between the sleep end and start times. Sleep manager 1430 cooperates with conversion module 1420 to form a target sleep score to which a user strives to attain. As such, sleep manager 1430 is configured to track a user's progress and to motivate the user to modify sleep patterns to attain an optimal sleep profile. Sleep manager 1430, therefore, is configured to coach a user to improve the user's health and wellness by improving the user's sleep activity. According to various one or more examples, sleep-related parameters can be acquired or derived by any of the sensors or sensor functions described in, for example, FIGs. 3 to 5E. For example, other parameters (e.g., location-related parameters describing a home/bedroom location or social-related parameters describing proximity with family members) can be used to determine whether a user is engaged in a sleep-related activity and a quality or condition thereof.

Activity manager 1432 is configured to receive data representing parameters relating to one or more motion or movement-related activities of a user and to maintain data representing one or more activity profiles. Activity-related parameters describe characteristics, factors or attributes of motion or movements in which a user is engaged, and can be established from sensor data or derived based on computations. Examples of parameters include motion actions, such as a step, stride, swim stroke, rowing stroke, bike pedal stroke, and the like, depending on the activity in which a user is participating. As used herein, a motion action is a unit of motion (e.g., a substantially repetitive motion) indicative of either a single activity or a subset of activities and can be detected, for example, with one or more accelerometers and/or logic configured to determine an activity composed of specific motion actions. Activity manager 1432 cooperates with conversion module 1420 to form a target activity score to which a user strives to attain. As such, activity manager 1432 is configured to track a user's progress and to motivate the user to modify anaerobic and/or aerobic activities to attain or match the activities defined by an optimal activity profile. Activity manager 1432, therefore, is configured to coach a user to improve the user's health and wellness by improving the user's physical activity, including primary activities of exercise and incidental activities (e.g., walking and climbing stairs in the home, work, etc.). According to various one or more examples, activity-related parameters can be acquired or derived by any of the sensors or sensor functions described in, for example, FIGs. 3 to 5E. For example, other parameters (e.g., location-related parameters describing a gym location or social-related parameters describing proximity to other persons working out) can be used to determine whether a user is engaged in a movement-related activity, as well as the aspects thereof.

Nutrition manager 1434 is configured to receive data representing parameters relating to one or more activities relating to nutrition intake of a user and to maintain data representing one or more nutrition profiles. Nutrition-related parameters describe characteristics, factors or attributes of consumable materials (e.g., food and drink), including nutrients, such as vitamins, minerals, etc. that a user consumes. Nutrition-related parameters also include calories. The nutrition-related parameters can be formed from sensor data or derived based on computations. In some cases, a user provides or initiates data retrieval representing the nutrition of food and drink consumed. Nutrition-related parameters also can be derived, such as calories burned or expended. Examples of parameters include an amount (e.g., expressed in international units, "IU") of a nutrient, such as a vitamin, fiber, mineral, fat (various types), or a macro-nutrient, such as water, carbohydrate, and the like. Nutrition manager 1434 cooperates with conversion module 1420 to form a target nutrition score to which a user strives to attain. As such, nutrition manager 1434 is configured to track a user's progress and to motivate the user to modify dietary-related activities and consumption to attain an optimal nutrition profile. Nutrition manager 1434, therefore, is configured to motivate a user to improve the user's health and wellness by improving the user's eating habits and nutrition. According to various one or more examples, nutrition-related parameters can be acquired or derived by any of the sensors or sensor functions described in, for example, FIGs. 3 to 5E. For example, other parameters (e.g., location-related parameters identifying the user is at a restaurant, or social-related parameters describing proximity to others during meal times) can be used to determine whether a user is engaged in a nutrition intake-related activity as well the aspects thereof. In one example, acquired parameters include detected audio converted to text that describes the types of food or drink being consumed. For example, a user in the restaurant may verbally convey an order to a server, such as "I will take the cooked beef, a crab appetizer and an ice tea." Logic can decode the audio to perform voice recognition. Location data received from a sensor can be used to confirm the audio is detected in the context of a restaurant, whereby the logic determines that the utterances likely constitute an order of food. This logic can reside in nutrition manager 1434, which can be disposed in or distributed across any of a wearable computing device, an application, a mobile device, a server, in the cloud, or any other structure.

General health/wellness manager 1436 is configured to manage any aspect of a user's health or wellness in a manner similar to sleep manager 1430, activity manager 1432, and nutrition manager 1434. For example, general health/wellness manager 1436 can be configured to manage electromagnetic radiation exposure (e.g., in microsieverts), such as radiation generated by a mobile phone or any other device, such as an airport body scanner. Also, general health/wellness manager 1436 can be configured to manage amounts or doses of sunlight sufficient for vitamin D production while advising a user against an amount likely to cause damage to the skin. According to various embodiments, general health/wellness manager 1436 can be configured to perform or control any of the above-described managers or any generic managers (not shown) configured to monitor, detect, or characterize, among other things, any one or more acquired parameters for determining a state or condition of any aspect of health and wellness that can be monitored for purposes of determining trend data and/or progress of an aspect of health and wellness of a user against a target value or score. As the user demonstrates consistent improvement (or deficiencies) in meeting one or more scores representing one or more health and wellness scores, the target value or score can be modified dynamically to motivate a user to continue toward a health and wellness goal, which can be custom-designed for a specific user. The dynamic modification of a target goal can also induce a user to overcome slow or deficient performance by recommending various activities or actions in which to engage to improve nutrition, sleep, movement, cardio goals, or any other health and wellness objective. Further, a wearable device or any structure described herein can be configured to provide feedback related to the progress of attaining a goal as well as to induce the user to engage in or refrain from certain activities. The feedback can be graphical or haptic in nature, but is not so limiting. Thus, the feedback can be transmitted to the user in any medium to be perceived by the user by any of the senses of sight, auditory, touch, etc.

Therefore, that general health/wellness manager 1436 is not limited to controlling or facilitating sleep, activity and nutrition as aspects of health and wellness, but can monitor, track and generate recommendations for health and wellness based on other acquired parameters, including those related to the environment, such as location, and social interactions, including proximity to others (e.g., other users wearing similar wearable computing devices) and communications via phone, text or emails that can be analyzed to determine whether a user is scheduling time with other persons for a specific activity (e.g., playing ice hockey, dining at a relative's house for the holidays, or joining colleagues for happy hour). Furthermore, general health/wellness manager 1436 and/or aggregator engine 1410 is not limited to the examples described herein to generate scores, the relative weightings of activities, or by the various instances by which scores can be calculated. The use of points and values, as well as a use of a target score are just a few ways to implement the variety of techniques and/or structures described herein. A target score can be a range of values or can be a function of any number of health and wellness representations. In some examples, specific point values and ways of calculating scores are described herein for purposes of illustration and are not intended to be limiting.

Conversion module 1420 includes a score generator 1422 and an emphasis manager 1424. Score generator 1422 is configured to generate a sub-score, score or target score based on sleep-related parameters, activity-related parameters, and nutrition-related parameters, or a combination thereof. Emphasis manger 1424 is configured emphasize one or more parameters of interest to draw a user's attention to addressing a health-related goal. For example, a nutrition parameter indicating an amount of sodium consumed by a user can be emphasized by weighting the amount of sodium such that it contributes, at least initially, to a relatively larger portion of a target score. As the user succeeds in attaining the goal of reducing sodium, the amount of sodium and its contribution to the target score can be deemphasized.

Status manager 1450 includes a haptic engine 1452 and a display engine 1454. Haptic engine 1452 can be configured to impart vibratory energy, for example, from a wearable device 1470 to a user's body, as a notification, reminder, or alert relating to the progress or fulfillment of user's sleep, activity, nutrition, or other health and wellness goals relative to target scores. Display engine 1454 can be configured to generate a graphical representation on an interface, such as a touch-sensitive screen on a mobile phone 1472. In various embodiments, elements of aggregation engine 1410 and elements of status manager 1450 can be disposed in either wearable device 1470 or mobile phone 1472, or can be distributed among device 1470, phone 1472 or any other device not shown. Elements of aggregation engine 1410 and elements of status manager 1450 can be implemented in either hardware or software, or a combination thereof. Further, the structures and/or functionalities of aggregation engine 1410 and/or its components can be varied and are not limited to the examples provided.

FIG. 15 depicts an example of a sleep manager, according to some examples. Diagram 1500 depicts sleep manager 1410 including one or more of the following: a data interface 1501, a sleep evaluator 1502, a circadian rhythm ("CR") manager 1504, a sleep wellness module 1506, a repository 1507 configured to store data representing one or more sleep profiles 1509, one or more sleep deficiency profiles 1508, and a profile generator 1510. A bus 1505 couples each of the elements for purposes of communication. Profile generator 1510 can generate one or more profiles representative of a user's sleep patterns based on trend analysis (i.e., empirically over time and various cycles of sleep) or as an input via data 1520 for an initial sleep profile. Profile generator can generate data representing a subset of acquired parameters to establish sleep profile 1540. For example, sleep profile 1540 can represent one or more sleep cycles during which acquired parameters were used to determine sleep trends of a user. Or, sleep profile 1540 can represent a current sleep cycle undergoing monitoring and, optionally, modification to conform a user's sleep habit to that associated with a target sleep score, which can be determine by a sleep profile 1509.

Data interface 1501 is configured to receive data representing parameters, such as physical parameters 1511 and environmental parameters 1512. Examples of physical parameters 1511 include a sleep start time, a sleep end time, a duration of light sleep (and/or a total duration of light sleep between the start and sleep end times), a duration of deep sleep (and/or a total duration of deep sleep between the start and sleep end times), a heart rate, a body temperature, and the like. In some examples, deep sleep includes REM sleep and sleep stages 3 and 4, whereas light sleep includes sleep stages 1 and 2 of typical sleep. Examples of environmental parameters 1512 include an amount of light, a level of sound energy, an ambient temperature, and the like. Parameters also can include steps, minutes of activity/motion, minutes of inactivity/no motion, intensity of activity, aerobic minutes, aerobic intensity, calories burned, training sessions, length of training sessions, intensity of training sessions, calories burned during training session(s), type of activities, duration of each type of activity, intensity of each type of activity, calories burned during each type of activity, instantaneous body temperature, average body temperature, instantaneous skin galvanization, average skin galvanization, instantaneous heart rate, average heart rate, instantaneous perspiration, average perspiration, instantaneous blood sugar level, average blood sugar level, instantaneous respiration rate, average respiration rate, and the like.

Sleep evaluator 1502 is configured to acquire data representing acquired parameters describing the sleep and sleep-related characteristics of user. In particular, sleep evaluator 1502 is configured to determine characteristics as depicted in generated sleep profile 1540 as generated by profile generator 1510. As shown, sleep evaluator 1502 is configured to determine a sleep start time 1550 when sleep evaluator 1502 detects, for example, cessation of motion indicative of a wakefulness state 1542. Sleep evaluator 1502 is configured to determine a light sleep state 1546 and a duration 1554 thereof. For example, sleep evaluator 1502 can detect, for example, motion indicative of "hypnic jerks" or involuntary muscle twitching motions typical during light sleep state 1546. Also, sleep evaluator 1502 is configured to determine a deep sleep state 1548 and a REM state 1544 for durations 1555 and 1553, respectively. For example, sleep evaluator 1502 can detect, for example, a decreased heart rate and body temperature, and the absence voluntary muscle motions to confirm or establish that a user is in a deep sleep state. Further, sleep evaluator 1502 is configured to detect initiation of motion indicative of a wakefulness state 1542 to determine a sleep end time 1552, with which a duration 1551 of sleep can be derived. Sleep evaluator 1502 can also compare acquired parameters to expected parameters set forth in optimal sleep profiles 1509 to confirm the stages of sleep. Optimal sleep profiles 1509 include expected durations of light sleep and deep sleep, as well as number of times light and deep sleep is entered and exited during sleep.

A circadian rhythm manager 1504 is configured to monitor whether a user's current sleep activity or overall sleep habits align with optimal human circadian biological clock, such as sleeping during the hours of 10 pm and 6 am (or the duration associated with darkness). For example, a user may travel over multiple time zones and experience jet lag, whereby the period of darkness or optimal human circadian biological clock for the new time zone is depicted as time diagram 1570. Sleep wellness module 1506 is configured to determine an optimal sleep profile aligned with the new sleep start time 1560 and the new sleep end time 1562, and is further configured to motivate or induce a user to adjust the sleep habits to adjust the human circadian biological clock to the new time zone.

Sleep wellness module 1506 also is configured to compare a user's sleep profile 1540 against data representing one or more sleep deficiency profiles 1508 to determine whether a deficiency exists (e.g., an irregular sleep schedule, a lack of deep sleep, whether a sleep deficit exists, etc.). The one or more sleep deficiency profiles 1508 can include data representative of sleep deficiencies or suboptimal sleeping environments. Examples of suboptimal sleeping environments include too much light, too much sound energy (e.g., too much noise), ambient temperature that is colder or warmer than that is optimal, and the like. Further, sleep wellness module 1506 is configured to provide recommendations to modify the user's behavior to optimize the user's sleep score, thereby optimizing the user's sleep activities to ensure health and wellness. Sleep wellness module 1506 generates notifications and alerts (e.g., graphical, haptic, audio, or otherwise perceptible to a user) to induce a user to modify user behavior, or environmental and physical parameters to improve the sleep of the user. In some examples, sleep wellness module 1506 is configured to cause generation of a graphical representation on an interface to induce modification of an acquired parameter (e.g., a level of light beyond a recommended amount, or a duration of sleep), or to cause generation of a haptic-related signal for providing vibratory feedback to induce modification of the acquired parameter.

FIG. 16 is an example flow diagram for a technique of managing sleep using wearable devices, including sensors, according to some examples. At 1602, data representing one or more baseline parameters is received. The baseline parameters include sleep-related characteristics that define parameters upon which a target sleep score is established. For example, the baseline parameters can be set forth in a data arrangement constituting a sleep profile 1509 of FIG. 15. In some cases, the values of the baseline parameters are such that if the user attains or fulfils the goals of optimizing sleep, the target sleep score having a value of 100. At 1604, parameters are acquired that describe a state or characteristics of user's sleep activity. Examples of acquired parameters can include—via derivation or measurement—a heart rate, a duration of sleep, a duration of wakefulness, a sleep start time, a sleep end time, a body temperature, an ambient temperature, an amount of light, an amount of sound energy, a quantity of minutes for a one or more durations of light sleep, a quantity of minutes for a one or more durations of deep sleep, a quantity of minutes for sleep aligned with a specific circadian clock (e.g., sleep occurring between 10 pm to 6 am), etc.

Scores are calculated at 1606 relative to or associated with baseline parameters. A first score can be calculated for a first acquired parameter, such as a duration of sleep in a sleep cycle, based on a first quantity associated with a sleep profile. The first quantity can be a point value assigned to each minute of sleep. A second score can be calculated for a second acquired parameter, such as one or more durations of deep sleep, based on a second quantity associated with the sleep profile. The second quantity can be another point value assigned to each minute of deep sleep. A third score can be calculated for a third acquired parameter, such as a duration of the sleep associated with a time of day representing sleep times aligned with an optimal human circadian biological clock, based on a third quantity associated with the sleep profile. The third quantity can be yet another point value or weighting factor assigned to each minute of sleep during the aligned sleep times (e.g., between 10 pm and 6 am). A sleep score is calculated at 1608 based on the one or more acquired parameters. A difference between the calculated sleep score and the target sleep score indicates a deficiency between optimal sleep activity for health and wellness.

