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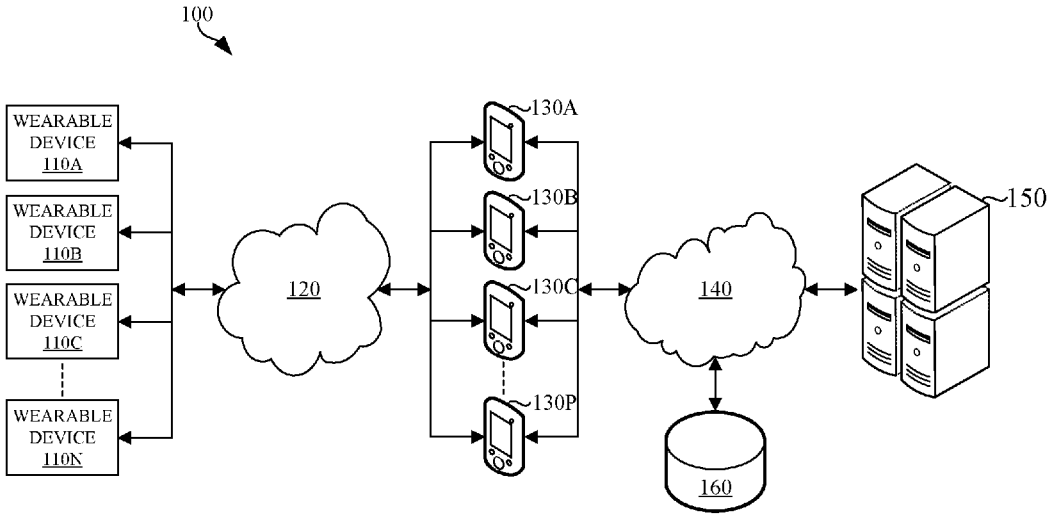

FIG. 1

(57) Abstract: A method of connecting users of wearable devices comprising, receiving signals from a plurality of sensors in the wearable devices to form a sensor data, generating plurality of performance metrics corresponding to plurality of users from the respective sensor data, comparing the performance metrics of the users to determine similar performances, connecting the users of the wearable devices exhibiting similar performance metrics when they are determined in vicinity, and connecting the users of the wearable devices with similar performance metrics on a social network platform otherwise. The method further comprises determining an activity from the sensor data collected over a first period of time and selecting a first set of sensor data for determining a first activity.

WO 2019/212413 A1

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A METHOD, SYSTEM AND APPARATUS FOR CONNECTING USERS OF WEARABLE DEVICES

FIELD OF INVENTION

[0001] Embodiments of the present disclosure relate generally to signal and data processing and more specifically to a method, system and apparatus for connecting users of wearable devices.

RELATED ART

[0002] Wearable device often refers to device that is attached to the human body to sense health parameters, physical movements, body conditions, environmental condition around, location, etc. Some wearable devices are employed with a display and other user interface mechanism to provide information, indication, alarm, and other sensory stimulations to user.

[0003] In some conventional applications, wearable devices are employed to monitor the health of the user and provide monitored information to the doctor for attention. In some other conventional application, the wearable devices provide information about day-to-day activities and guidance to users for maintaining their health like, calories burnt, total exercise time, reminders to preset activities, etc. Further, in some other conventional applications, wearable devices are connected to one or more mobile phones through wireless network such as Wi-Fi, Bluetooth, and to monitor the activities of the user. In some other conventional application, plurality of wearable devices is connected to a server and their data is being used for group monitoring like as in hospital for monitoring health of patients.

[0004] However, the above conventional systems do not establish a connection between the users through their respective smart wearables. Hence, there is a need for dynamically establishing a connection between one user of the network to one or more users, when they are in the range or vicinity. Further, the dynamic connection between the users establishes a network which is based on one or more parameters measured on the wearable device.

SUMMARY

[0005] According to an aspect of the present disclosure, a method of connecting users of wearable devices comprising, receiving signals from a plurality of sensors in the wearable devices to form a sensor data, generating plurality of performance metrics corresponding to plurality of users from the respective sensor data, comparing the performance metrics of the users to determine similar performances, connecting the users of the wearable devices exhibiting similar performance metrics when they are determined in vicinity, and connecting the users of the wearable devices with similar performance metrics on a social network

platform otherwise. The method further comprises determining an activity from the sensor data collected over a first period of time and selecting a first set of sensor data for determining a first activity.

[0006] Several aspects are described below, with reference to diagrams. It should be understood that numerous specific details, relationships, and methods are set forth to provide a full understanding of the present disclosure. One who skilled in the relevant art, however, will readily recognize that the present disclosure can be practiced without one or more of the specific details, or with other methods, etc. In other instances, well-known structures or operations are not shown in detail to avoid obscuring the features of the present disclosure.

BRIEF DESCRIPTION OF DRAWINGS

[0007] FIG. 1 is a block diagram of a system connecting the users of wearable devices in an embodiment.

[0008] FIG.2 is a block diagram of an example wearable device in an embodiment.

[0009] FIG. 3 is a block diagram illustrating example metrics in one embodiment.

[0010] FIG. 4 is block diagram illustrating the manner in which the set of wearable devices are connected in an embodiment.

[0011] FIG. 5 is a block diagram illustrating the manner in which the data from the sensors are attributed to performance metrics.

[0012] FIG. 6 is example activity tables in an embodiment.

[0013] FIG. 7A is graphical representation of the set of wearable devices in the system.

[0014] FIG. 7B is the block diagram illustrating an example sequence of operation in the system.

[0015] FIG. 8 illustrates example matching of performance metric in an embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EXAMPLES

[0016] FIG. 1 is a block diagram of a system connecting the users of wearable devices in an embodiment. The system 100 is shown comprising wearable devices 110A-110N, a first network 120, mobile phones 130A-130P, a second network 140, a server cluster 150, and central data storage 160. Each element is described in further detail below.

[0017] The first network 120 provides short distance communication channels to establish one-to-one, one-to-many and many-to-one connection between the wearable devices 110A-110N and the mobile phones 130A-130P. The first network 120 may be one of, but not limited to Bluetooth network, Wi-Fi network, nearfield communication channels. The mobile phone 130A-130P connects to one or more wearable devices through network 120. The mobile phone/device 130A-130P may perform preliminary signal processing of the data provided by

the wearable devices 110A-110N before transferring the data to server cluster 150. Mobile devices 130A-130P may provide a user interface to control and monitor the wearable devices and the data reports. Mobile devices 130A-130P may monitor and maintain the status of all the connected wearable devices 110A-110N, and further initialize them to perform one or more actions. The mobile devices 130A-130P are configured with mobile applications (not shown) that receive data/inputs from the wearable devices 110A-110N. Also, the mobile application sends appropriate data to the wearable device. The mobile application is also configured to appropriately display the data received from the server cluster 150.

