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(54) **INFORMATION PROCESSING DEVICE, CONTROL METHOD FOR INFORMATION PROCESSING DEVICE, AND STORAGE MEDIUM**

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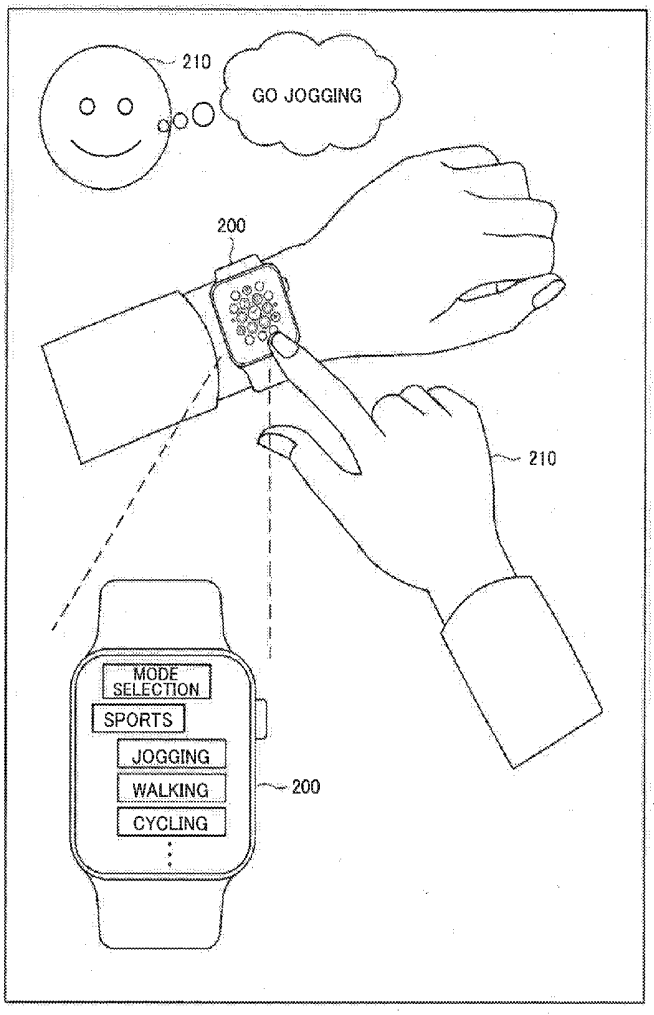
(57) **ABSTRACT**

This information processing device selects a sensor to be controlled according to the activity plan of a user. The information processing device is attached to the user's body. The information processing device is provided with: a plurality of sensors; an acquisition means for acquiring an activity plan of the user; and a control means that selects a sensor to be controlled from among the plurality of sensors on the basis of the acquired activity plan. The control means activates the sensor suited for the activity plan from among the plurality of sensors and inactivates sensors that are not suited for the activity plan from among the plurality of sensors.