A determination is made at 1610 whether to implement normative feedback to bring the sleep patterns of the user to conformity with target sleep patterns. If so, then flow 1600 moves to 1612 at which characteristics (or parameters) of a sleep activity is identified for modification to improve the sleep score. For example, a duration of sleep to improve a sleep score ought to be between 7 and 9 hours. A duration of 4 hours can be indicative of a deficient sleep pattern. Thus, flow 1600 can identify the duration of sleep for modification to improve the user's health and wellness. At 1616, modifications to improve the sleep score is implemented. At 1614, the determination of a sleep score can be modified relative to a threshold. For example, when the sleep score exceeds the target score, the rate at which the sleep score can be reduced as a function of the difference between the sleep score and the target score. That is, it gets more difficult to accrue points for the sleep score when exceeding the target score. For example, for sleep scores between 100 and 110, it is 50% harder to obtain sleep score points (e.g., 25% fewer points are rewarded), for sleep scores between 111 and 125, it is 75% harder to obtain sleep score points, and for sleep scores above 126 it is 100% harder.

At 1618, a classification for a user can be either leveled up or down. For example, a subset of sleep scores can be determined and the classification associated with a user can be changed based on the subset of sleep scores. The classification can be changed by leveling up to a first sleep profile if the subset of sleep scores is associated with a first range, or the classification can be changed by leveling down to a second sleep profile if the subset of sleep scores is associated with a second range. The first range of activity scores are nearer to the target score than the second range of activity scores. To illustrate, if the sleep score is 95% of the target score (e.g., for a duration), the user is either leveled up or provided the opportunity to level up to implement, for example, a new value of a parameter of a different sleep profile. But if the sleep score is 70% or less of the target score, the user is given the option to level down (e.g., to a less ambitious or rigorous sleep profile).

FIG. 17 is another example flow diagram for another technique of managing sleep using wearable devices, including sensors, according to some examples. At 1702, a sleep start time is determined, and an amount of time of sleep at a first level (e.g., a light sleep level) is determined at

1704. If one or more portions of the time is not associated with a duration of sleep aligned with a circadian rhythm profile, then a first score is determined at 1712 based on a second value (e.g., +1.00 points per minute of light sleep are awarded). But if one or more portions of the time is associated with the duration of sleep aligned with the circadian rhythm profile, then a first score is determined at 1714 based on a first value (e.g., +1.20 points per minute of light sleep are awarded). At 1716, an amount of time of sleep at a second level (e.g., a deep sleep level) is determined. If one or more portions of the time is not associated with a duration of sleep aligned with a circadian rhythm profile, then a second score is determined at 1722 based on a third value (e.g., +2.00 points per minute of deep sleep are awarded). But if one or more portions of the time is associated with the duration of sleep aligned with the circadian rhythm profile, then a second score is determined at 1724 based on a fourth value (e.g., +2.40 points per minute of deep sleep are awarded).

At 1726, a score is calculated by the first and/or second scores. One or more acquired parameters are determined at 1728 to modify the sleep score to equalize with the target score. Inducement adjustments are applied at 1730, whereby a user may be prompted or motivated to modify sleep behavior to improve the health or wellness of the user. At 1732, a sleep end time is determined, If flow 1700 does not terminate at 1734, then flow 1700 moves to 1736, at which the effects of the inducement adjustments are monitored to determine the effectiveness. At 1738, sleep trend data is generated and analyzed to determine how well a user's sleep pattern is converging on the patterns defined by an optimal sleep profile.

FIG. 18 depicts a functional interaction between a sleep evaluator and score generator, according to some examples. Sleep evaluator 1502 provides an indication of light sleep to score generator 1422a and an indication of deep sleep to score generator 1422b. Score generator 1422a adds +x points per minute of light sleep between 10 pm and 6 am and adds +y points per minute of light sleep between 6 am to 10 pm. Score generator 1422b adds +X points per minute of deep sleep between 10 pm and 6 am and adds +Y points per minute of deep sleep between 6 am to 10 pm. Optionally, score 1830 calculated by either score generator 1422a or 1422b, or both, is modified responsive to disruptive sleep activity (e.g., states of wakefulness during sleep). For example, score 1830 is modified by subtracting –Z points for suboptimal sleep.

Although the foregoing examples have been described in some detail for purposes of clarity of understanding, the above-described inventive techniques are not limited to the details provided. There are many alternative ways of implementing the above-described invention techniques. The disclosed examples are illustrative and not restrictive.

What is claimed:

1. A method comprising:

receiving data representing a sleep profile defining parameters upon which a target score is established;

acquiring data representing acquired parameters associated with sleep activity;

determining a first score for a first acquired parameter based on a first quantity associated with the sleep profile;

determining a second score for a second acquired parameter based on a second quantity associated with the sleep profile;

calculating at a processor a sleep score based on data in a memory including the first score and the second score; and

causing presentation of a representation of the sleep score to indicate either an attainment of the target score or a deviation therefrom.

2. The method of claim 1, wherein the sleep score is indicative of an ability of a user to achieve a measure of sleep,

wherein the target score is indicative of a sleep standard against which to compare the measure of sleep.

3. The method of claim 1, further comprising:

determining a third score for a third acquired parameter based on a third quantity associated with the sleep profile.

4. The method of claim 3, wherein the first acquired parameter is a duration of sleep in units of time, the second acquired parameter is a first portion of the duration representing deep sleep, and the third acquired parameter is a second portion of the duration representing a time of day aligned with a circadian clock.

5. The method of claim 1, further comprising:

identifying a subset of parameters to modify to reduce a difference between a magnitude of the sleep score to and a magnitude of the target score.

6. The method of claim 1, further comprising:

identifying a subset of acquired parameters; and

modifying an acquired parameter in the subset of acquired parameters to reduce a difference between a magnitude of the sleep score to and a magnitude of the target score.

7. The method of claim 1, further comprising:

causing generation of a graphical representation on an interface to induce modification of the acquired parameter, or

causing generation of a haptic signal for providing vibratory feedback to induce modification of the acquired parameter.

8. The method of claim 1, further comprising:

determining sleep trend data representing one or more of sleep cycles based on the acquired parameters, the sleep trend data being stored in a memory;

indentifying at least one acquired parameter as deviating by a threshold amount from a corresponding parameter defined by the sleep profile;

recommending modification of the at least one acquired parameter to reduce the threshold amount; and

detecting whether the at least one acquired parameter is modified.

9. The method of claim 8, wherein indentifying the at least one acquired parameter comprises:

identifying an environmental parameter including one of an amount of light, a level of sound energy, and an ambient temperature,

wherein recommending modification of the environmental parameter facilitates an increased target score.

10. The method of claim 8, wherein indentifying the at least one acquired parameter comprises:

identifying a physical parameter including one of a sleep start time, a sleep end time, a duration of light sleep, a duration of deep sleep, a heart rate, and a body temperature,

wherein recommending modification of the physical parameter facilitates an increased target score.

11. The method of claim 1, further comprising:

modifying the sleep score by a value representing one or more time periods of disrupted sleep.

12. The method of claim 1, further comprising:

detecting the sleep score exceeds the target score; and

reducing a rate at which the sleep score as a function of the difference between the sleep score and the target score.

13. The method of claim 1, further comprising:

determining a subset of sleep scores; and

changing a classification associated with a user based on the subset of sleep scores.

14. The method of claim 13, further comprising:

determining the subset of sleep scores is in a first range of sleep scores or a second range of sleep scores;

changing the classification to level up to a first sleep profile if the subset of sleep scores is associated with the first range; and

changing the classification to level down to a second sleep profile if the subset of sleep scores is associated with the second range,

wherein the first range of activity scores are nearer to the target score than the second range of activity scores.

15. The method of claim 1, wherein causing presentation of a representation of the sleep score comprises:

generating signals to either display a graphical representation on a user interface or a haptic response generated by a wearable device, the signals representing feedback to modify an acquired parameter to comply with a parameter associated with the target score.

16. A device comprising:

a sleep manager comprising:

a repository configured to store data representing a sleep profile defining parameters upon which a target score is established; and

a score generator configured to:

determine a first score for a first acquired parameter based on a first quantity associated with the sleep profile;

determine a second score for a second acquired parameter based on a second quantity associated with the sleep profile; and

calculate a sleep score based on the first score and the second score;

a sleep wellness module configured to facilitate modification of a value of an acquired parameter associated with sleep activity to change the target score; and

a status manager configured to cause presentation of a representation of the target score,

wherein the sleep score is indicative of either an attainment of the target score or a deviation therefrom.

17. The device of claim 16, further comprising:

a sleep evaluator to acquire data representing acquired parameters; and

a circadian rhythm manager to manage the sleep activity to conform to optimal times of a day for a circadian clock of a user.

18. The device of claim 14, wherein the status manager comprises:

a haptic engine configured to impart vibratory energy; and

a display engine configured to generate a graphical representation on an interface.

19. A computer readable medium including instructions for performing a method, the method comprising:

receiving data representing a sleep profile defining parameters upon which a target score is established;

acquiring data representing acquired parameters associated with sleep activity;

determining a first score for a first acquired parameter based on a first quantity associated with the sleep profile;

determining a second score for a second acquired parameter based on a second quantity associated with the sleep profile;

calculating at a processor a sleep score based on data in a memory including the first score and the second score; and

causing presentation of a representation of the sleep score to indicate either an attainment of the target score or a deviation therefrom.

20. The method of claim 19, further comprising:

determining a third score for a third acquired parameter based on a third quantity associated with the sleep profile.

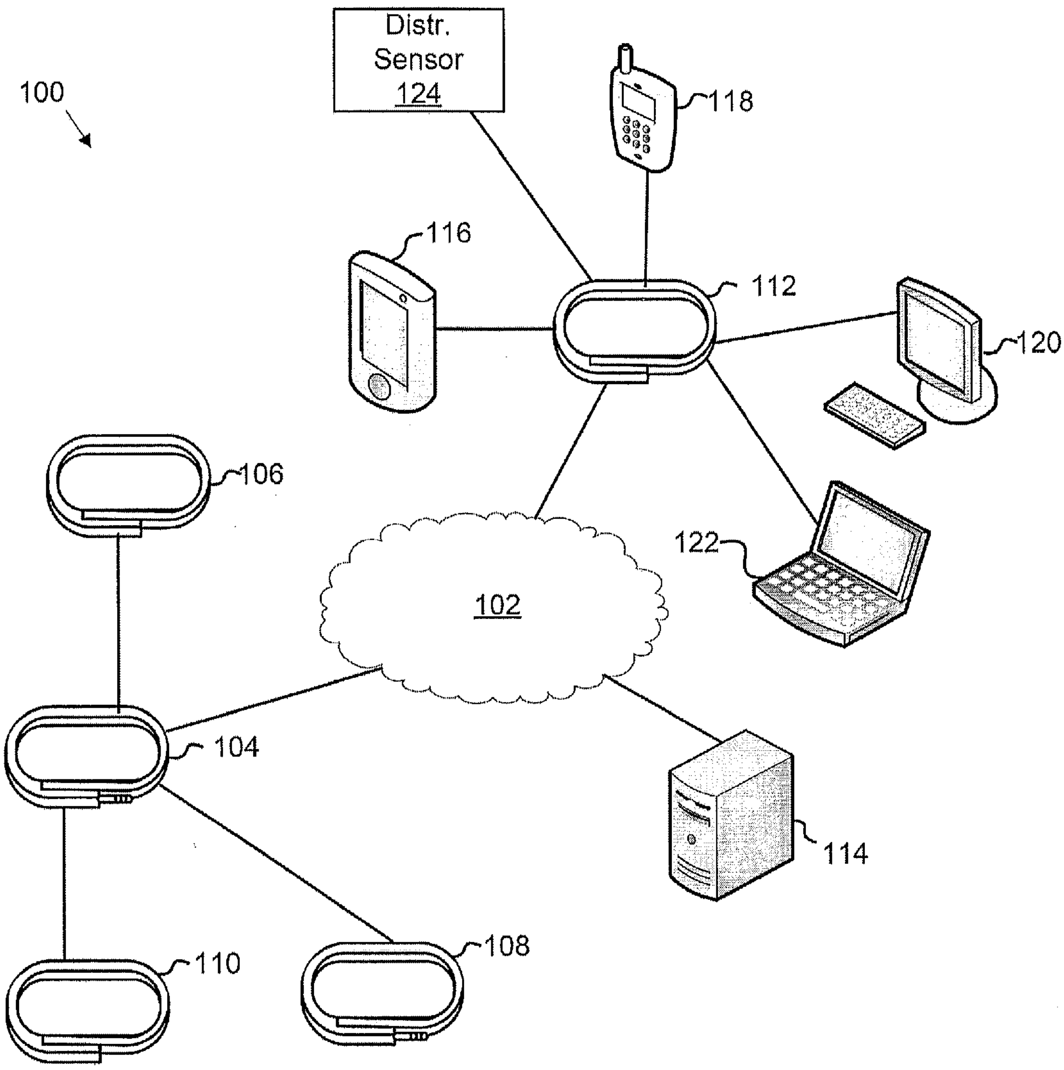

Distr.
Sensor
124
100
118
116
112
120
106
122
102
104
114
110
108

FIG. 1

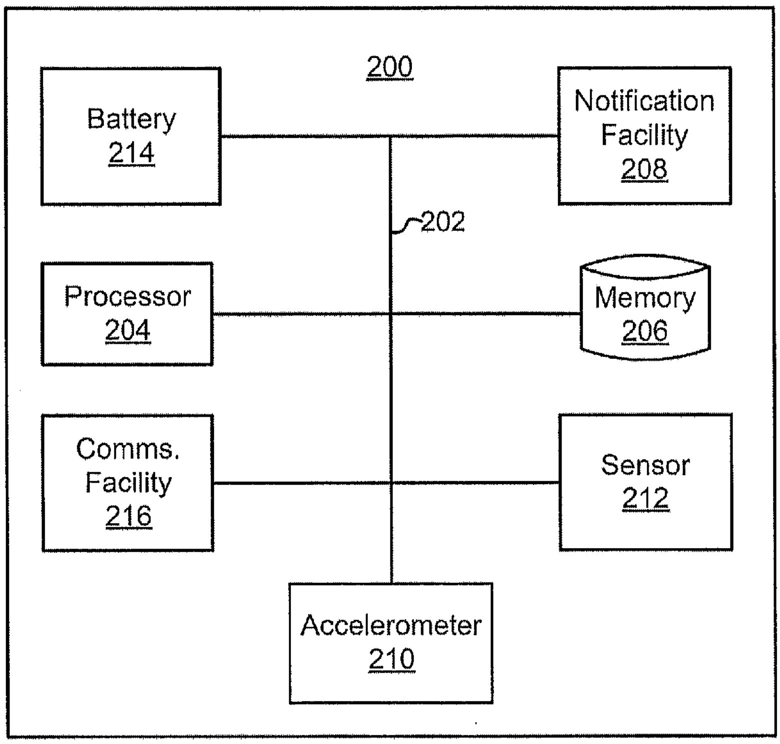

200
Battery
214
Notification Facility
208
202
Processor
204
Memory
206
Comms. Facility
216
Sensor
212
Accelerometer
210

FIG. 2

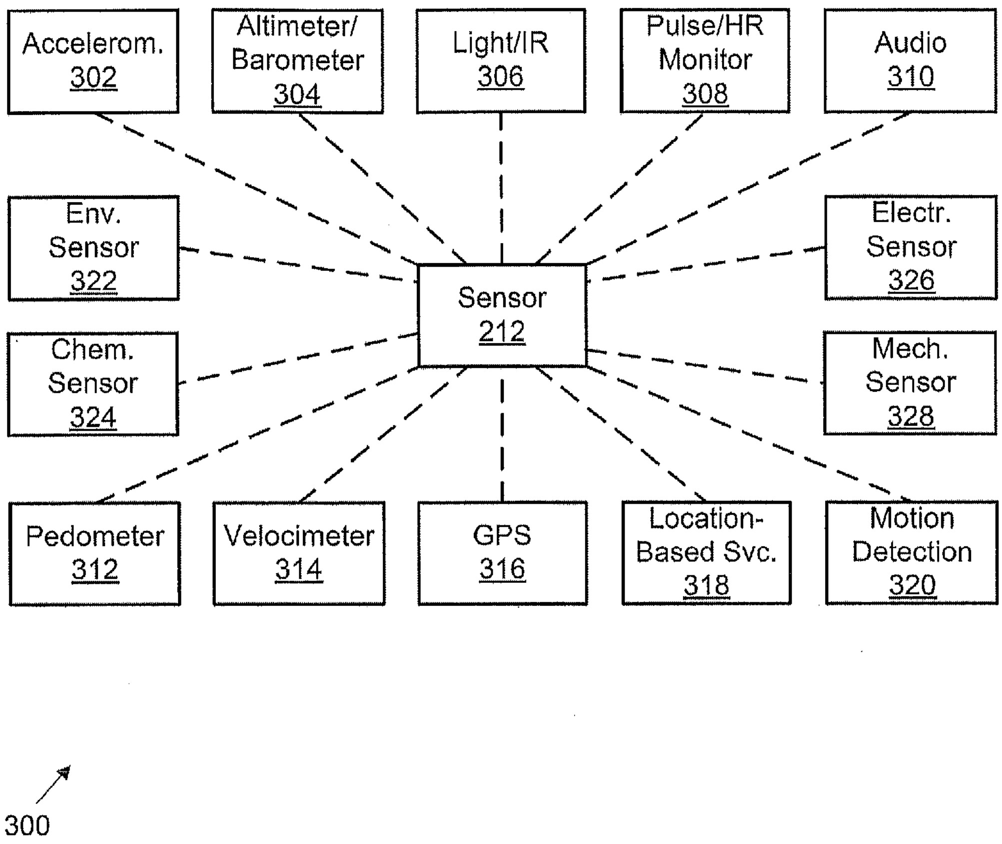

Accelerom.
302
Altimeter/
Barometer
304
Light/IR
306
Pulse/HR
Monitor
308
Audio
310
Env.
Sensor
322
Electr.
Sensor
326
Sensor
212
Chem.
Sensor
324
Mech.
Sensor
328
Pedometer
312
Velocimeter
314
GPS
316
Location-
Based Svc.
318
Motion
Detection
320
300