[0018] The second network 140 provides long distance communication channels to establish one-to-one, one-to-many and many-to-one connection among the mobile devices, the server cluster 150 and the central data storage 160. The second network 140 may comprise the GSM, CDMA, satellite communication long distance RF communication network, 4G, 5G communication networks and other advanced long distance and cellular communication networks for example.

[0019] The server cluster 150 operates to provide various functionalities to the system 100. In that, the server cluster 150 may be configured to interact with the mobile devices 130A-130P and also with wearable devices 110A-110N over communication network 140 and 120. The server cluster 150 may comprise plurality of server processors deployed at different locations and connected together by means of a dedicated connectivity, Local Area Network (LAN), Wide Area Network (WAN) etc. The server cluster 150 operates as applications server running multiple application to provide one or more desired functionalities.

[0020] The central data storage 160 stores all the data provided by the wearable devices 110A-110N, mobile phones 130A-130P and the server cluster 150. The central data storage 160 may archive the data and maintain the reports and other results of the processing performed at the server cluster 150, mobile device 130A-130P and wearable devices 110A-110N for further processing and/or for retrieval on request/query. The central data storage 160 may be deployed at different locations and capable of collecting the data from the wearable devices 110A-110N, mobile devices, and server cluster 150. Further, a local database (a local storage unit) may be deployed in the wearable devices 110A-110N and mobile phones 130A-130P. The local database in capable of storing the data temporarily for a period, and further shares the data with central data storage 160 and updates the associated data tables (for example, data synchronization between one or more connected devices).

[0021] The wearable device 110A-110N collects numerous data, information through various sensors, process the information and output the processed information in the form of text,

picture media, light, sound, and vibration. The wearable device is attached to the person so as to measure, collect and capture several body parameters, health parameters and movements. In one embodiment, one or more wearable units may be attached to different parts of the body to measure localized conditions. In that, all the wearable units that are attached to one person may be combined to operate as one wearable device. The wearable device 110A-110N provides the measurement, or the processed data on the network 120. Each wearable device may have a unique identification number (UID) or serial number to recognize and appropriately segregate the data.

[0022] FIG. 2 is a block diagram of an example wearable device 200 in an embodiment. The wearable device 200 is shown comprising health monitoring sensors 210A-210K, position sensors 220A-220P, inertial navigation sensors 230A-230J, input/output (I/O) devices 240A-240N, processor 250, memory 260, wireless transceiver 270, a temperature sensor 280 and wearing mechanism 290. Each element is described in further detail below.

[0023] The wearing mechanism 290 enables the wearable device 200 to be conveniently attached to the body such that the elements 210A-210K, 220A-220P, 230A-230J, 240A-240N, 250, 260, 270, and 280 may perform its desired operation effectively. In one embodiment, the wearing mechanism 290 may comprise a flexible belt with a fastener such as fulcrum, hook etc. alternately the wearing mechanism 290 may comprise hook, pin that may be attached to the garments such that the elements (sensor modules) make desired contact with the body of the user.

[0024] The health monitoring sensors 210A-210K sense signals representing the health and body conditions. The health monitoring sensors 210A-210K may comprise in vivo sensors or external sensors. The health monitoring sensors 210A-210K may comprise, blood pressure sensors, blood sugar sensors or glucometer, heart beat sensor, ECG sensor, Oximeters, EMG sensor, pressure sensors, body temperature sensor, each sensing the corresponding variations/signals on the body and provide the data representing the corresponding health parameters. The sensors may be deployed integrated to one casing or may be deployed separately as independent unit and connected to the processor through wire communication or wireless communication as in wireless body sensor network.

[0025] The position sensors 220A-220P detects and provides the geographically referenced position of the sensor. The position sensors 220A-220P may comprise, geographical position system (GPS) sensor that track GPS satellites, GLONASS position sensor that track GLONASS satellites, inertial navigation sensor that determine the position based from the

measured accelerometer, magnetic direction and gyro sensors, Galileo position sensor and IRNSS sensor that track different satellite systems to determine position, speed, acceleration.

[0026] The inertial navigation sensors (INS) 230A-230J sense and generate the acceleration, tilt, direction information and compute position of the wearable device. In one embodiment, the INS may determine may take reference position from the position sensor. Alternatively, the INS may provide acceleration, speed, direction, tilt, jerk information along with the position information.

[0027] The input/output (I/O) devices 240A-240N comprise, touch screen, display device, speaker, control buttons, light emitting diodes to provide information to the user and to receive input from the user of the wearable device. The processor 250 controls and processes the signal received elements 210-240 and 260 and 270. In one embodiment, the processor performs operations in entirety or partially to connect the wearable device to another wearable device based on the predetermined condition. The processor 250 may execute set of instructions to perform desired operation of connecting one or more smart wearable devices which are in range. The memory 260 stores the data received from the elements 210-250 and 270 for retrieval and processing.

[0028] The wireless transceiver 270 provides connectivity on the first network 120. The wireless transceiver 270 may employ one or more suitable protocols to provide connectivity on the Bluetooth, Wi-Fi, and other short distance communication standards. The transceiver 270 may employ protocol stacks or dynamically adapt the protocol stack by detecting the available channels on the network 120.

[0029] The temperature sensor 280 senses the body temperature and provides the body temperature as one of the health parameter to the processor 250.The sensors of the wearable device 200 are capable of monitoring one or more activities of the user. The activities that include, but not limited to, walking, running, jogging, driving, swimming. Further, the sensors also record the activity parameters relating to each activity. For example, the activity parameters for running that include, but not limited to step count, speed (pace), distance travelled, whether the user is regular or irregular (consistency), heart-beat. The system analyzes the activities performed by the user in any manner (either regular or irregular) and measure or predicts the performance-oriented metrics for one activity. In the similar fashion, the system determines performance-oriented metrics for other user activities. In an embodiment, the system measures an overall performance metrics of the user relating to all user activities, combining performance-oriented metrics of one or more activities.

Accordingly, example performance metrics and the manner in which performance metrics are generated in an embodiment are further described below.

[0030] FIG. 3 is a block diagram illustrating example metrics in one embodiment. The metrics 300 is shown comprising the pedometer data 310, altitude data 320, blood pressure 330, heart beat 340, geographical data 350, accelerometer data 360, blood sugar data 370, profile data 380 and the preference data 390. Each element is described in further detail below.

[0031] The pedometer data 310 represents the steps measured on the pedometer sensor over a time period. As shown there the data 310A represents the number of steps vs. time, the data 310B represents the step frequency for example. Similarly, the pedometer data 310 may comprise other data representing step size, step count, steps acceleration etc. The altitude data 320 represents the altitude measured on the inertial navigation sensor and/or geographical position system (GPS) over a time period. As shown there the data 320A represents the altitude vs. time.