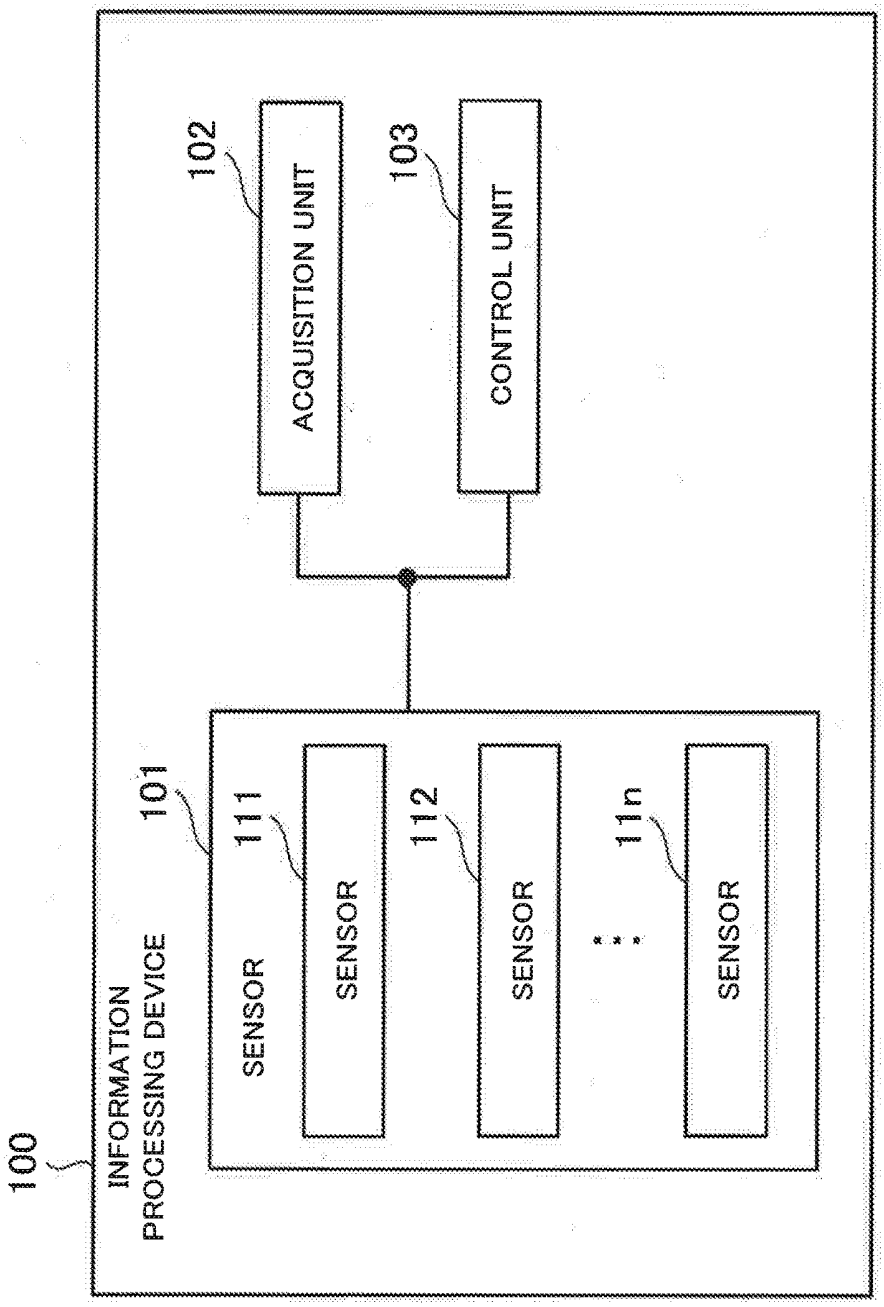