FIG. 3

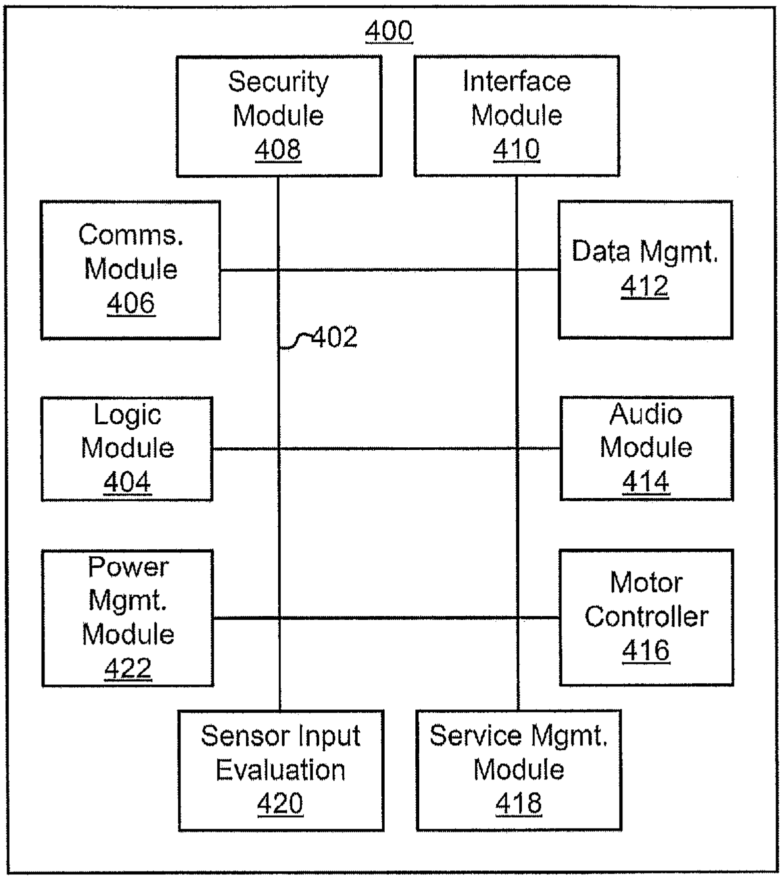

400
Security Module 408
Interface Module 410
Comms. Module 406
Data Mgmt. 412
402
Logic Module 404
Audio Module 414
Power Mgmt. Module 422
Motor Controller 416
Sensor Input Evaluation 420
Service Mgmt. Module 418

FIG. 4

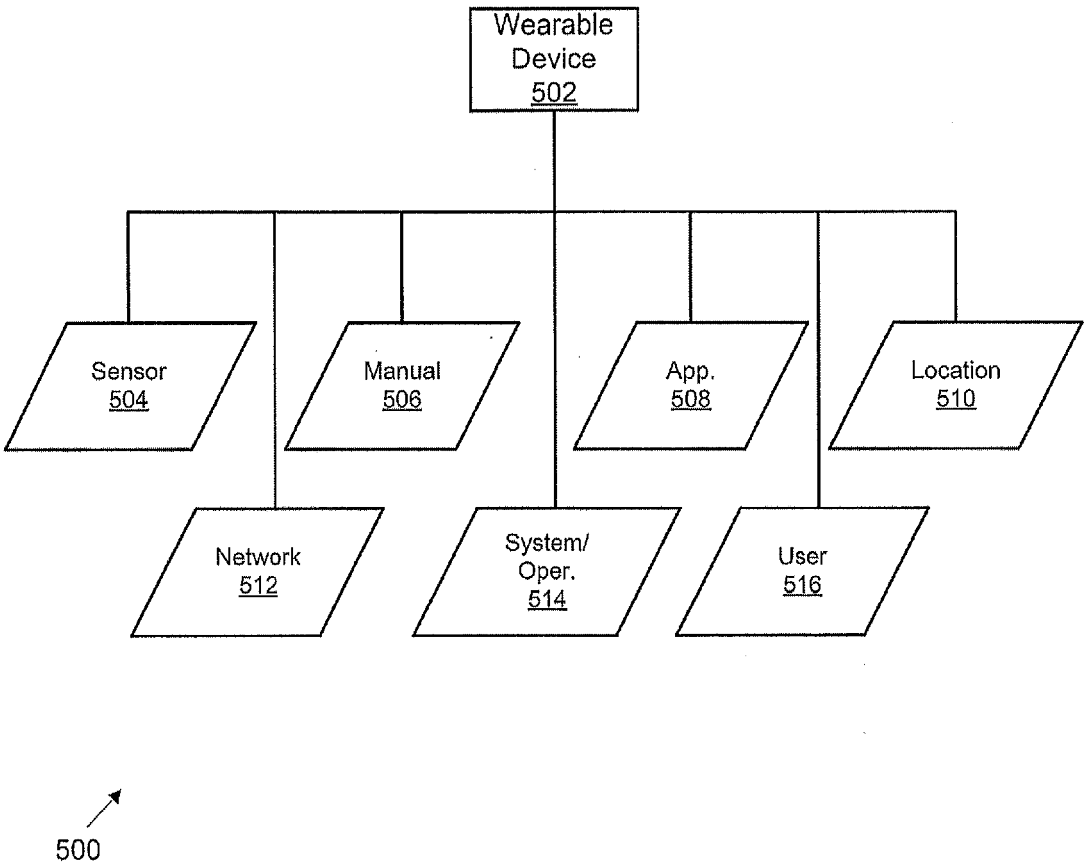

Wearable
Device
502
Sensor
504
Manual
506
App.
508
Location
510
Network
512
System/
Oper.
514
User
516
500

FIG. 5A

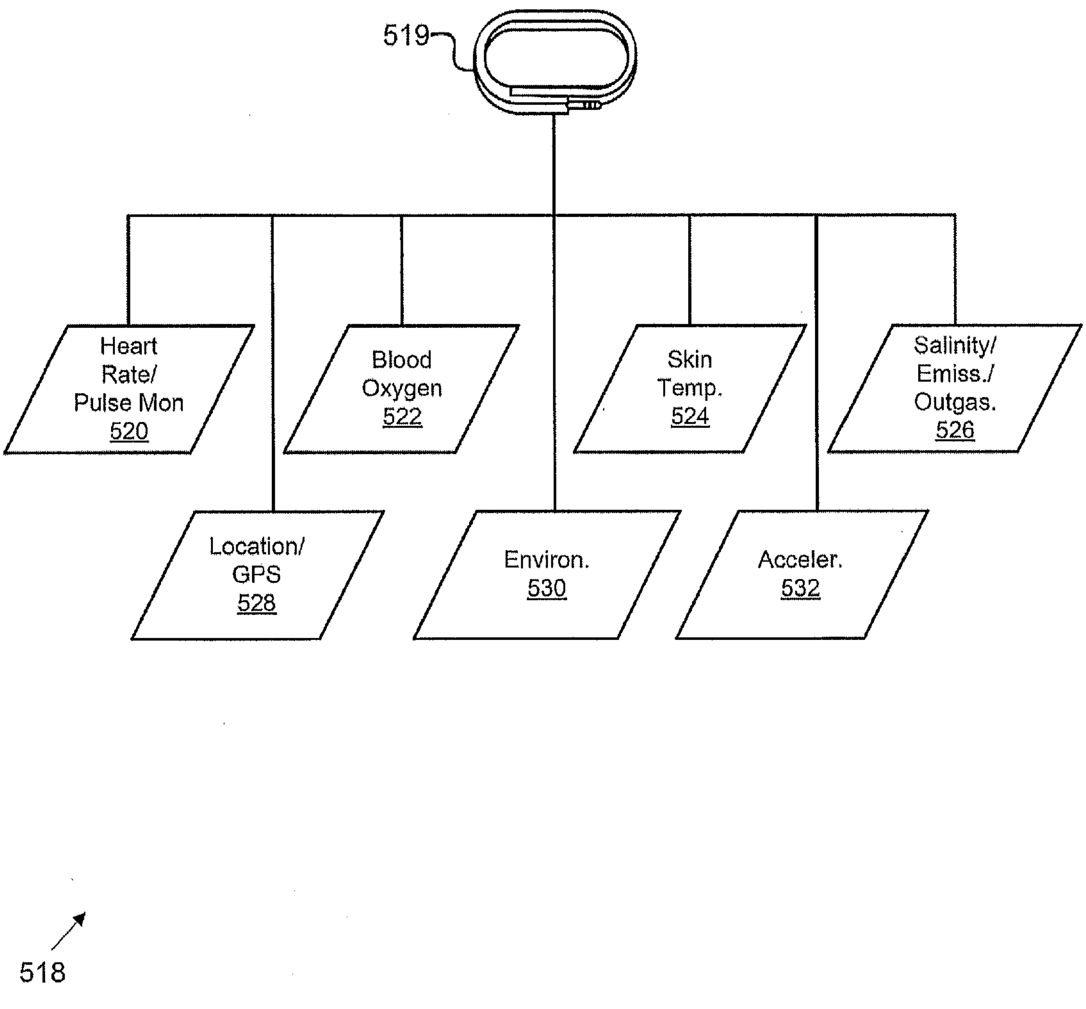

519
Heart
Rate/
Pulse Mon
520
Blood
Oxygen
522
Skin
Temp.
524
Salinity/
Emiss./
Outgas.
526
Location/
GPS
528
Environ.
530
Acceler.
532
518

FIG. 5B

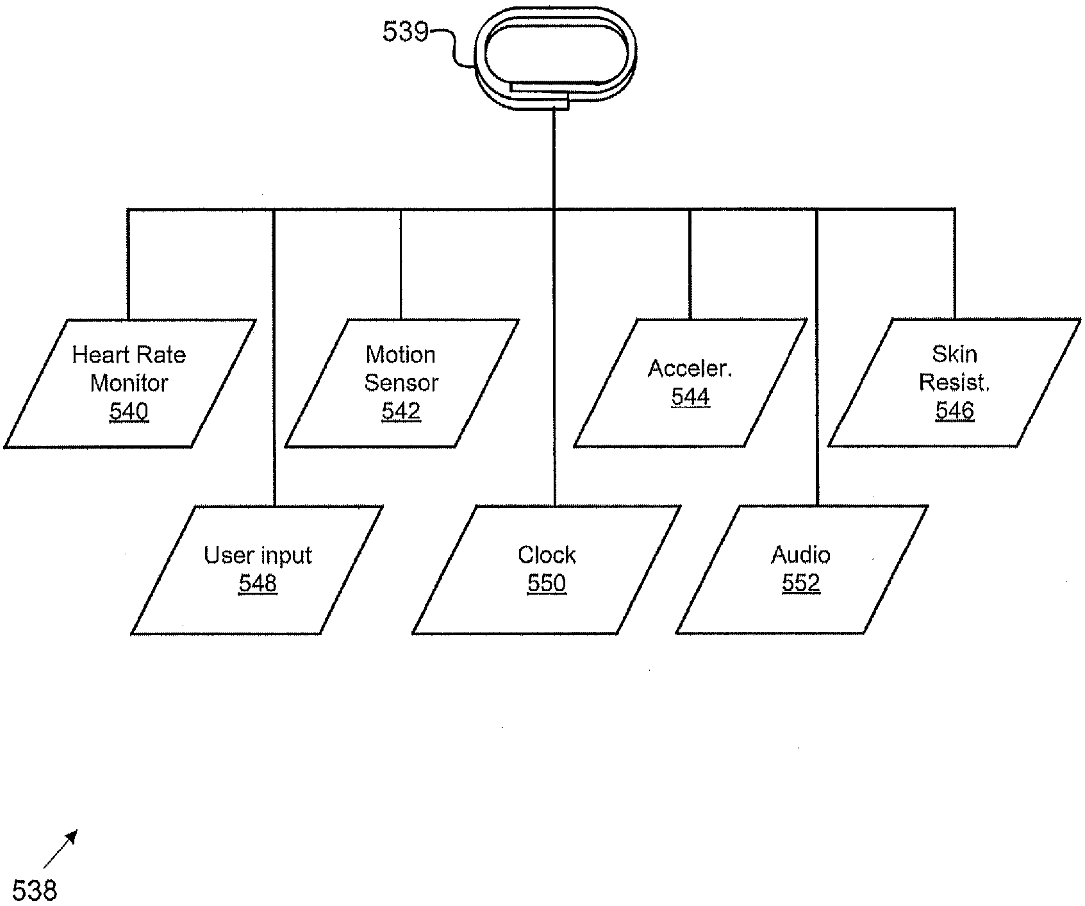

539
Heart Rate
Monitor
540
Motion
Sensor
542
Acceler.
544
Skin
Resist.
546
User input
548
Clock
550
Audio
552
538

FIG. 5C

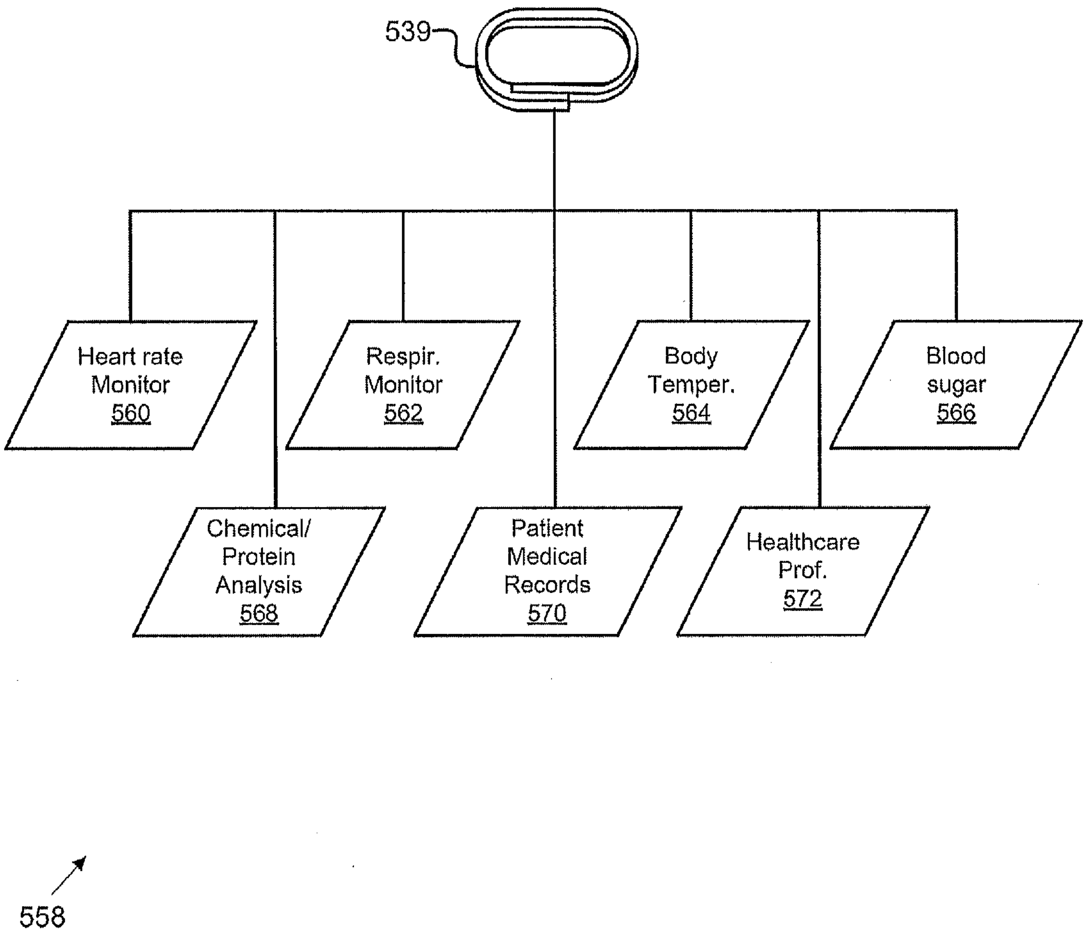

539
Heart rate Monitor 560
Respir. Monitor 562
Body Temper. 564
Blood sugar 566
Chemical/ Protein Analysis 568
Patient Medical Records 570
Healthcare Prof. 572
558