[0032] The blood pressure 330 represents the blood pressure measured on the blood pressure sensor over a time period. As shown there the data 330A represents the number of blood pressure in millimeter of mercury (mmHg) vs. time. The data 330A may represent the systolic and/or diastolic measurements. The heart beat 340, represents the heart beat measured on the heart beat sensor over a time period. As shown there the data 340A represents the number of heart beat vs. minute. In one embodiment, the heart beat 340 may be measured by ECG unit, thereby representing other heart information in addition to the heart beat alone. As may be seen the heart rate is shown increasing from 68 beats per minute to 100 beats per minute in 3 minutes and remaining substantially constant thereafter for 20 minutes.

[0033] The geographical data 350 represents sequence of latitude, longitude and altitude measured on the GPS sensor and/or INS sensors over a time period. As shown there the data 350A represents the measured latitude and longitude located on a reference map 350B. Accordingly, the geographical data 350 may comprise both measured position information 350A and the reference map 350B. In another embodiment, the altitude may be represented on a 3-dimensional map and/or on a separate chart with respect to time (as in 320A).

[0034] The accelerometer data 360, represents acceleration measured on the accelerometer (part of INS sensors) and/or as computed by GPS sensor over a time period. As shown there the data 360A represents the measured acceleration over a time period. Further, the accelerometer data 360 may comprise the speed, velocity (direction of the movement) jerk

points, for example. The data 360B illustrates a constant speed, the data 360C represents the jerks (pulses) representing sudden movements like taking steps etc.

[0035] The blood sugar data 370 represents the blood sugar (or glucose) level measured on the glucose sensor over a time period. As shown there the data 370A represents the glucose level in real time (measure at time instances). As shown there the data 370 is shown reducing from a value 108 to 85 in 20 Minutes. Further, the blood sugar data 370A may also comprise the insulin level in the blood.

[0036] The profile data 380 represents the set of information collected on I/O devices. For example, as shown there the profile data may comprise, user name 380A, user age 380B, user gender 380C, address 380D, received through the I/O device during initialization or an account creation. Further, the profile data 380 may also comprise other information received through I/O device in time to time for example, prompts made on the output devices like display device.

[0037] The preference data 390 represents the set of information collected on I/O devices in respect of choices. For example, the preference data may comprise, food type 390A, hobbies 390B, sports 390C, interests 390D. Each data may carry different values. For example, data 390A may take value 1 to represent a vegetarian food and value 2 to represent non-vegetarian food etc. Similarly, data 390B may take value 1 to represent hobby reading, 2 to represent travelling etc. The metric 300 is stored in the data base or in memory as sequence of digital values in table and array. Alternately the metric 300 may be distributed and stored in the mobile device, and wearable device.

[0038] FIG. 4 is block diagram illustrating the manner in which the set of wearable devices are connected in an embodiment. In block 410, the system 100 generates performance metrics from the sensor data. In block 420, the system 100 compares the performance metrics to determine similar performance metrics. In block 430, the system 100 checks if the wearable devices with similar performance metrics are within the vicinity. If the check results yes, control passes to block 440, the control passes to block 450 otherwise. In block 440, the system 100 connects the wearable devices 110A-110N with similar performance metrics. In block 450, system 100 connects the wearable devices with similar performance metric on a social network platform. In one embodiment, similar performance metrics (behavior) comprise at least one of similar physical activity, similar health profile, age, etc.

[0039] FIG. 5 is a block diagram illustrating the manner in which the data from the sensors are attributed to a performance metrics. The embodiment is described with respect to performance metric that represent physical activity for illustration. In block 510, the system

100 receives performance metrics 300. In block 520, the system 100 selects the first set of data for determining the activity. In one embodiment, the system 100 may select pedometer data 310, altitude data 320, blood pressure 330, heart beat 340, geographical data 350, and accelerometer data 360 for determining the activity. In block 530, the system 100 determines an activity from the data for a predefined period of time. For example, the system 100 may iteratively parse the activity table and select the activity having data set matching to the data received from the sensor (400).

[0040] FIG. 6 is example activity tables in an embodiment. As shown there each table 601 through 604 corresponds to one of user activity. In table, first column comprises the selected set of data (or sensors involved in the operation) and the second column comprises the value range of the corresponding data. Accordingly, when the data from the sensor matches the data in one of the table 601 through 604, the system 100 attributes the corresponding activity of the table to the activity performed by the user.

[0041] For example, activity walking (601) table comprises the pedometer data, accelerometer data, and position data on the first column and the corresponding value range in the second column. As may be appreciated, when the received pedometer measurement is in the range of 30-50 steps per minute, the accelerometer measurement indicates a speed in the range of 2KM to 5KM per hour, and position data falls on a path in the reference map, the system 100 attributes the activity as walking.

[0042] As an alternative example, activity running (602) table comprises the pedometer data, accelerometer data, and position data on the first column and the corresponding value range in the second column. As may be appreciated, when the received pedometer measurement is in the range of 50-100 steps per minute, the accelerometer measurement indicates a speed in the range of 5.1KM to 10KM per hour, and position data falls on a path in the reference map, the system 100 attributes the activity as running.

[0043] As a further alternative example, activity treadmill (603) table comprises the pedometer data, accelerometer data, and position data on the first column and the corresponding value range in the second column. As may be appreciated, when the received pedometer measurement is in the range of 30-100 steps per minute, the accelerometer measurement indicates a speed that is substantially zero and position data indicate a fixed point, the system 100 attributes the activity as tread mill.

[0044] As a further alternative example, activity cycling (604) table comprises the pedometer data, accelerometer data, position data, and heartbeat, on the first column and the corresponding value range in the second column. As may be appreciated, when the received

pedometer measurement is substantially zero, the accelerometer measurement indicates a speed in the range of 5.1KM to 15KM per hour, position data falls on a path in the reference map, and the heart beat is in the range of 90 -120, the system 100 attributes the activity as cycling. Similarly, the received data may be matched iteratively to determine the activity. The tables 501-505 may be stored in the database or memory for comparison and parsing. Accordingly, the system 100 converts sensor measurements into one or more performance metrics like physical activity, health condition, age, interests, hobbies etc. Further, each performance metrics may be compared to generate a performance rank to user of the wearable device. For example, the performance rank of a user with running speed of 10KM per hour is ranked higher than the user with running speed of 9KM per hour. Accordingly, the performance rank may be assigned and stored in the profile data 380.

[0045] In one embodiment, the blocks 310-350, blocks 510-530 and metric 300 are deployed on the server cluster 150. In an alternative embodiment, the blocks 310-350 and block 510-530 may be entirely or in parts deployed selectively on the wearable device110A-N, mobile phones130A-K and server cluster 150 to share overall processing power and memory of the system 100.

[0046] The manner in which the system 100 operates to connect user of the wearable devices is further illustrated with reference to FIG. 7A and 7B. FIG. 7A is graphical representation of the set of wearable devices 710-770 in the system. FIG. 7B is the block diagram illustrating an example sequence of operation 791-797 in the system 100. The example sequence of operations 791-797may be initiated at the mobile phone, device 710, at the server cluster 150 and/or combination as relevant to the operation and a person of the relevant skill reading this disclosure shall be able to suitably select the element to deploy the sequence operation.