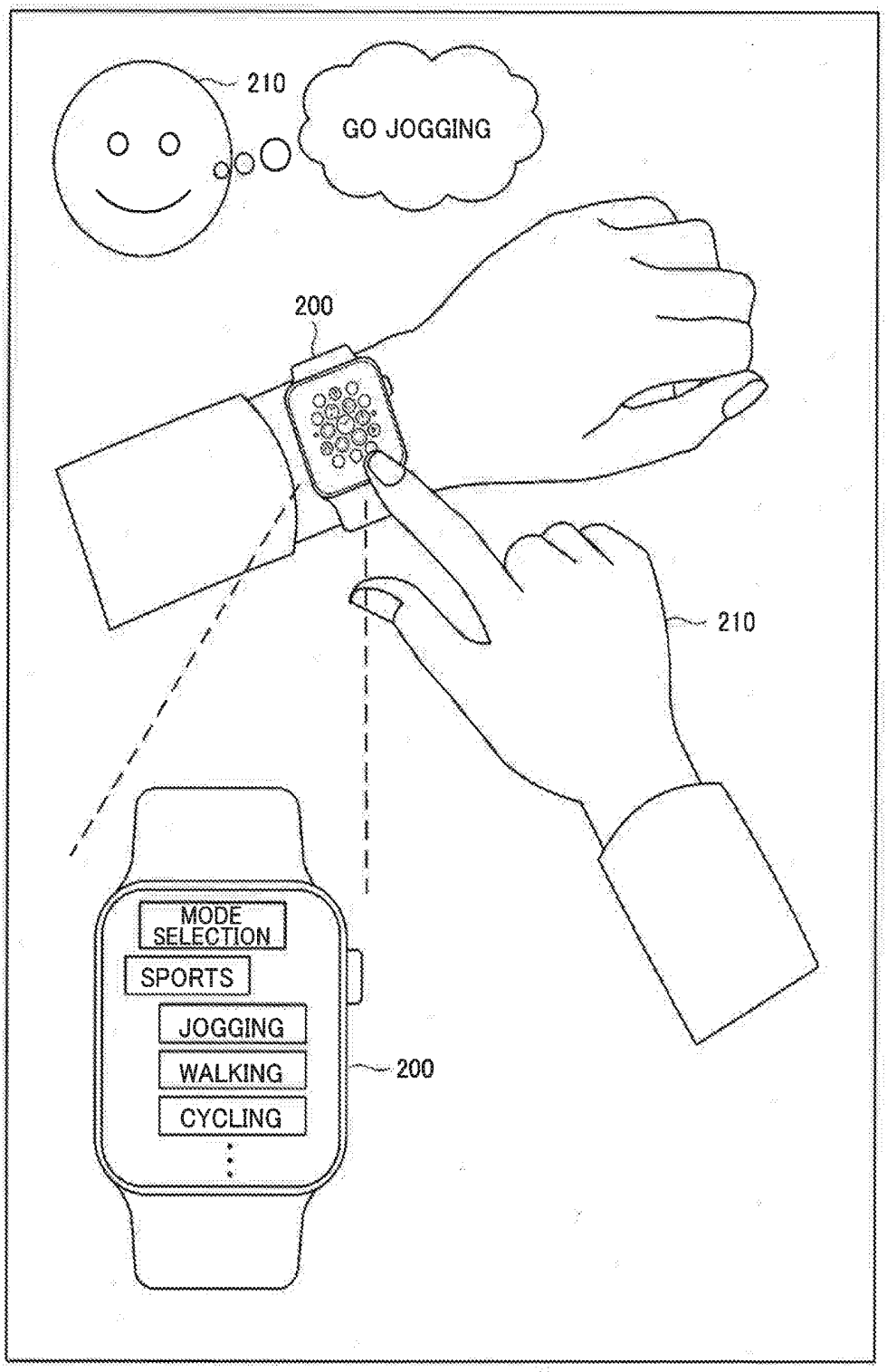