FIG. 5D

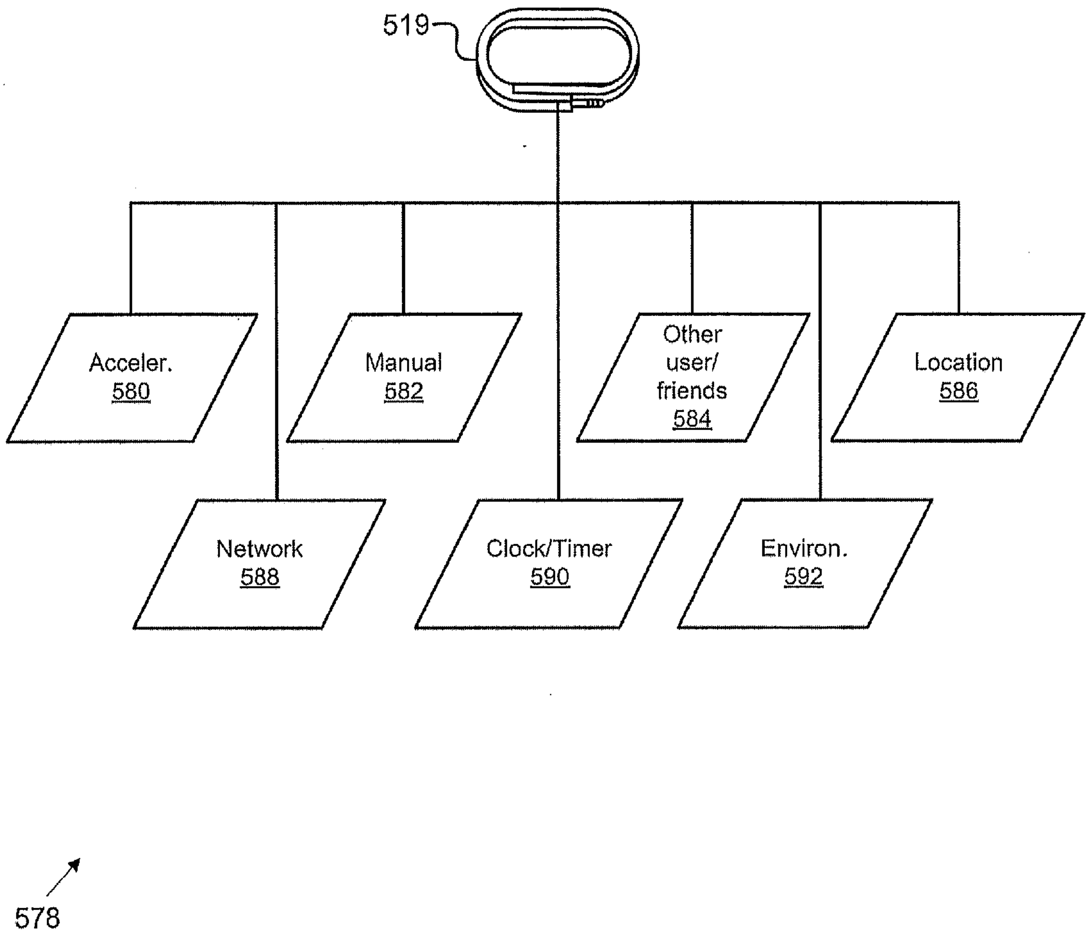

519
Acceler.
580
Manual
582
Other
user/
friends
584
Location
586
Network
588
Clock/Timer
590
Environ.
592
578

FIG. 5E

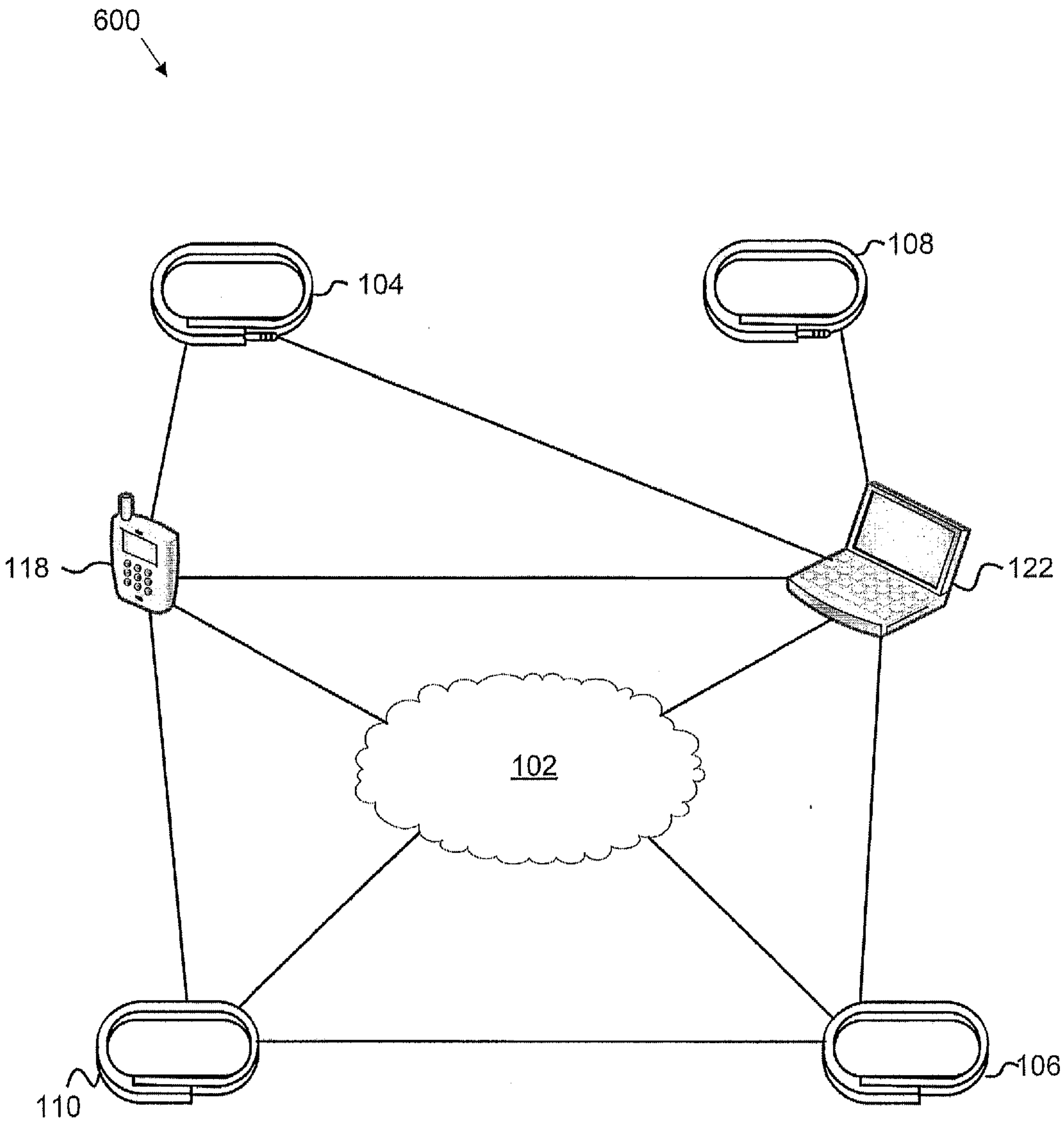


FIG. 6

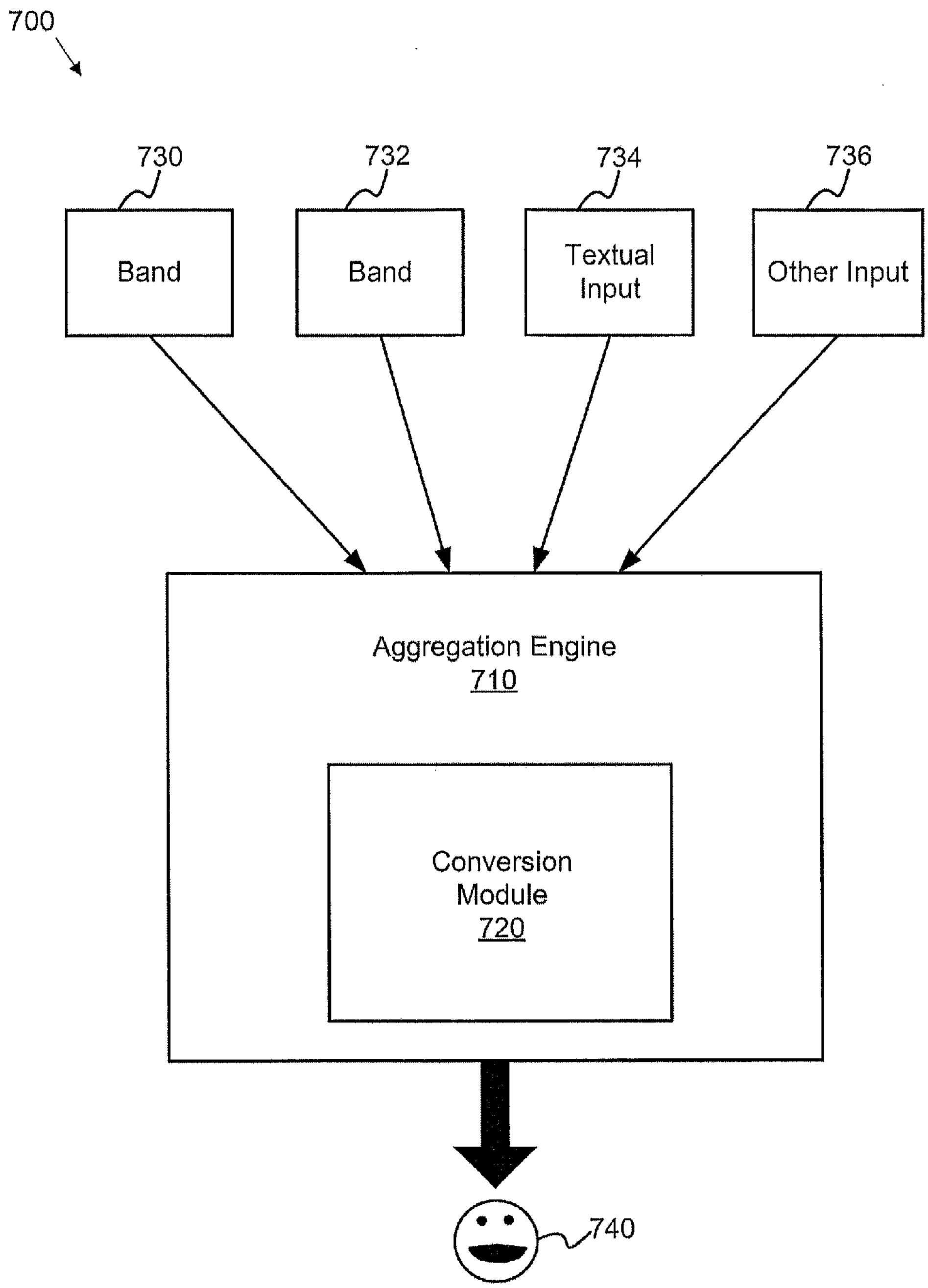

700
730
732
734
736
Band
Band
Textual Input
Other Input
Aggregation Engine
710
Conversion Module
720
740

FIG. 7

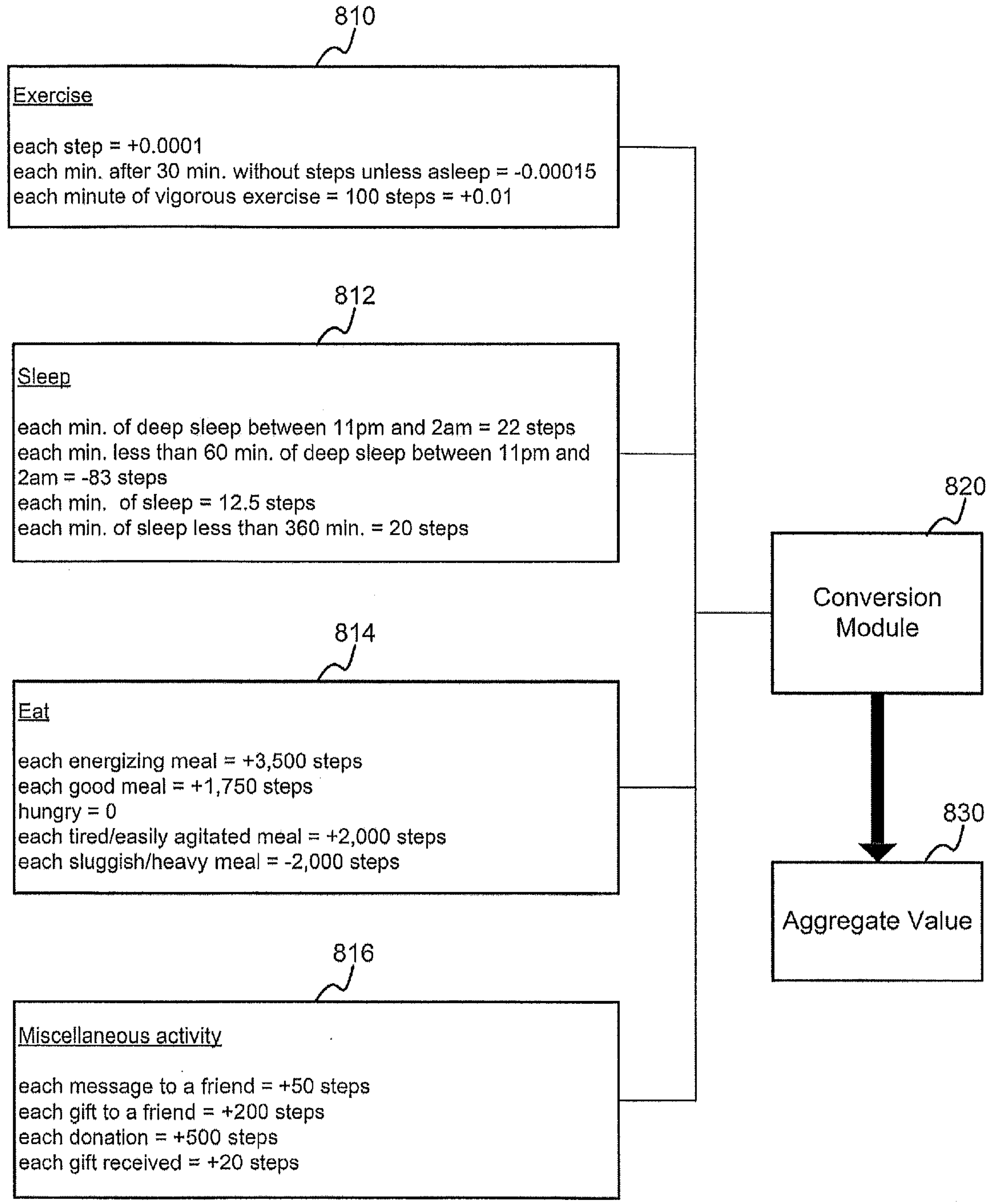

810
Exercise
each step = +0.0001
each min. after 30 min. without steps unless asleep = -0.00015
each minute of vigorous exercise = 100 steps = +0.01
812
Sleep
each min. of deep sleep between 11pm and 2am = 22 steps
each min. less than 60 min. of deep sleep between 11pm and 2am = -83 steps
each min. of sleep = 12.5 steps
each min. of sleep less than 360 min. = 20 steps
814
Eat
each energizing meal = +3,500 steps
each good meal = +1,750 steps
hungry = 0
each tired/easily agitated meal = +2,000 steps
each sluggish/heavy meal = -2,000 steps
816
Miscellaneous activity
each message to a friend = +50 steps
each gift to a friend = +200 steps
each donation = +500 steps
each gift received = +20 steps
820
Conversion Module
830
Aggregate Value