[0047] In block 791, the system 100 scans and senses the location of nearby devices 720-770 through device 710. The scanning may be performed for Bluetooth devices in the network 120 with predetermined protocol to recognize and respond to each other. In block 792, the system 100 collects and receives ID's of the set of devices 720-770 on the device 710. In block 793, the system 100 (e.g. device 710) sends the received device IDs (720-770) to server cluster 150 through the mobile device 130. In block 794, the system 100 retrieves the profiles and performance metric 300 of each device 710-770.

[0048] In block 795, the system analyzes the retrieved metric 300 of the devices 710-770 for matching performance metrics and the preferences. A match is determined to be made when at least the activity is matched, or when the performance rank is of same value. FIG. 8 illustrates example matching of performance metric in an embodiment. As shown there, the

columns 891 illustrates the parameters considered for analysis and matching, 892 represents values for a first user, 893 represents values of a of second user, 894 represents weightage attached as a process of matching, and 895 represents the priority assigned to each parameter in matching. The rows 861-871 represents the parameters (activity detected, the sensor data & preference data) employed for analysis and matching in an embodiment. For example, the row 861 represents the activity detected in accordance with the FIG. 6. Row 862-869 represents the measurements and readings determined from the sensors 210A-210K, 220A-220P, 230A-230J, and 280 for example. The rows 870 and 871 represents the profile data received from the I/O devices 240A-240N for example.

[0049] As may be appreciated, the system 100 determines the 100% match in the activity of user 1 and user 2, and location of the activity. Accordingly assigns a weightage 100% to the respective parameters on row 862 and 866. Similarly, the system determines a 70% match with respect to parameters time of activity, pattern, pace and assigns a weightage 70% on rows 863, 867, and 869. In a similar way, the weightage is assigned to the other parameters as illustrated.

[0050] In one embodiment, the system 100 determines the match is made when weightage of at least three parameters is greater than 70%. In another embodiment, the system 100 may select top four priority parameters (activity, calories, distance covered, heart rate, pace of user, geographical location) and determine the match is made if the weightage is greater than 60%. Similarly, different thresholds and priority may be selected to make the match based.

[0051] Continuing further with reference to FIG.7, in block 796, the system 100 sends the performance metrics of the matching devices to the mobile device connected to the device 710. In block 797, the system (mobile device and the wearable device) shows the list of the devices (for example 740, 750, 770) with the respective metrics. In one embodiment, the matching devices 740, 750, 770 may also display the device ID of the matching metrics. In operation, user wears one of the wearable devices 710 at least in the form of a band, a watch, thus gets connected to another person wearing device 740, 750, and 770.

[0052] The wearable device is paired or connected with at least one of first mobile phone through the first communication network that may be a Bluetooth communication network for example. Further, the wearable device may operate as a peripheral device to the mobile phone that operates as master to wearable device. In that, the mobile phone connects to all wearable devices in a range of the first network. The mobile phone may display a list of all nearby (wearable devices) in the vicinity. Alternatively, the wearable device may act as a master device and connect to other wearable devices and the mobile phones. The mobile

phones/wearable device as may be the case is connected to the server cluster 150 through the second communication network.

[0053] While various embodiments of the present disclosure have been described above, it should be understood that they have been presented by way of example only, and not limitation. Thus, the breadth and scope of the present disclosure should not be limited by any of the above-discussed embodiments but should be defined only in accordance with the following claims and their equivalents.

CLAIMS

We Claim,

1. A method of connecting users of wearable devices comprising:
   receiving signals from a plurality of sensors in the wearable devices to form a sensor data;
   generating plurality of performance metrics corresponding to plurality of users from the respective sensor data;
   comparing the performance metrics of the users to determine similar performances;
   connecting the users of the wearable devices exhibiting similar performance metrics when they are determined in vicinity; and
   connecting the users of the wearable devices with similar performance metrics on a social network platform otherwise.
2. The method of claim 1, further comprising determining an activity from the sensor data collected over a first period of time and selecting a first set of sensor data for determining a first activity.
3. The method of claim 2, further comprising:
   scanning and sensing location of wearable devices in the first network;
   collecting UID (user identification) of a first set of wearable devices that are within a first geographical location;
   retrieving a profile and the performance metric of each wearable device in the first set of wearable devices; and
   sending the performance metrics of that matches to the first set wearable devices.
4. The method of claim 3, further comprising determining a physical activity from at least two sensors data, wherein the sensor data comprising at least one of a pedometer data, altitude data, blood pressure, heart beat geographical data, accelerometer data, blood sugar data, user profile data, and preference data.
5. The method of claim 4, further comprising:
   determining first physical activity as “walking” when the pedometer data is in the range of 30-50 counts, the accelerometer data is in the range of 2-4KM/Hrs, and geographical data indicate a path;
   determining first physical activity as “running” when the pedometer data is in the range of 51-100 counts, the accelerometer data is in the range of 5.1-10KM/Hrs, and geographical data indicate a path on the referenced map;

determining first physical activity as "Cycling" when the pedometer data is substantially zero, the accelerometer data is in the range of 5.1-15KM/Hrs, geographical data indicate a path on the referenced map and the heart beat is in the range of 90-120 counts /Min; and

determining first physical activity as "Treadmill" when the pedometer data is in the range of 30-100 counts, the accelerometer data is substantially zero, and geographical data indicate a path on the referenced map.

6. The method of claim 5, further comprising:

forming an activity profile from the sensors data measured during the activity and the preference data;

ranking each profile data in respect of another user profile data; and

connecting the users to another user based on the profile data and the rank.

7. The method of claim 6, wherein the activity profile is "running activity" and comprises the data of calorie burnt, time of activity, distance covered, heart rate, pattern of the activity, activity history, pace and age, and the preference data comprises the food type, hobbies, sports and interests.

8. The method of claim 7, further comprising assigning a weightage to each data in the activity profile based on the closeness of a match measured on a pre-set scale for each data and connecting user when the weightage is greater than a threshold value for at least three data.

9. The method of claim 7, further comprising assigning a priority to each data in the activity and connecting user when a top three priority data has weightage greater than the threshold value.

10. A method, system and apparatus providing one or more features as described in the paragraphs of this specification.

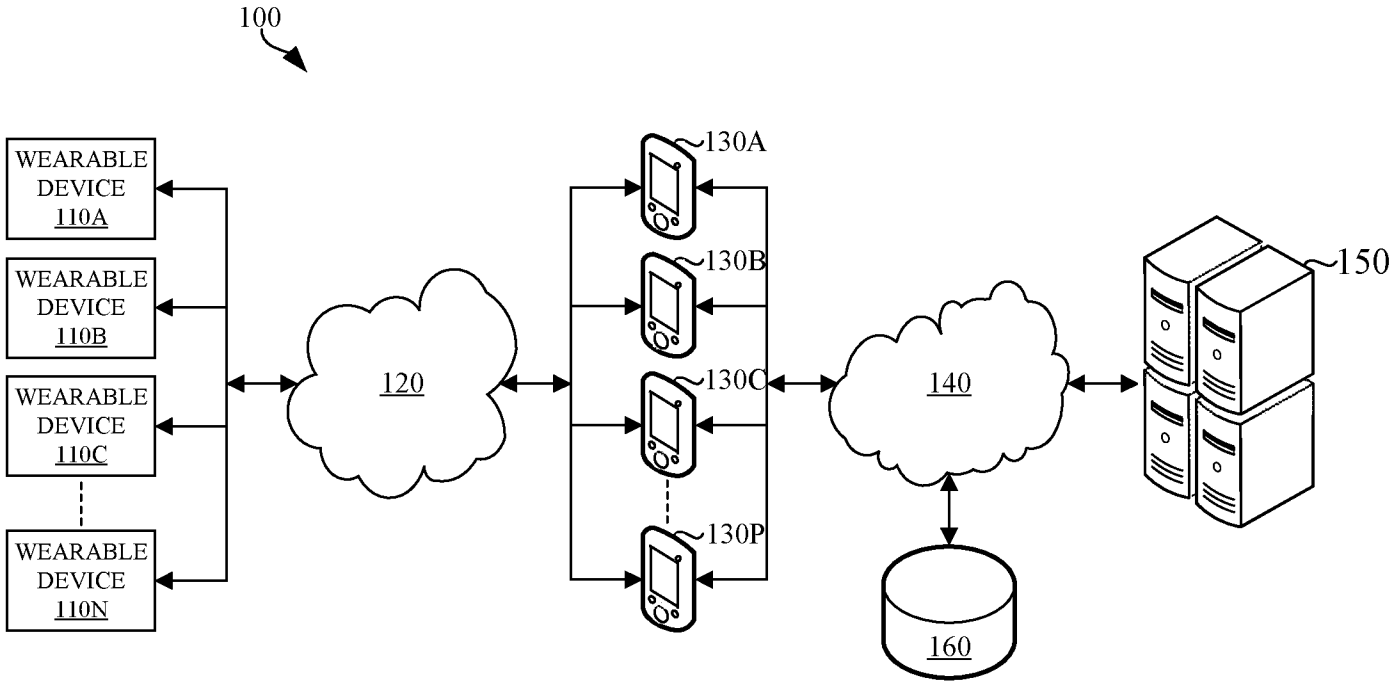
100
WEARABLE DEVICE 110A
WEARABLE DEVICE 110B
WEARABLE DEVICE 110C
WEARABLE DEVICE 110N
120
130A
130B
130C
130P
140
150
160

FIG. 1

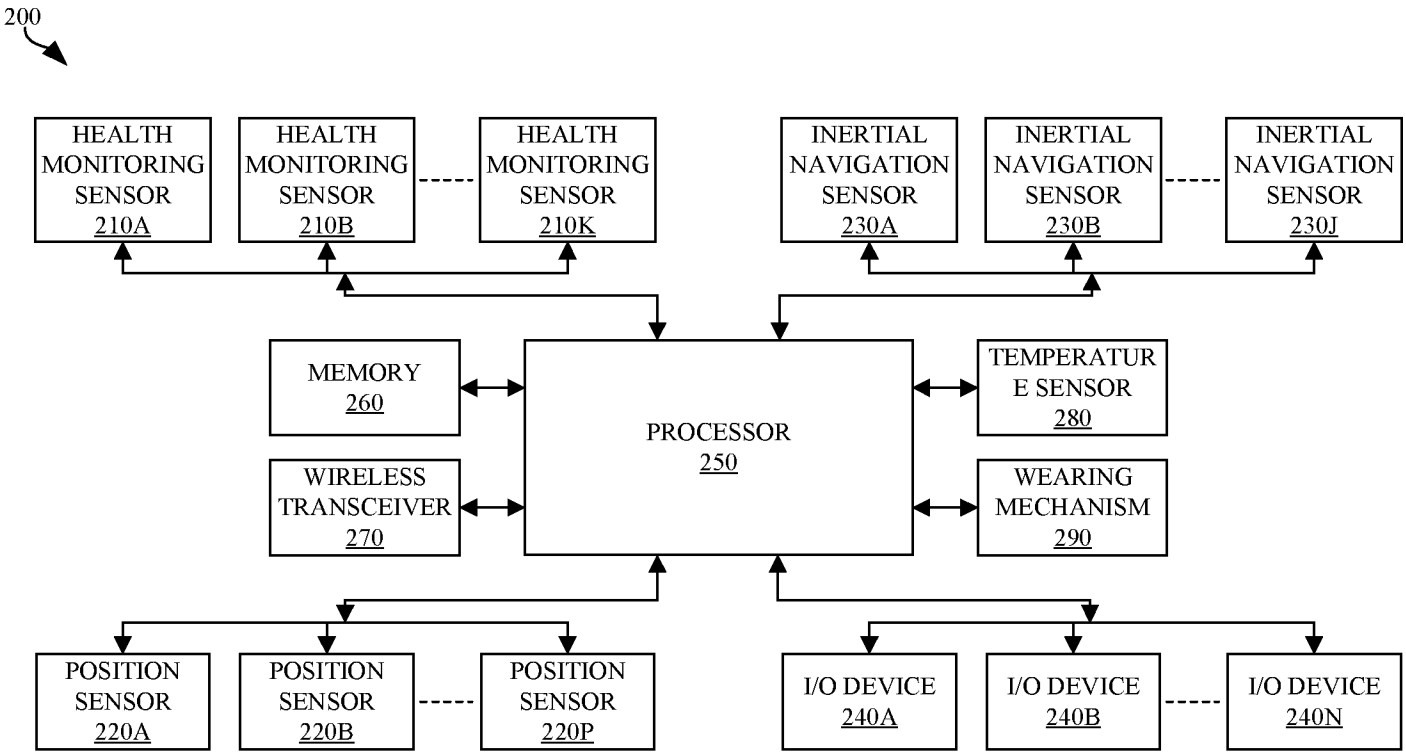
200
HEALTH MONITORING SENSOR 210A
HEALTH MONITORING SENSOR 210B
HEALTH MONITORING SENSOR 210K
INERTIAL NAVIGATION SENSOR 230A
INERTIAL NAVIGATION SENSOR 230B
INERTIAL NAVIGATION SENSOR 230J
MEMORY 260
PROCESSOR 250
TEMPERATURE SENSOR 280
WIRELESS TRANSCEIVER 270
WEARING MECHANISM 290
POSITION SENSOR 220A
POSITION SENSOR 220B
POSITION SENSOR 220P
I/O DEVICE 240A
I/O DEVICE 240B
I/O DEVICE 240N