FIG. 8

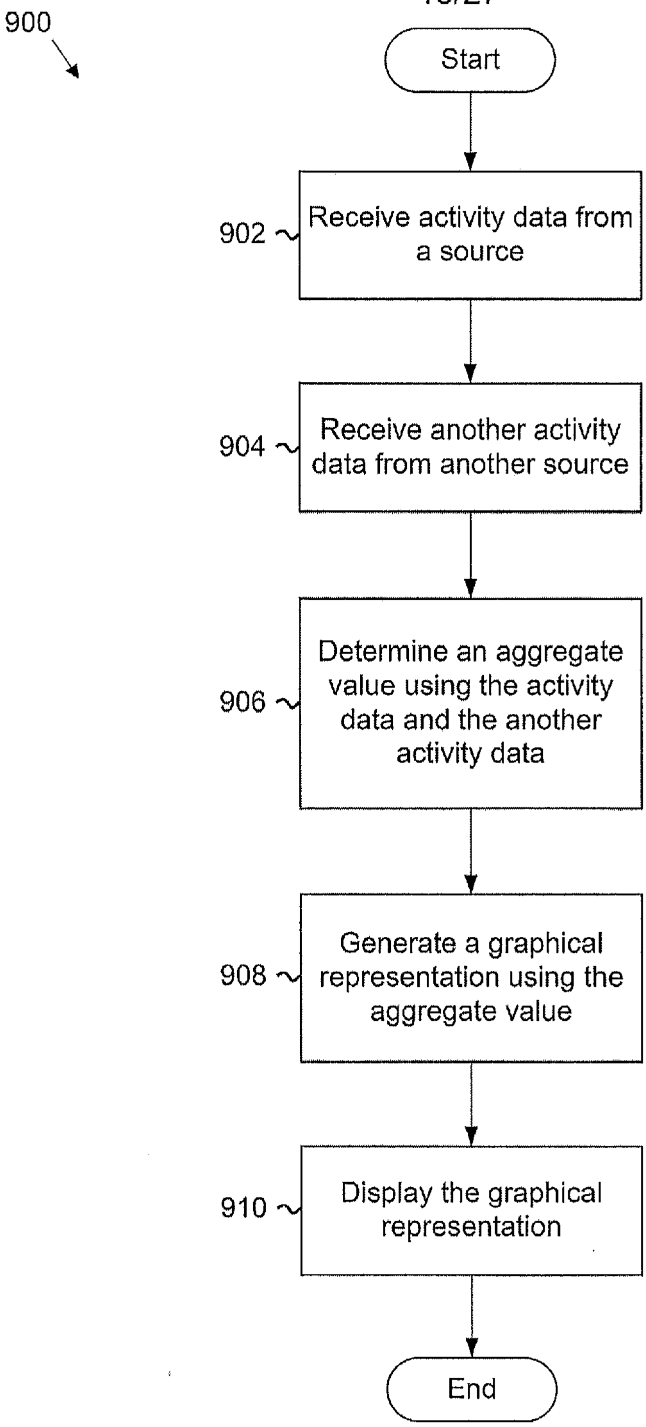
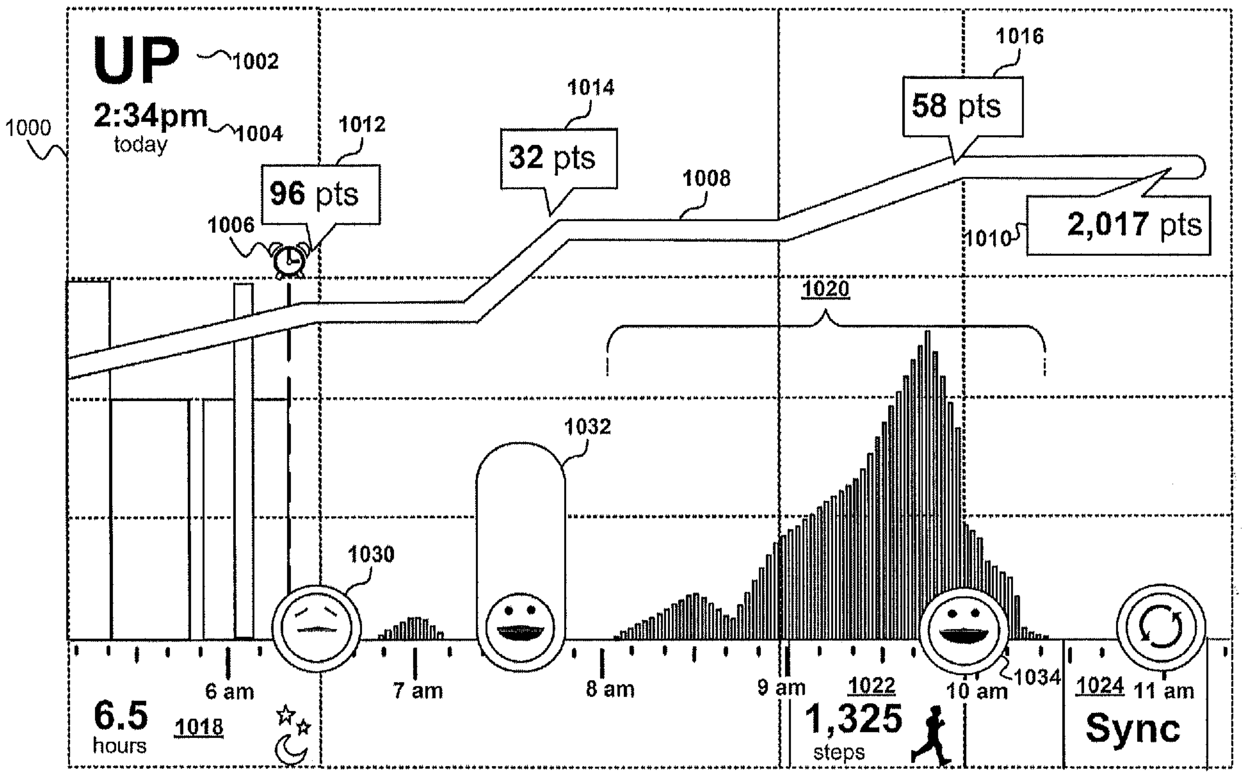

900
Start
902
Receive activity data from a source
904
Receive another activity data from another source
906
Determine an aggregate value using the activity data and the another activity data
908
Generate a graphical representation using the aggregate value
910
Display the graphical representation
End

FIG. 9



UP
1002
2:34pm
today
1004
1000
1012
96 pts
1006
1014
32 pts
1008
1016
58 pts
1010
2,017 pts
1020
1032
1030
6 am
7 am
8 am
9 am
1022
10 am
1034
1024
11 am
6.5
hours
1018
1,325
steps
Sync

FIG. 10

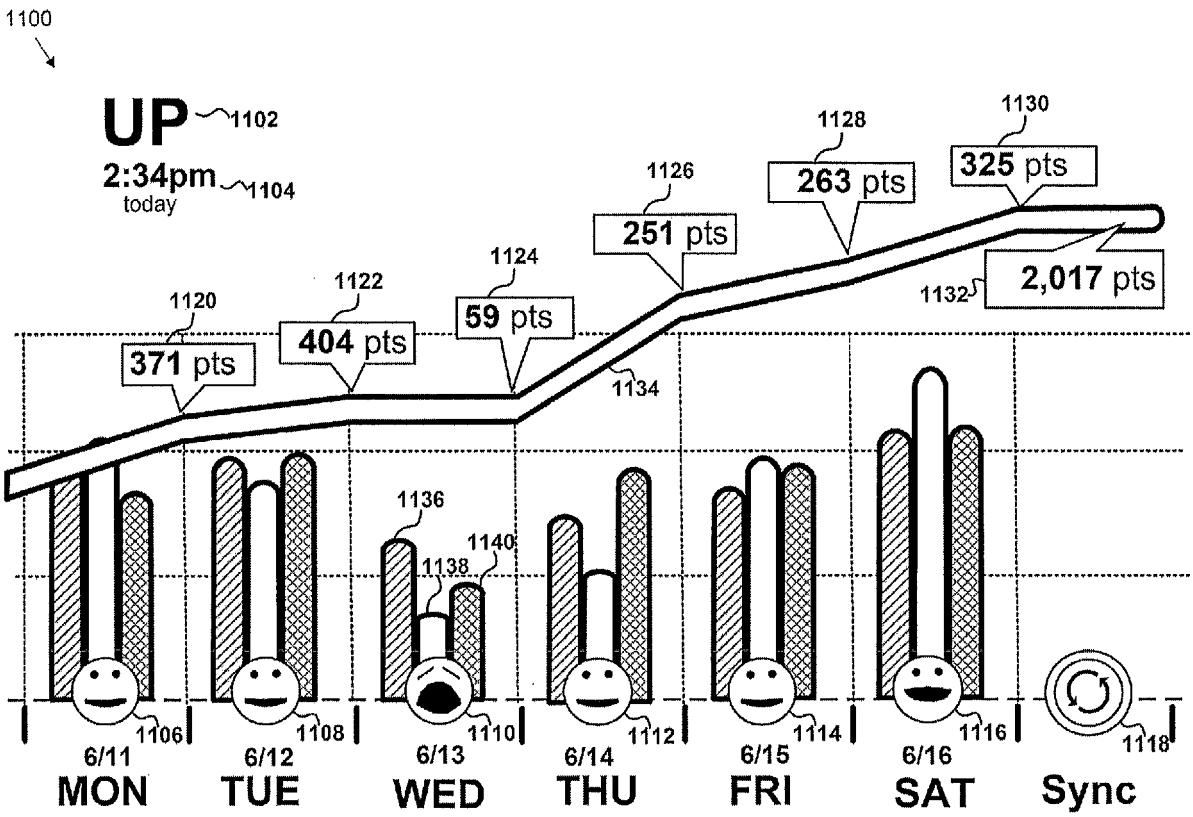

1100
UP
1102
2:34pm
today
1104
1120
371 pts
1122
404 pts
1124
59 pts
1126
251 pts
1128
263 pts
1130
325 pts
1132
2,017 pts
1134
1136
1138
1140
1106
1108
1110
1112
1114
1116
1118
6/11
MON
6/12
TUE
6/13
WED
6/14
THU
6/15
FRI
6/16
SAT
Sync

FIG. 11

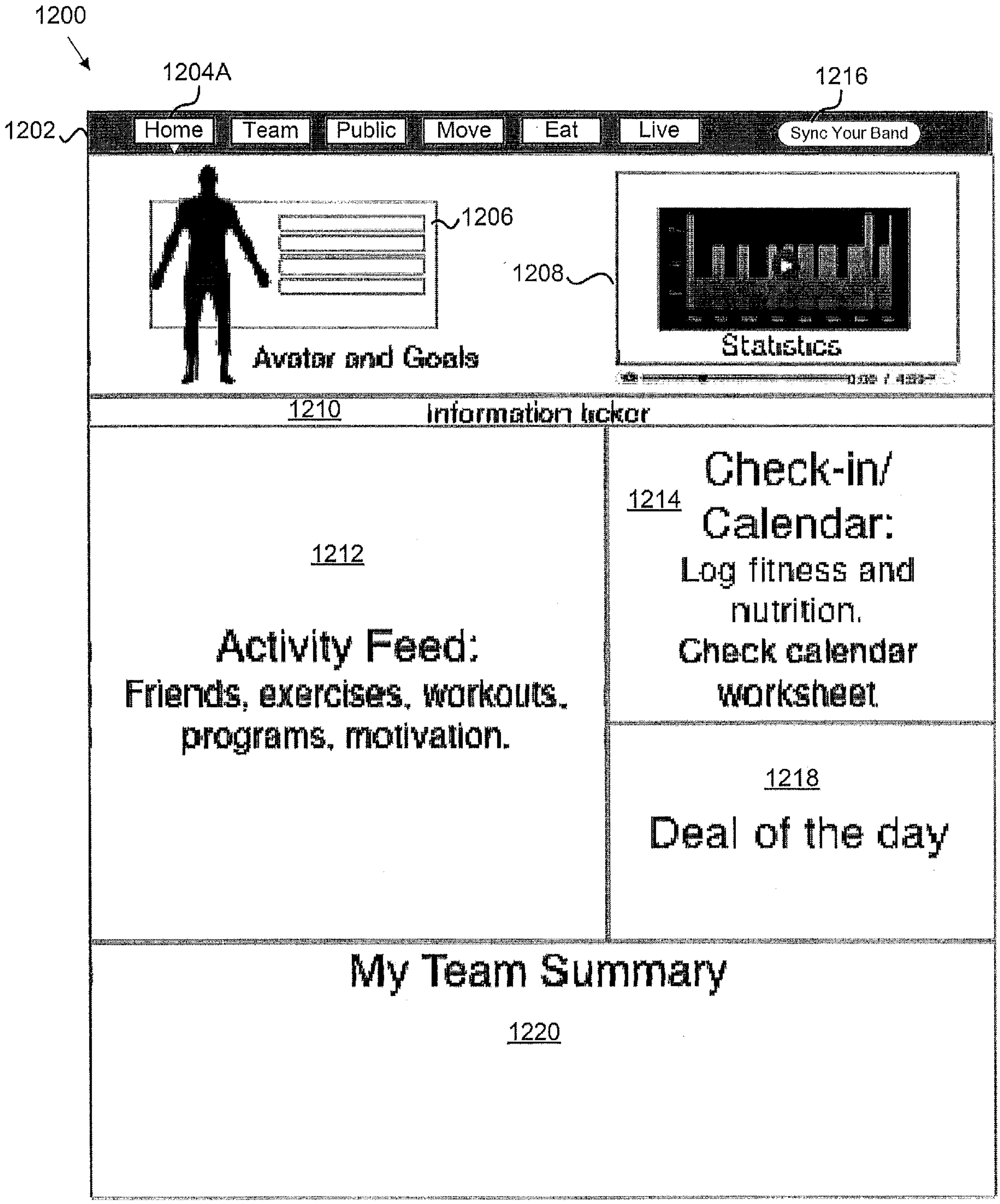
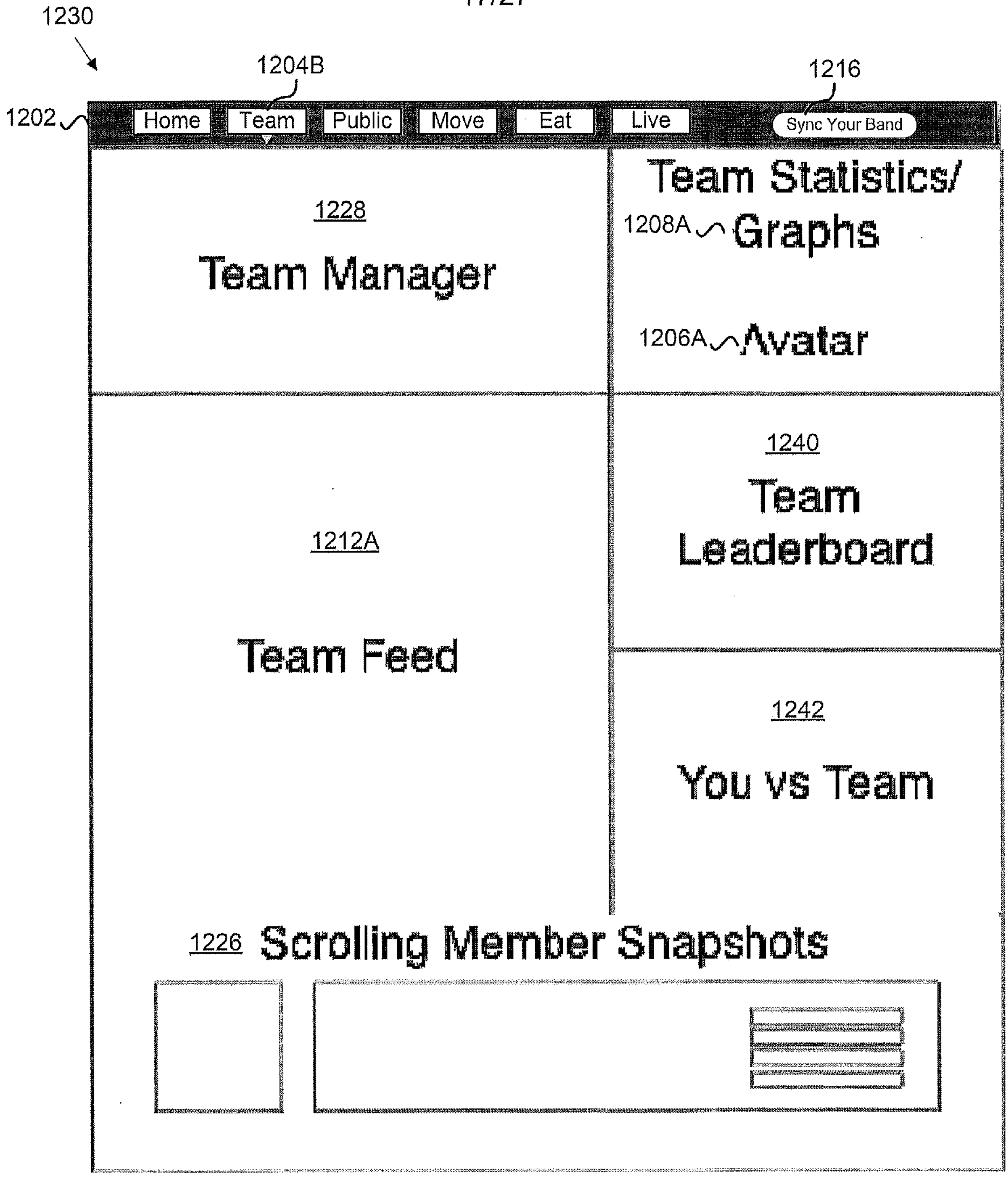