FIG. 2

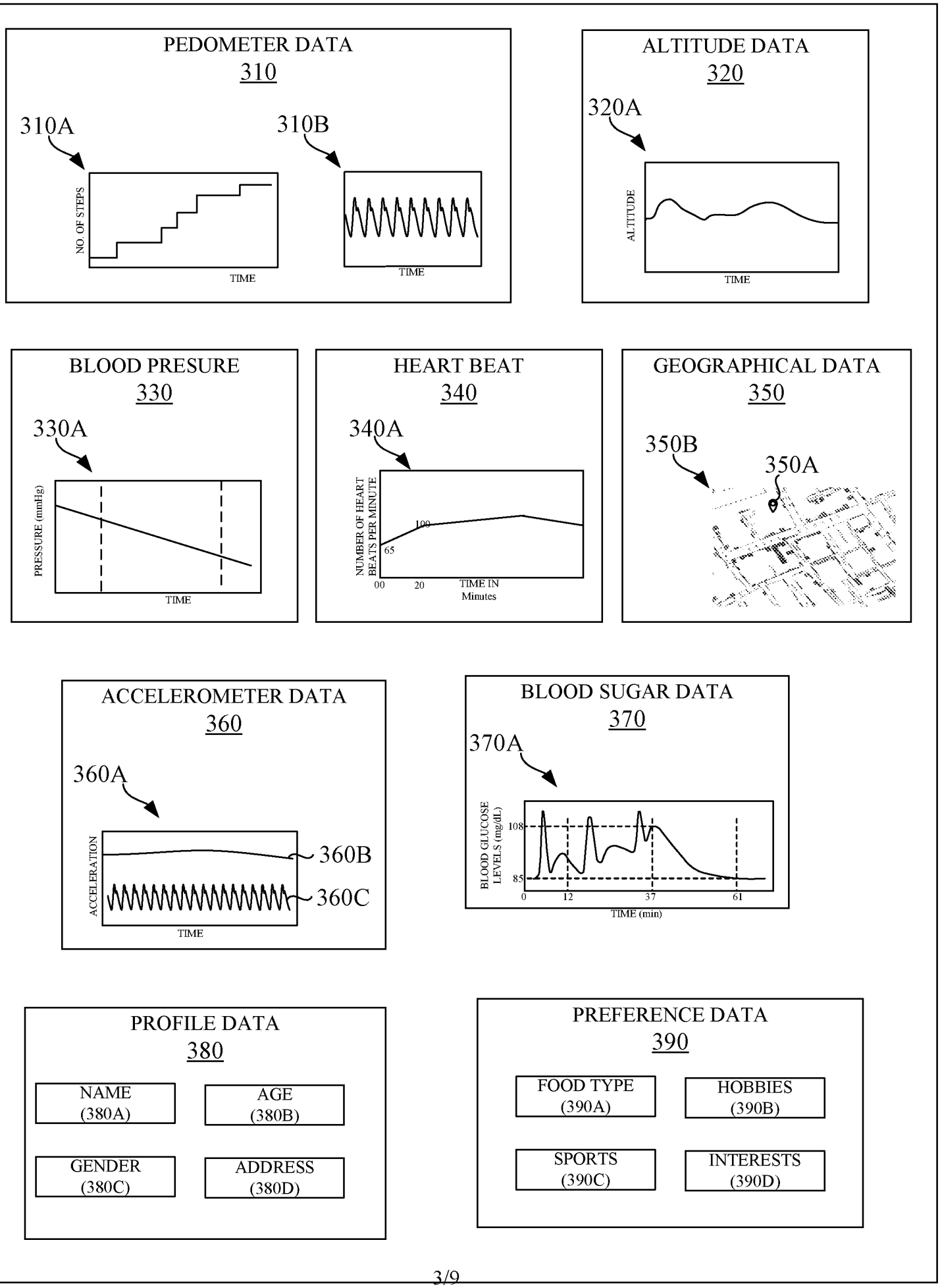
PEDOMETER DATA
310
310A
310B
NO. OF STEPS
TIME
TIME
ALTITUDE DATA
320
320A
ALTITUDE
TIME
BLOOD PRESURE
330
330A
PRESSURE (mmHg)
TIME
HEART BEAT
340
340A
NUMBER OF HEART BEATS PER MINUTE
109
65
00
20
TIME IN Minutes
GEOGRAPHICAL DATA
350
350B
350A
ACCELEROMETER DATA
360
360A
ACCELERATION
360B
360C
TIME
BLOOD SUGAR DATA
370
370A
BLOOD GLUCOSE LEVELS (mg/dL)
108
85
0
12
37
61
TIME (min)
PROFILE DATA
380
NAME (380A)
AGE (380B)
GENDER (380C)
ADDRESS (380D)
PREFERENCE DATA
390
FOOD TYPE (390A)
HOBBIES (390B)
SPORTS (390C)
INTERESTS (390D)

FIG. 3

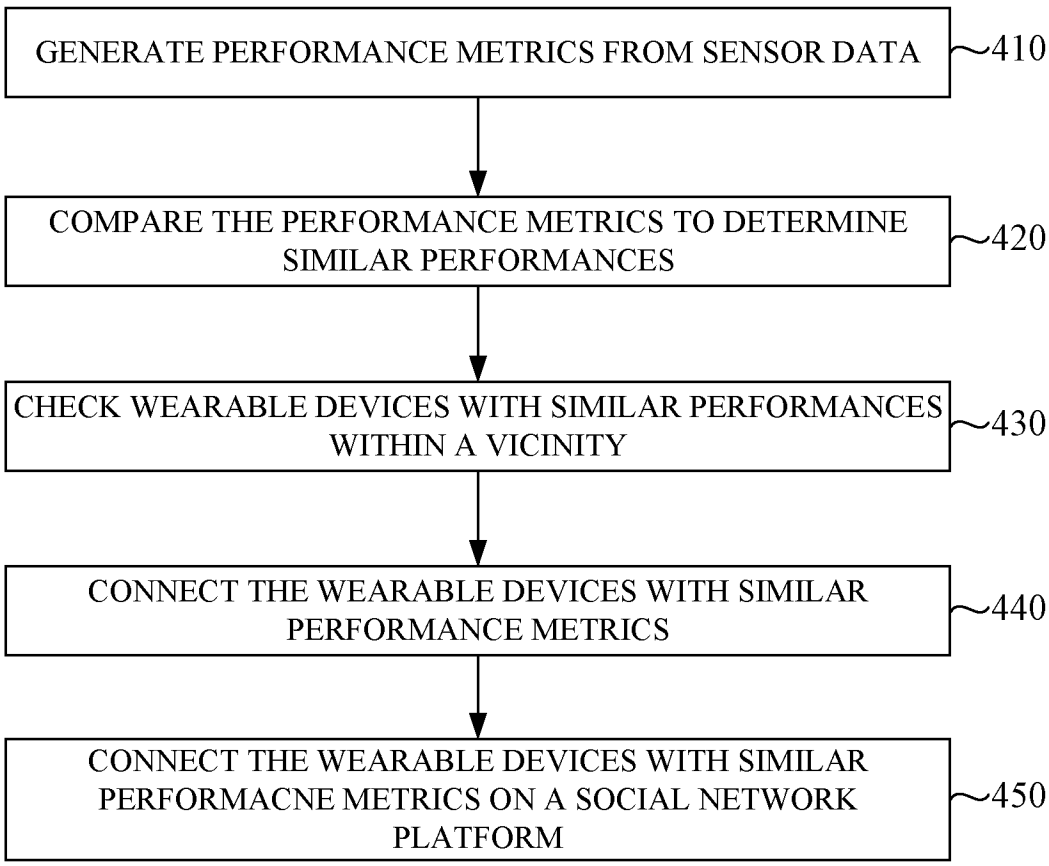
GENERATE PERFORMANCE METRICS FROM SENSOR DATA
410
COMPARE THE PERFORMANCE METRICS TO DETERMINE SIMILAR PERFORMANCES
420
CHECK WEARABLE DEVICES WITH SIMILAR PERFORMANCES WITHIN A VICINITY
430
CONNECT THE WEARABLE DEVICES WITH SIMILAR PERFORMANCE METRICS
440
CONNECT THE WEARABLE DEVICES WITH SIMILAR PERFORMACNE METRICS ON A SOCIAL NETWORK PLATFORM
450