1200
1204A
1216
1202
Home
Team
Public
Move
Eat
Live
Sync Your Band
1206
1208
Avatar and Goals
Statistics
1210
Information ticker
1214
Check-in/
Calendar:
Log fitness and
nutrition.
Check calendar
worksheet
1212
Activity Feed:
Friends, exercises, workouts,
programs, motivation.
1218
Deal of the day
My Team Summary
1220

FIG. 12A



1230
1204B
1216
1202
Home
Team
Public
Move
Eat
Live
Sync Your Band
1228
Team Manager
Team Statistics/
1208A
Graphs
1206A
Avatar
1212A
Team Feed
1240
Team
Leaderboard
1242
You vs Team
1226
Scrolling Member Snapshots

FIG. 12B

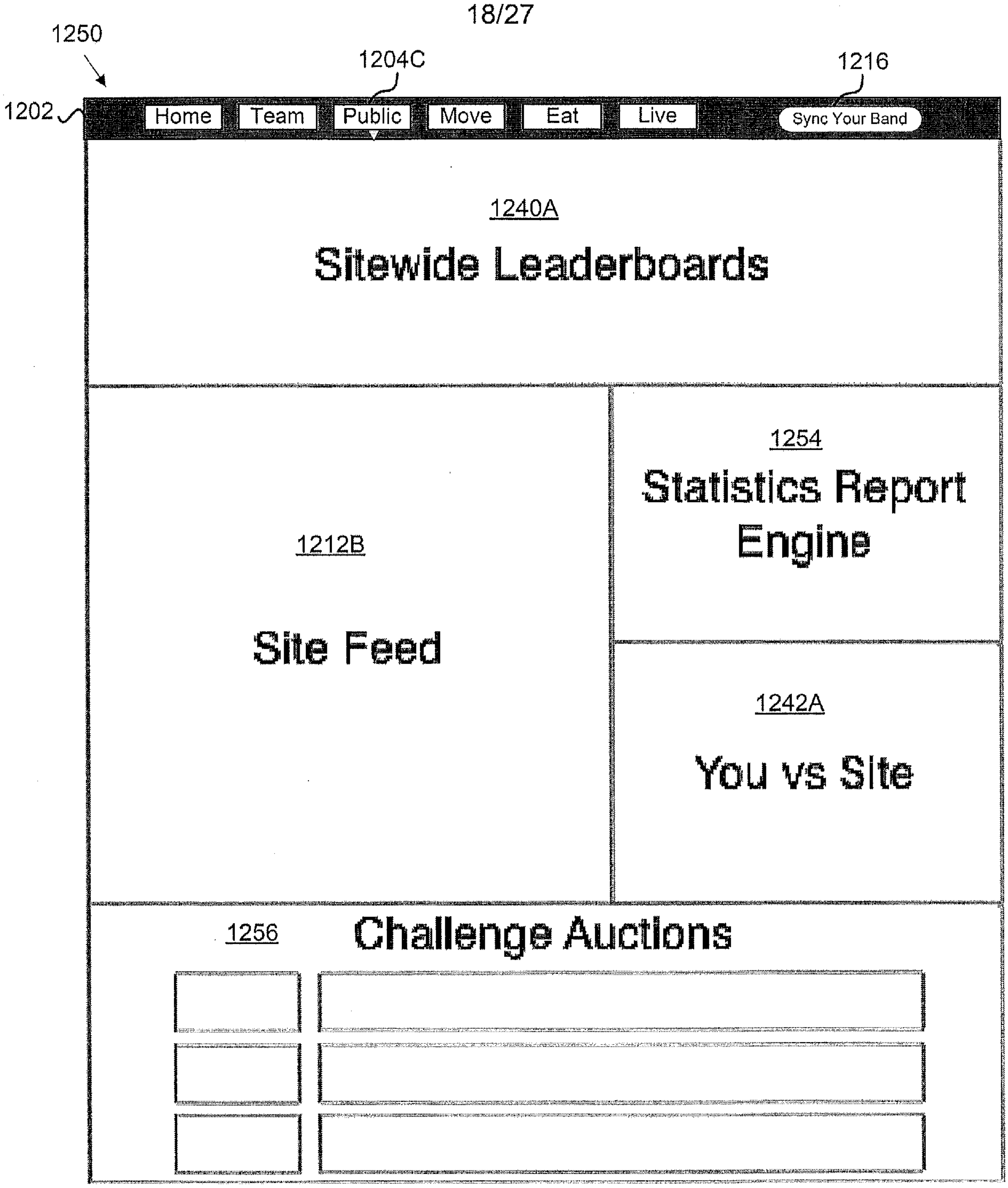

1250
1204C
1216
1202
Home
Team
Public
Move
Eat
Live
Sync Your Band
1240A
Sitewide Leaderboards
1254
Statistics Report Engine
1212B
Site Feed
1242A
You vs Site
1256
Challenge Auctions

FIG. 12C

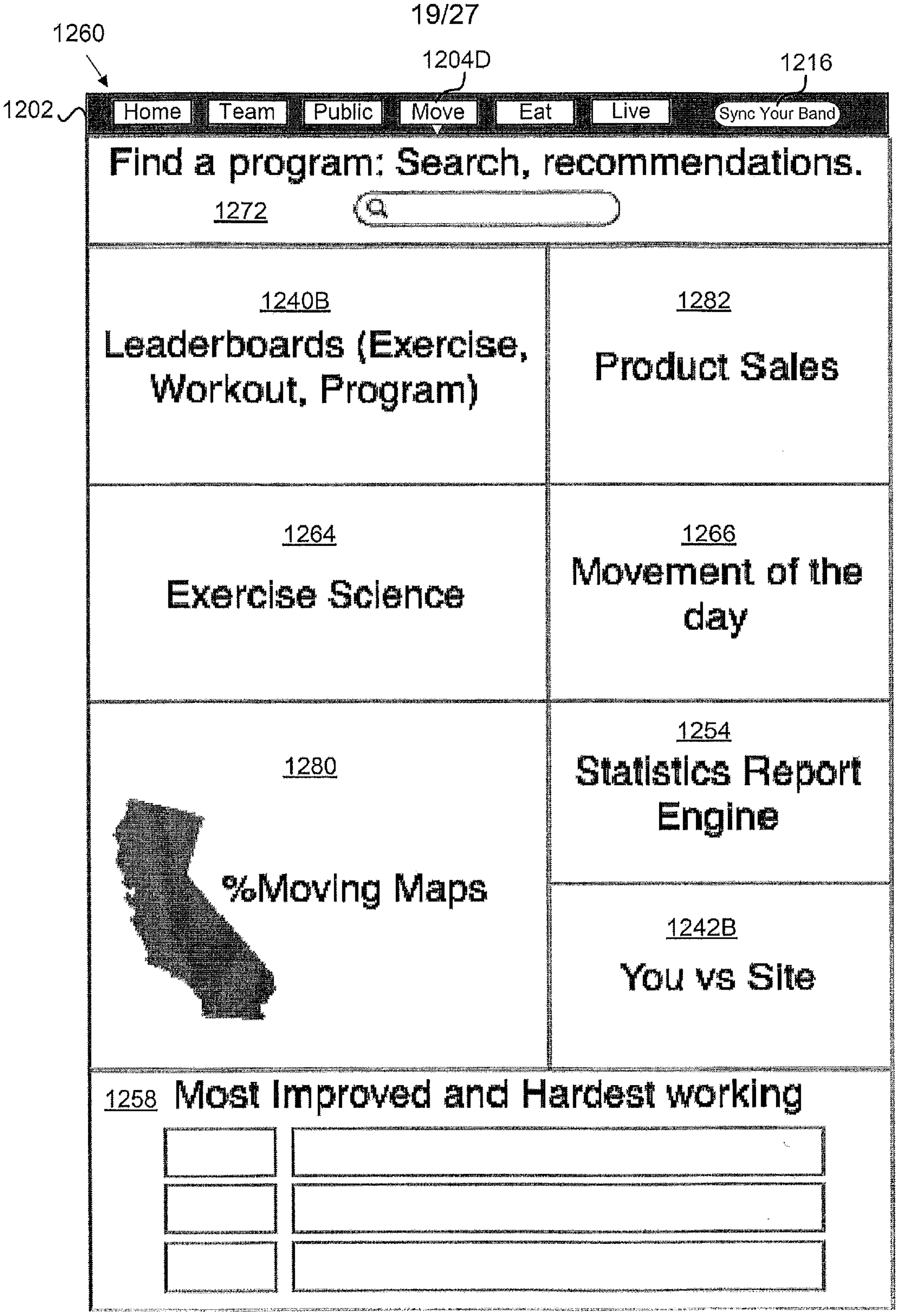

1260
1204D
1216
1202
Home
Team
Public
Move
Eat
Live
Sync Your Band
Find a program: Search, recommendations.
1272
1240B
Leaderboards (Exercise, Workout, Program)
1282
Product Sales
1264
Exercise Science
1266
Movement of the day
1280
%Moving Maps
1254
Statistics Report Engine
1242B
You vs Site
1258 Most Improved and Hardest working

FIG. 12D

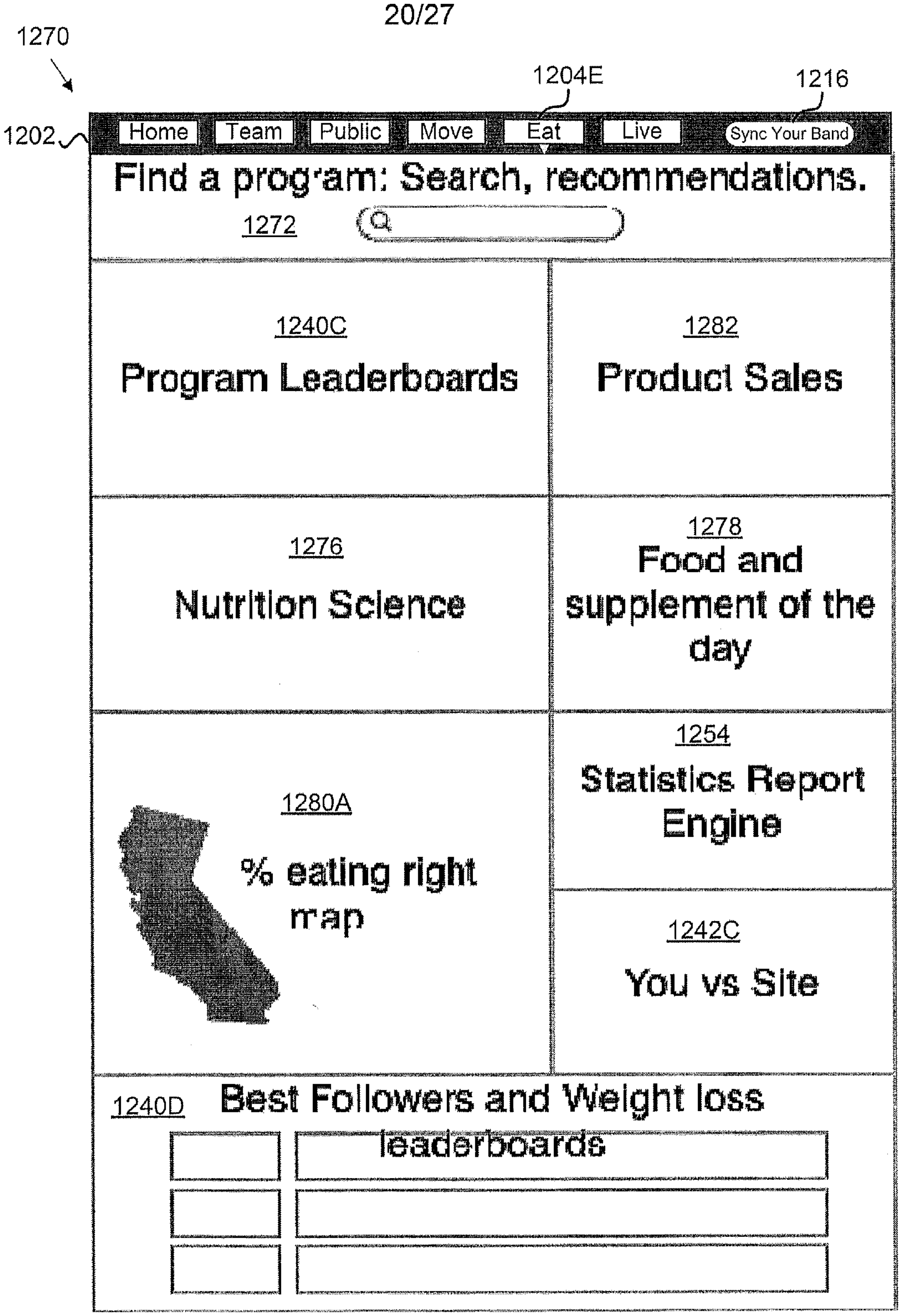

1270
1204E
1216
1202
Home
Team
Public
Move
Eat
Live
Sync Your Band
Find a program: Search, recommendations.
1272
1240C
Program Leaderboards
1282
Product Sales
1276
Nutrition Science
1278
Food and supplement of the day
1280A
% eating right map
1254
Statistics Report Engine
1242C
You vs Site
1240D
Best Followers and Weight loss leaderboards