FIG. 4

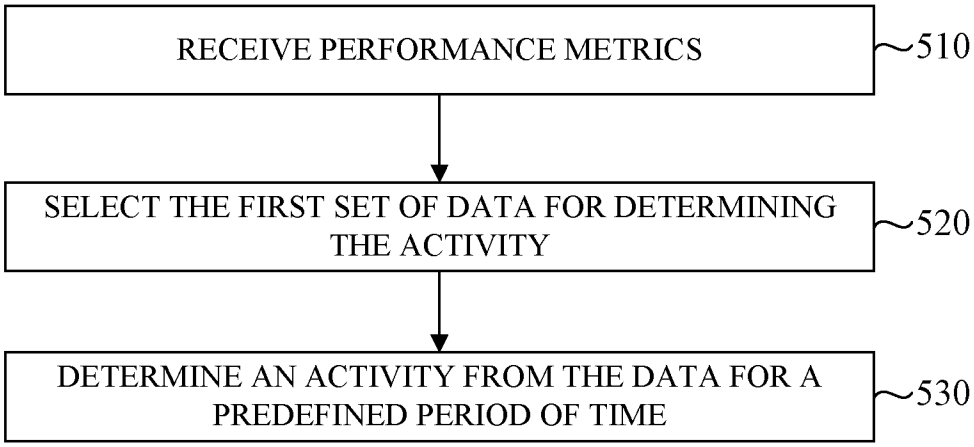
RECEIVE PERFORMANCE METRICS
510
SELECT THE FIRST SET OF DATA FOR DETERMINING THE ACTIVITY
520
DETERMINE AN ACTIVITY FROM THE DATA FOR A PREDEFINED PERIOD OF TIME
530