FIG. 12E

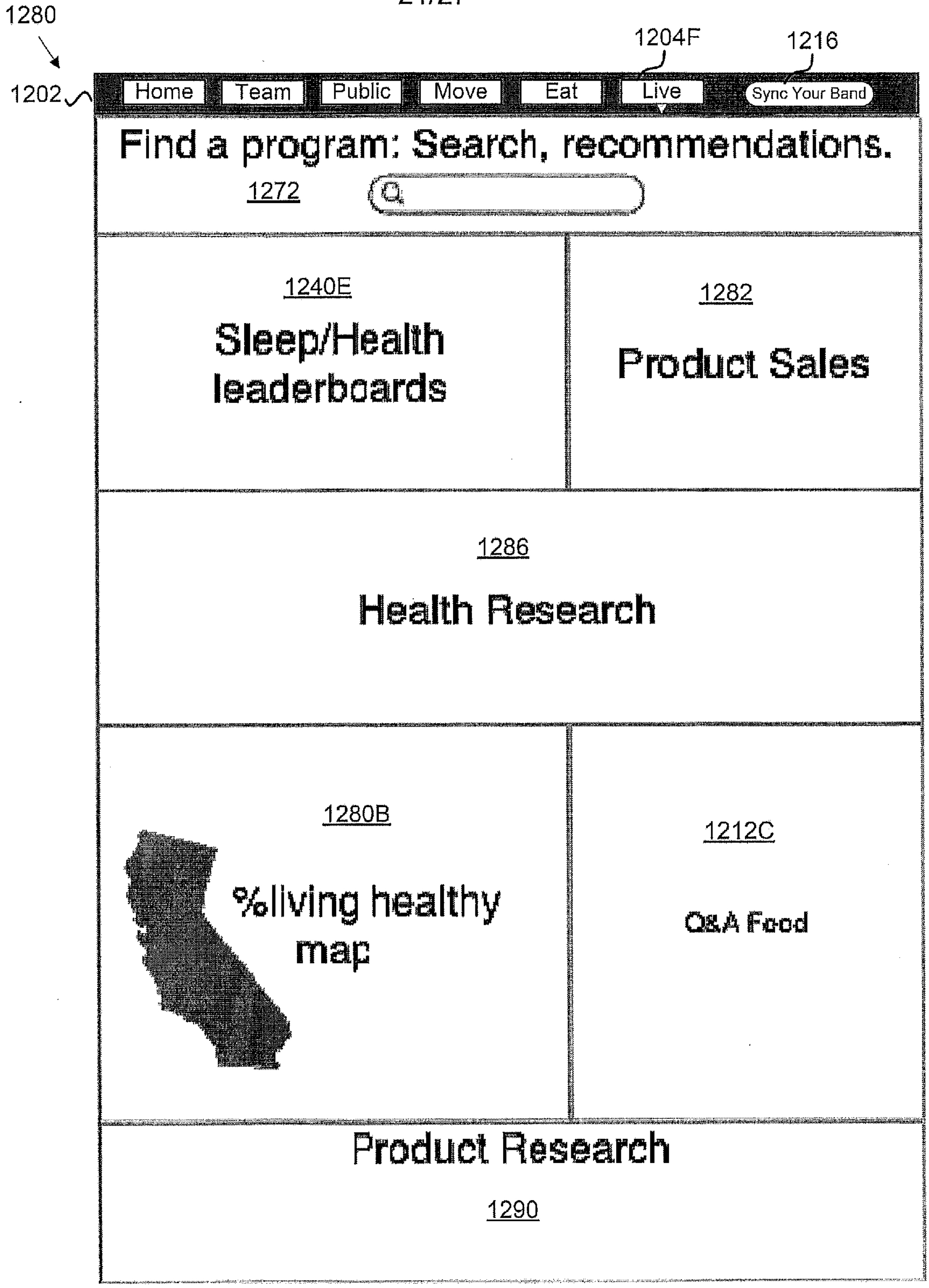

1280
1202
1204F
1216
Home
Team
Public
Move
Eat
Live
Sync Your Band
Find a program: Search, recommendations.
1272
1240E
Sleep/Health leaderboards
1282
Product Sales
1286
Health Research
1280B
%living healthy map
1212C
Q&A Food
Product Research
1290

FIG. 12F

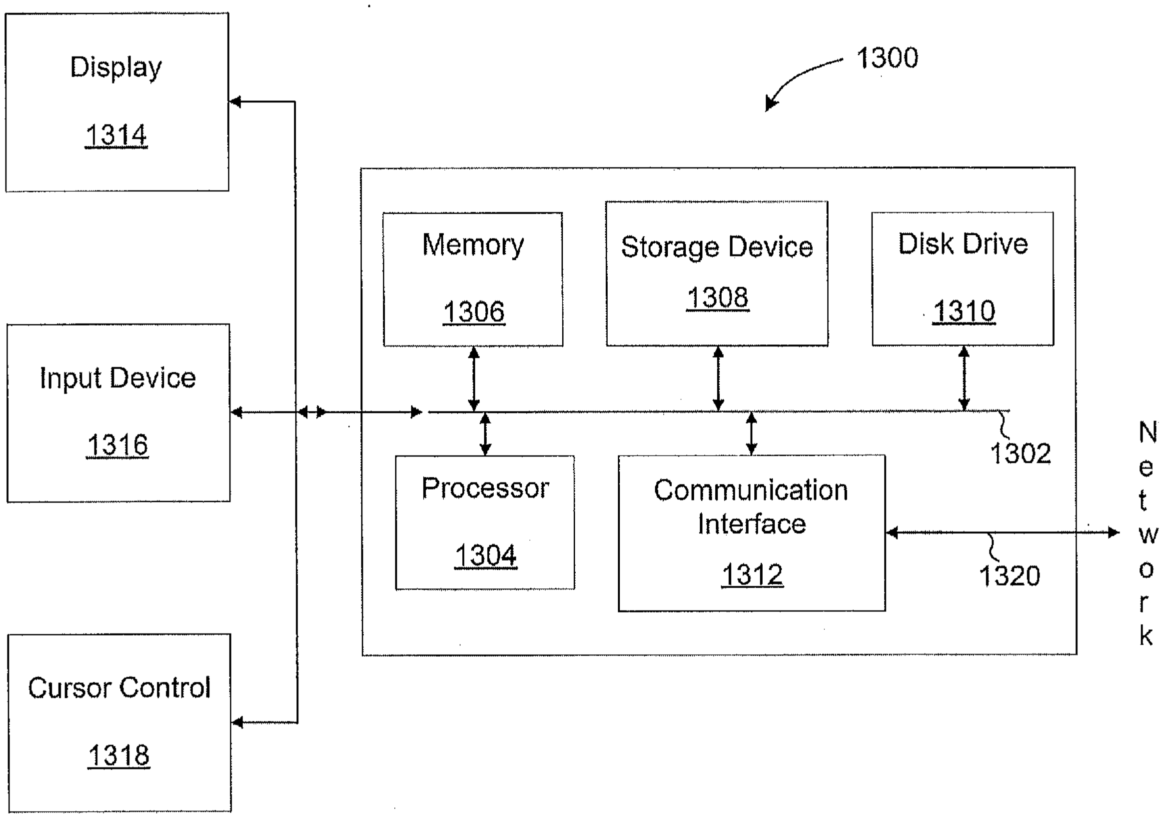

1300
Display
1314
Input Device
1316
Cursor Control
1318
Memory
1306
Storage Device
1308
Disk Drive
1310
1302
Processor
1304
Communication Interface
1312
1320
Network

FIG. 13

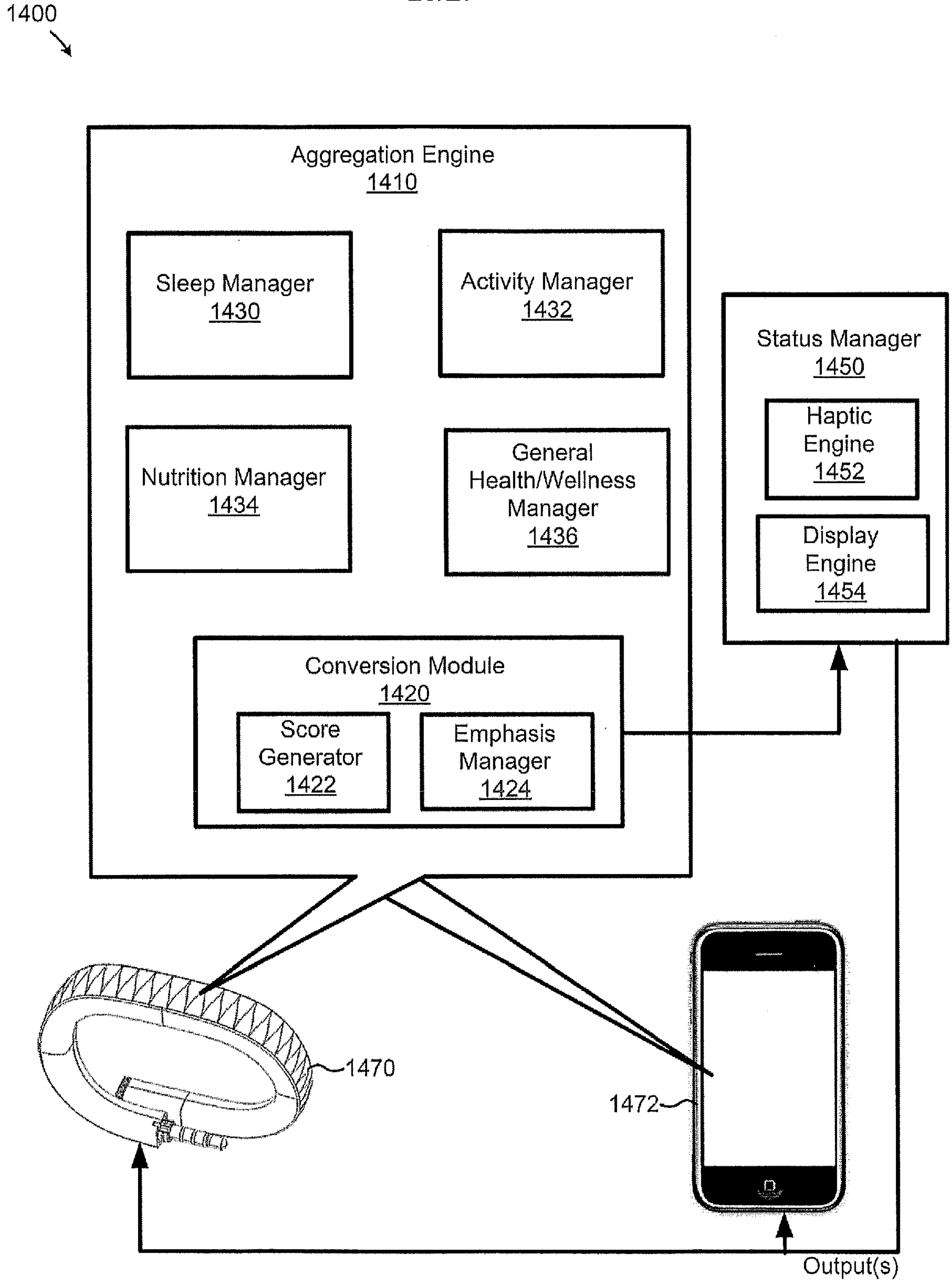

1400
Aggregation Engine
1410
Sleep Manager
1430
Activity Manager
1432
Nutrition Manager
1434
General
Health/Wellness
Manager
1436
Conversion Module
1420
Score
Generator
1422
Emphasis
Manager
1424
Status Manager
1450
Haptic
Engine
1452
Display
Engine
1454
1470
1472
Output(s)

FIG. 14

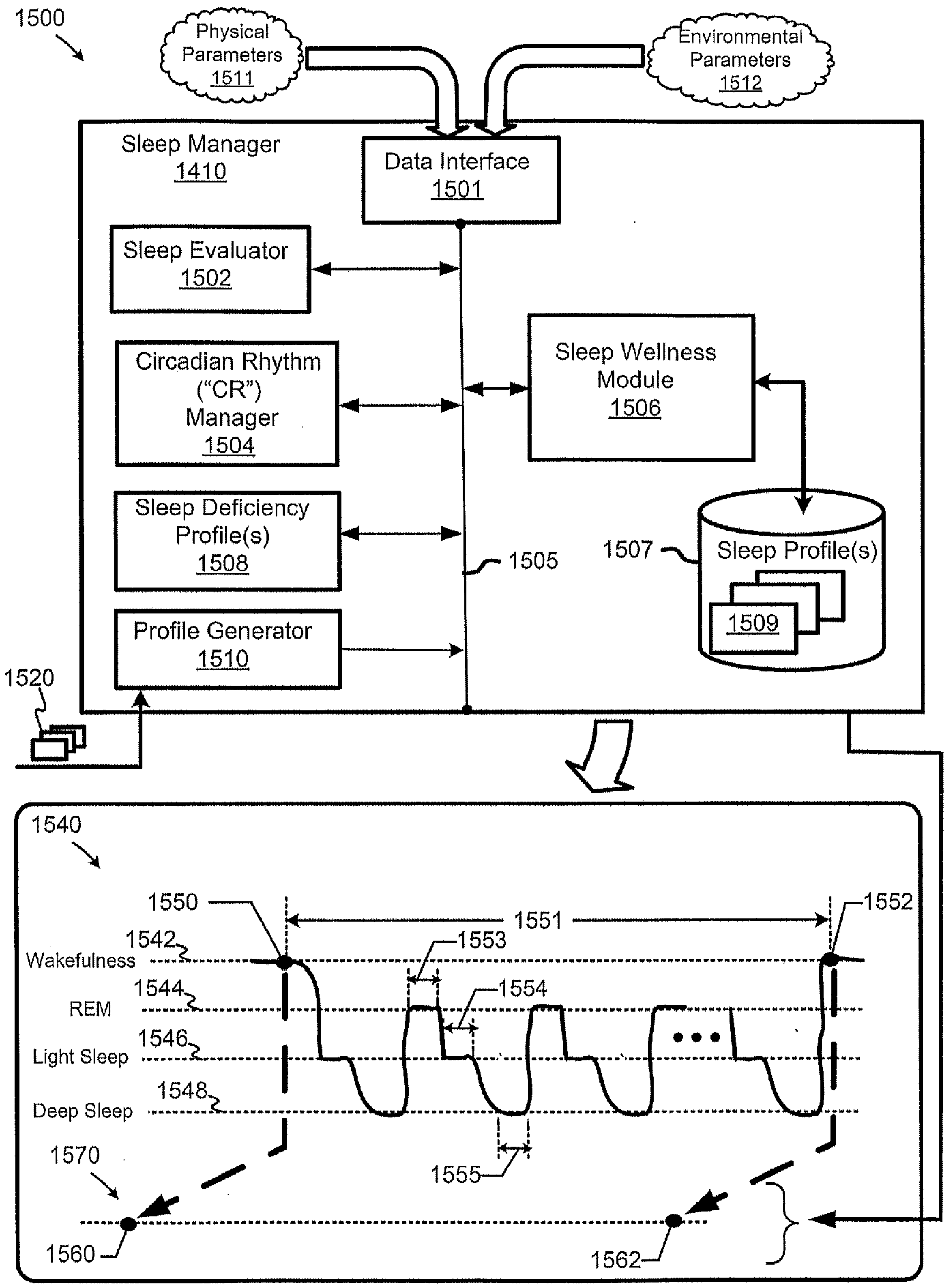

1500
Physical Parameters 1511
Environmental Parameters 1512
Sleep Manager 1410
Data Interface 1501
Sleep Evaluator 1502
Circadian Rhythm ("CR") Manager 1504
Sleep Wellness Module 1506
Sleep Deficiency Profile(s) 1508
1505
1507
Sleep Profile(s)
1509
Profile Generator 1510
1520
1540
1550
1551
1552
1542
Wakefulness
1553
1544
REM
1554
1546
Light Sleep
1548
Deep Sleep
1570
1555
1560
1562

FIG. 15

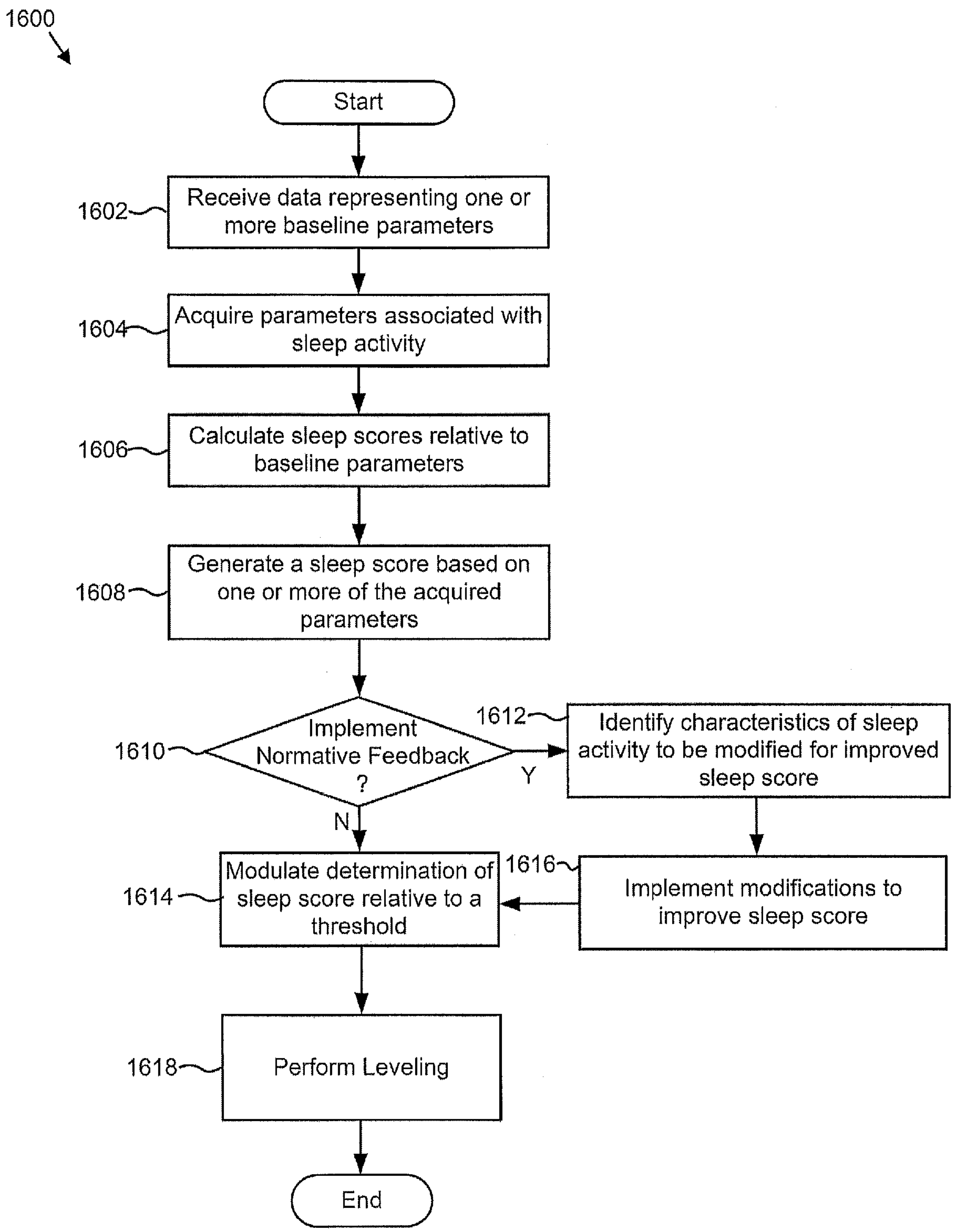

1600
Start
1602
Receive data representing one or more baseline parameters
1604
Acquire parameters associated with sleep activity
1606
Calculate sleep scores relative to baseline parameters
1608
Generate a sleep score based on one or more of the acquired parameters
1610
Implement Normative Feedback ?
Y
N
1612
Identify characteristics of sleep activity to be modified for improved sleep score
1614
Modulate determination of sleep score relative to a threshold
1616
Implement modifications to improve sleep score
1618
Perform Leveling
End

FIG. 16

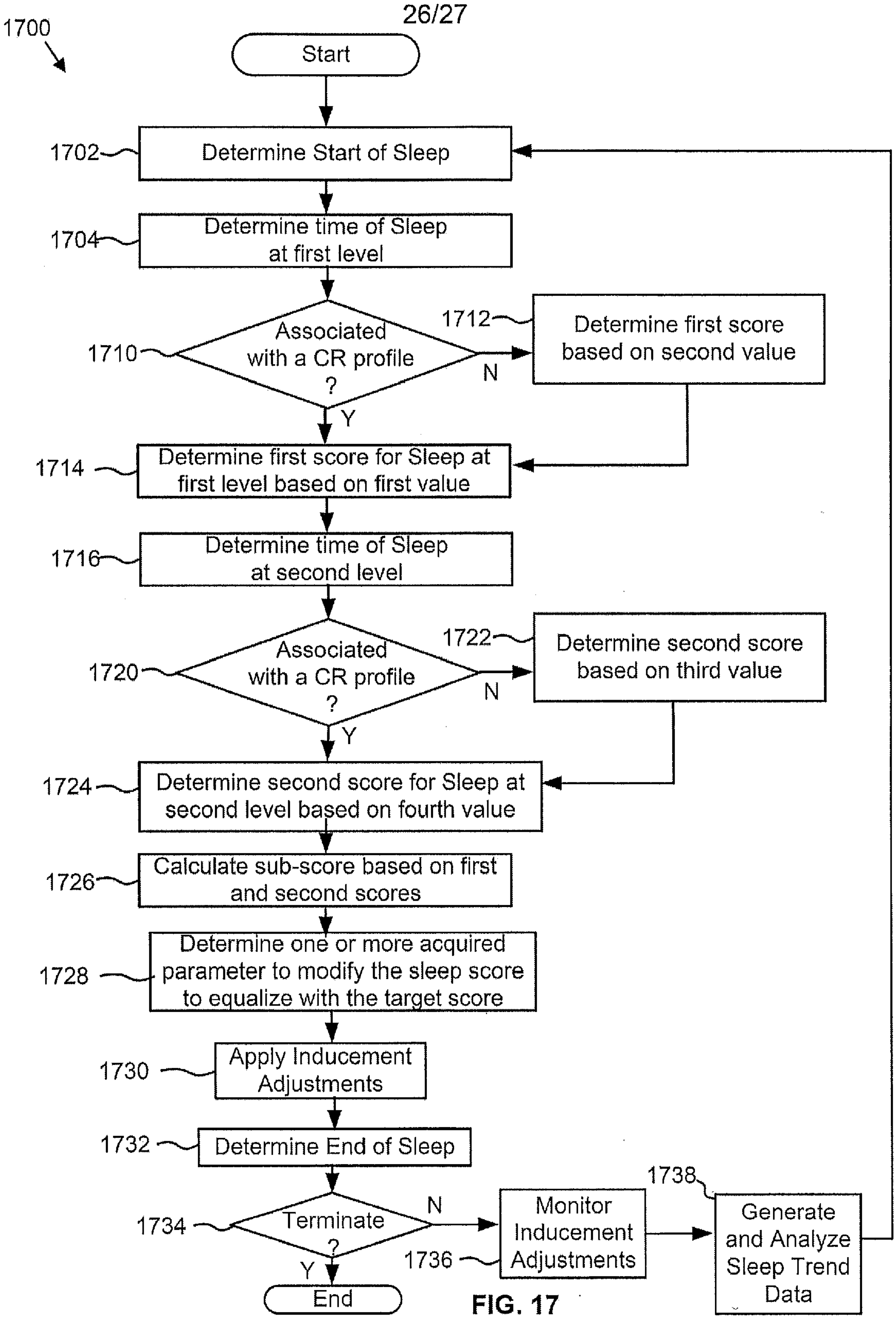

1700
Start
1702
Determine Start of Sleep
1704
Determine time of Sleep at first level
1710
Associated with a CR profile ?
1712
Determine first score based on second value
N
Y
1714
Determine first score for Sleep at first level based on first value
1716
Determine time of Sleep at second level
1720
Associated with a CR profile ?
1722
Determine second score based on third value
N
Y
1724
Determine second score for Sleep at second level based on fourth value
1726
Calculate sub-score based on first and second scores
1728
Determine one or more acquired parameter to modify the sleep score to equalize with the target score
1730
Apply Inducement Adjustments
1732
Determine End of Sleep
1734
Terminate ?
N
Y
End
1736
Monitor Inducement Adjustments
1738
Generate and Analyze Sleep Trend Data

FIG. 17

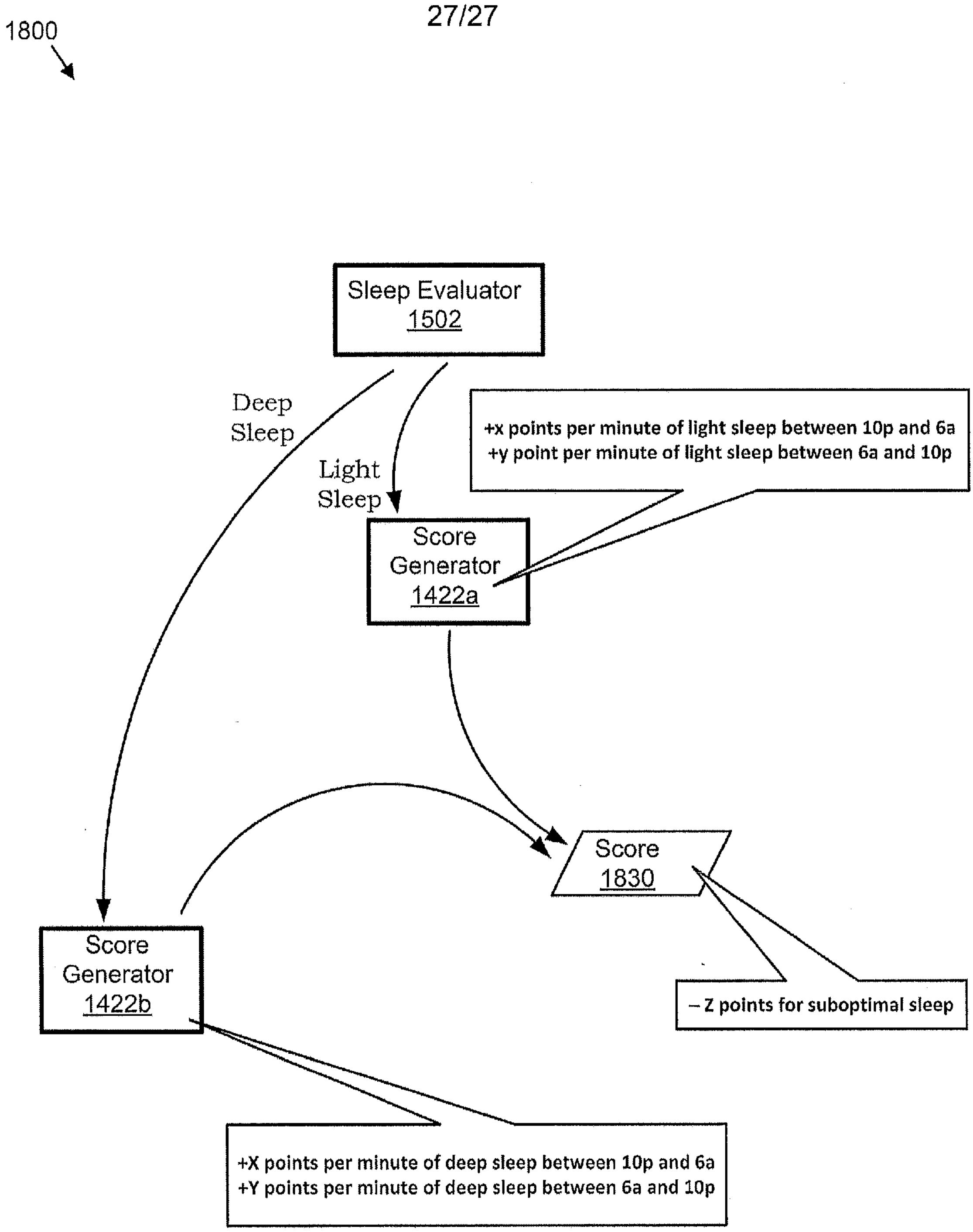

1800
Sleep Evaluator
1502
Deep
Sleep
Light
Sleep
+x points per minute of light sleep between 10p and 6a
+y point per minute of light sleep between 6a and 10p
Score
Generator
1422a
Score
1830
Score
Generator
1422b
– Z points for suboptimal sleep
+X points per minute of deep sleep between 10p and 6a
+Y points per minute of deep sleep between 6a and 10p

FIG. 18

patsnap

专利名称(译)	使用来自具有数据能力的频带的数据的健康应用的睡眠管理方法和装置		
公开(公告)号	EP2718082A2	公开(公告)日	2014-04-16
申请号	EP2012796656	申请日	2012-06-06
[标]申请(专利权)人(译)	艾利佛公司 绝对最大		
申请(专利权)人(译)	ALIPHCOM INC. 乱说，MAX		
当前申请(专利权)人(译)	ALIPHCOM INC. 乱说，MAX		
[标]发明人	UTTER II MAX EVERETT		
发明人	UTTER II, MAX EVERETT		
IPC分类号	B29C45/14 B29C45/76 A61B5/00		
CPC分类号	A61B5/0022 A61B5/02055 A61B5/02438 A61B5/0531 A61B5/1112 A61B5/1118 A61B5/14532 A61B5/14546 A61B5/4815 A61B5/681 A61B5/744 A61B2560/0242 G16H40/67		
代理机构(译)	JOHNSON，RICHARD ALAN		
优先权	61/495997 2011-06-11 US 61/495996 2011-06-11 US 13/433208 2012-03-28 US 13/158416 2011-06-11 US 13/181495 2011-07-12 US 61/495995 2011-06-11 US 61/495994 2011-06-11 US 13/181511 2011-07-12 US 13/361919 2012-01-30 US 13/158372 2011-06-10 US 13/180000 2011-07-11 US 13/180320 2011-07-11 US		
外部链接	Espacenet		

摘要(译)

睡眠管理技术和设备被配置为与具有数据能力的个人佩戴或携带设备一起使用。在一个实施例中，一种方法包括接收表示睡眠简档的数据，该睡眠简档定义了建立目标分数的参数，并且获取表示与睡眠活动相关的获取参数的数据。该方法还包括确定第一获取参数的第一分数，确定第二获取参数的第二分数，以及基于包括第一分数和第二分数的存储器中的数据在处理器计算睡眠分数。此外，该方法包括使得呈现睡眠分数的表示以指示达到目标分数或者从中获得偏差。