FIG. 5

601

ACTIVITY WALKING	
PEDOMETER	30-50
ACCELEROMETER	2KM TO 5KM
POSITION	PATH

602

ACTIVITY RUNNING	
PEDOMETER	51-100
ACCELEROMETER	5.1KM TO10KM
POSITION	PATH

603

ACTIVITY TREADMILL	
PEDOMETER	30-100
ACCELEROMETER	00
POSITION	POINT

604

ACTIVITY CYCLING	
PEDOMETER	00
ACCELEROMETER	5.1KM to 15KM
POSITION	PATH
HEART BEAT	90-120

FIG. 6

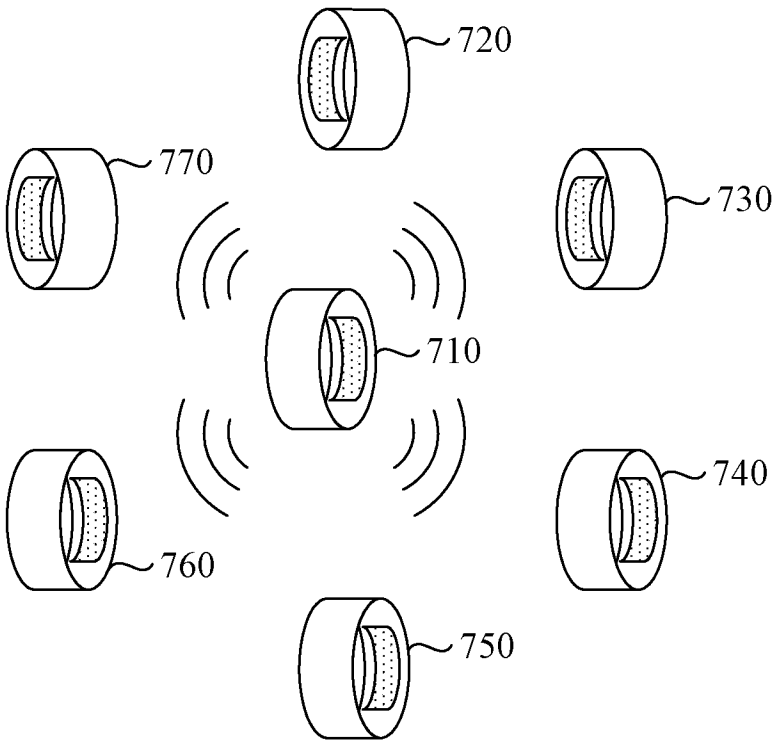

FIG. 7A

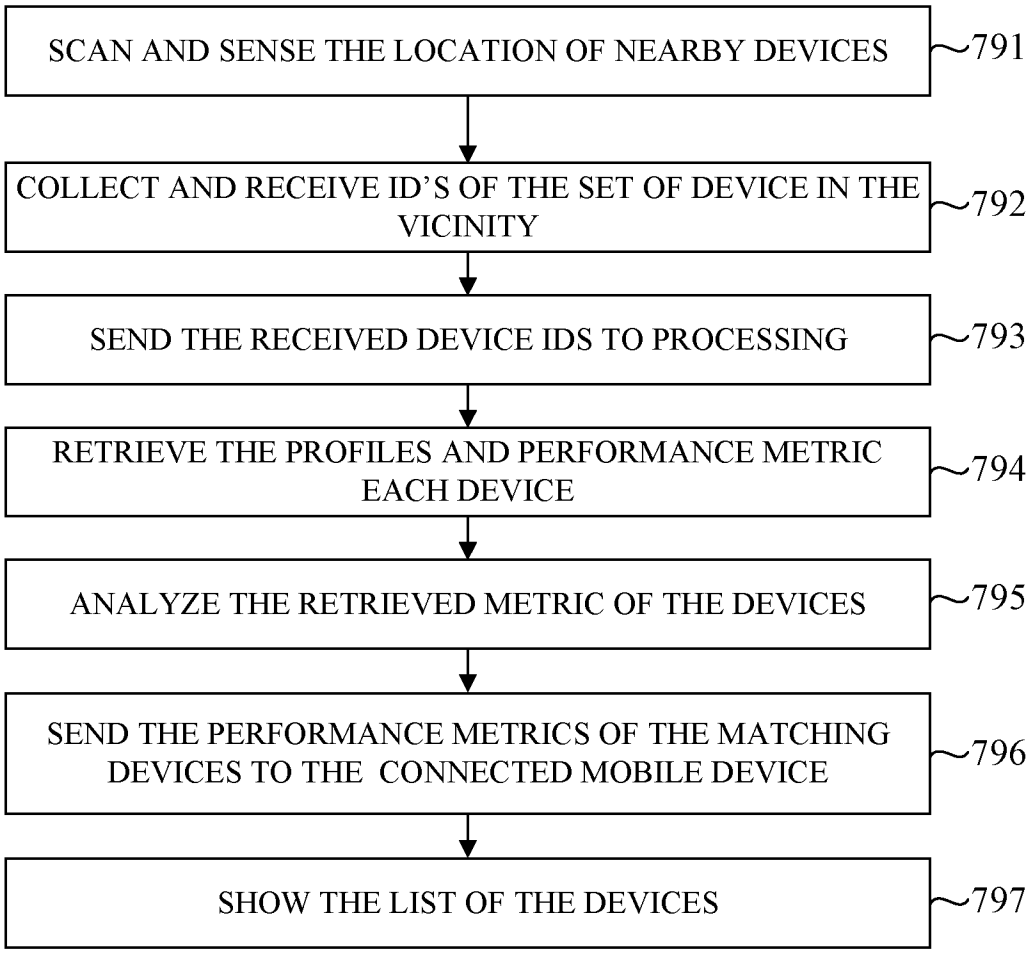
SCAN AND SENSE THE LOCATION OF NEARBY DEVICES
791
COLLECT AND RECEIVE ID'S OF THE SET OF DEVICE IN THE VICINITY
792
SEND THE RECEIVED DEVICE IDS TO PROCESSING
793
RETRIEVE THE PROFILES AND PERFORMANCE METRIC EACH DEVICE
794
ANALYZE THE RETRIEVED METRIC OF THE DEVICES
795
SEND THE PERFORMANCE METRICS OF THE MATCHING DEVICES TO THE CONNECTED MOBILE DEVICE
796
SHOW THE LIST OF THE DEVICES
797

FIG. 7B

	USER PARAMETERS CONSIDERED FOR PROFILING 891	USER 1 892	USER 2 893	WEIGHTAGE 894	PRIORITY 895
861	TYPE OF ACTIVITY (MOST PERFORMED ACTIVITY)	RUNNING	RUNNING	100%	1
862	CALORIES BURNT DURING THE ACTIVITY (AVERAGE VALUE, PEAK VALUE, LOW VALUE)	1000	1500	>60%	4
863	TIME OF ACTIVITY DURING DAY	6:00AM	6:30AM	>70%	5
864	DISTANCE COVERED	2KM	3KM	>60%	4
865	HEART RATE OF USER	120 BPM	110 BPM	>80%	3
866	GEOGRAPHICAL LOCATION OF THE ACTIVITY	PARK A	PARK A	100%	2
867	PATTERN	WALK-JOG-RUN-WALK	JOG-RUN-JOG	>70%	6
868	ACTIVITY HISTORY OF USER - CONSISTENCY	2 DAYS, A WEEK	4 DAYS, A WEEK	>30%	5
869	PACE OF USER	9 KMPH	10 KMPH	>70%	3
870	AGE OF USER	35 YEARS	28 YEARS	>60%	7
871	PARTICIPATION HISTORY IN SPORTS EVENTS OF USER	NA	4 EVENTS PARTICIPATED	>30%	8

FIG. 8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SG2019/050242

A. CLASSIFICATION OF SUBJECT MATTER

G06Q 50/00 (2012.01) *G06F 1/16 (2006.01)* *H04W 4/21 (2018.01)*

According to International Patent Classification (IPC)

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G01C; G06F; G06Q; H04W; H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Database: FamPat

Keywords: connect, link, user, wearer, wearables, smart watch, performance metrics, in vicnity, near, close, around , social network, 联接, 连接, 连系, 用户, 使用者, 穿戴, 随身, 智能, 设备, 电子, 佩戴, 手表 and related terms

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	US 2014/0288680 A1 (HOFFMAN ET AL.) 25 September 2014 para. [0007], [0120], [0121], [0127], [0147], [0149], [0170], [0299], [0350], [0360], [0364], [0365] fig. 81	1, 2 3-7 8, 9
X Y	US 2015/0106025 A1 (KELLER ET AL.) 16 April 2015 para. [0021], [0032], [0035], [0037], [0043], [0110]	1, 2 3
X Y	US 2014/0129239 A1 (UTTER, II) 8 May 2014 para. [0037], [0038], [0040], [0042], [0061], [0082], [0108], [0124]	1, 2 3

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

*Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27/06/2019 *(day/month/year)*	*18/07/2019* *(day/month/year)*

Name and mailing address of the ISA/SG

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/SG2019/050242

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2011/0295709 A1 (KUBO ET AL.) 1 December 2011 para. [0079], [0104], [0148], [0149]	3
A	US 2015/0242406 A1 (SINGH ET AL.) 27 August 2015 Whole document.	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SG2019/050242

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:

because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 10

because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

Please refer to Supplemental Box (Continuation of Box No. II).

3. ☐ Claims Nos.:

because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SG2019/050242

Supplemental Box
(Continuation of Box No. II)

This international search report has not been established in respect of Claims Nos **10** because they do not comply with Rule 6.2, which states that claims shall not rely on references to the description or drawings.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/SG2019/050242

Note: This Annex lists known patent family members relating to the patent documents cited in this International Search Report. This Authority is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2014/0288680 A1	25/09/2014	CN 109599160 A	09/04/2019
		KR 20150128970 A	18/11/2015
		EP 2973101 A2	20/01/2016
		WO 2014/144258 A2	18/09/2014
		US 2016/0317868 A1	03/11/2016
		JP 2016517329 A	16/06/2016
		US 2015/0306457 A1	29/10/2015
		CN 105229650 A	06/01/2016
		US 2017/0259118 A1	14/09/2017
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		JP 2017211994 A	30/11/2017
US 2015/0106025 A1	16/04/2015	NONE	
US 2014/0129239 A1	08/05/2014	NONE	
US 2011/0295709 A1	01/12/2011	US 2014/0194189 A1	10/07/2014
		US 2014/0164181 A1	12/06/2014
		CN 102262768 A	30/11/2011
		EP 2389993 A1	30/11/2011
		JP 2011250874 A	15/12/2011
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		IN 917CH2014 A	28/08/2015