100
INFORMATION PROCESSING DEVICE
101
SENSOR
111
SENSOR
112
SENSOR
11n
SENSOR
102
ACQUISITION UNIT
103
CONTROL UNIT

Fig. 1

Fig. 2


210
GO JOGGING
200
210
MODE SELECTION
SPORTS
JOGGING
WALKING
CYCLING
200

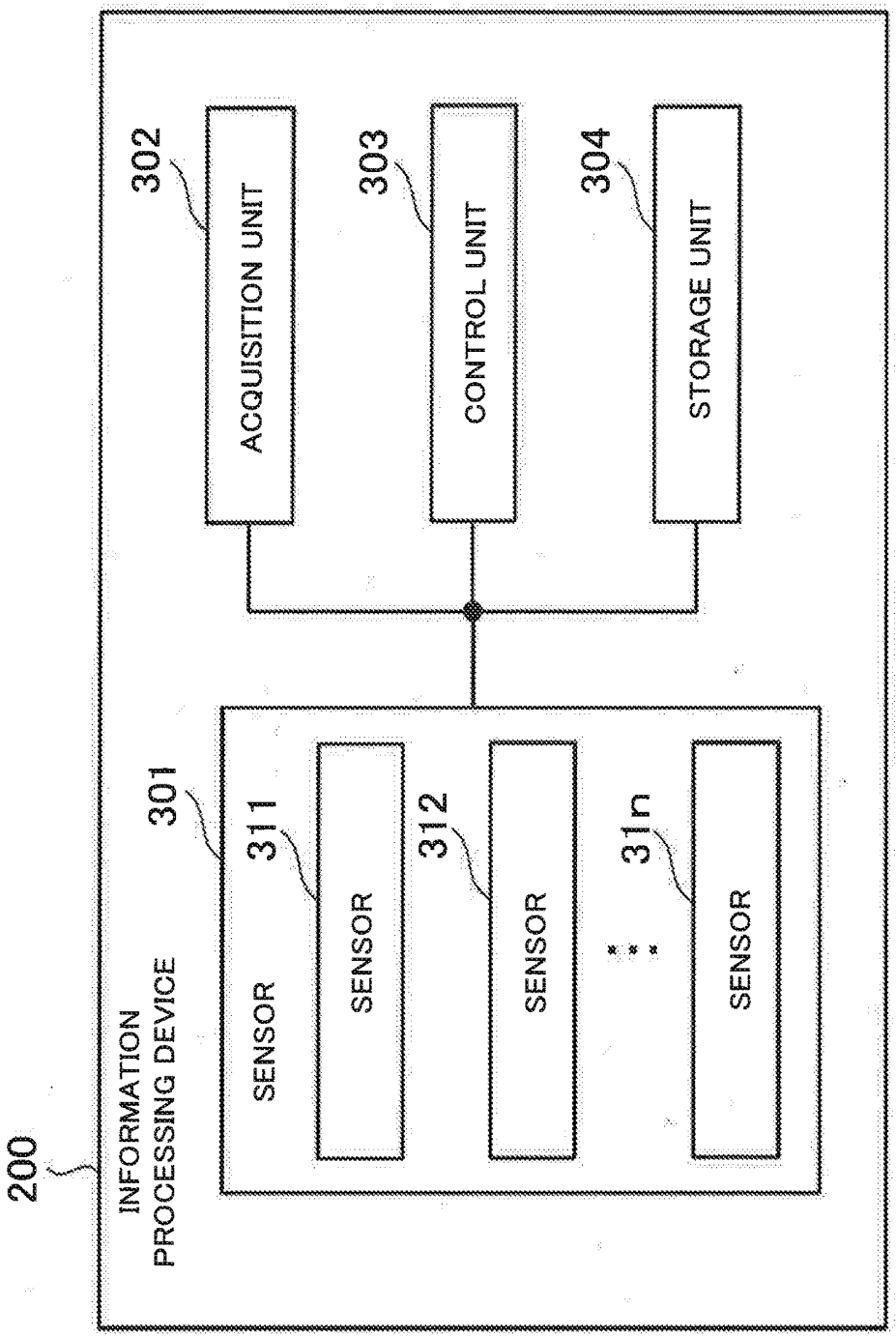
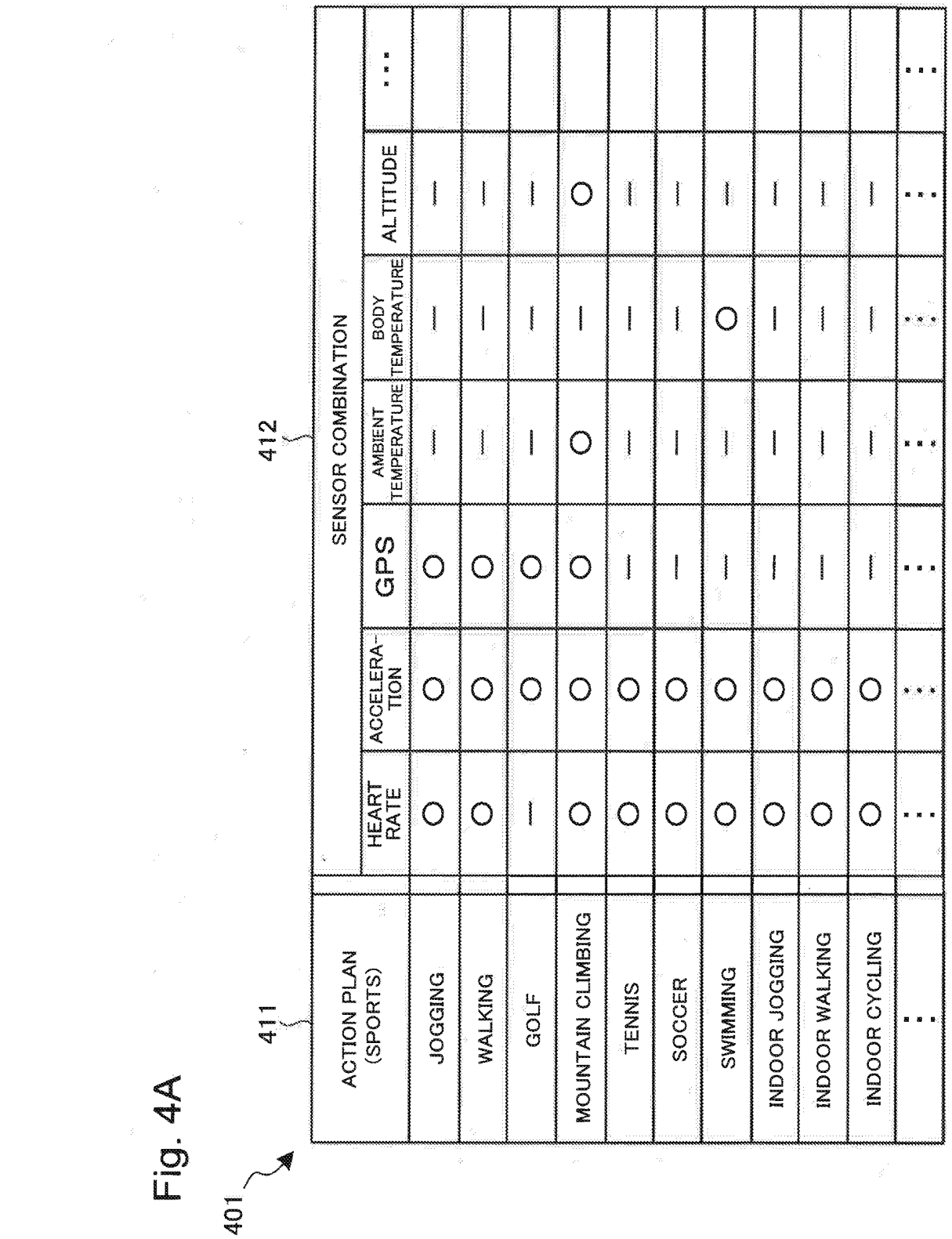

200
INFORMATION PROCESSING DEVICE
301
SENSOR
311
SENSOR
312
SENSOR
31n
SENSOR
302
ACQUISITION UNIT
303
CONTROL UNIT
304
STORAGE UNIT

Fig. 3

Fig. 4A


401
411
412
ACTION PLAN (SPORTS)
SENSOR COMBINATION
HEART RATE
ACCELERATION
GPS
AMBIENT TEMPERATURE
BODY TEMPERATURE
ALTITUDE
JOGGING
WALKING
GOLF
MOUNTAIN CLIMBING
TENNIS
SOCCER
SWIMMING
INDOOR JOGGING
INDOOR WALKING
INDOOR CYCLING

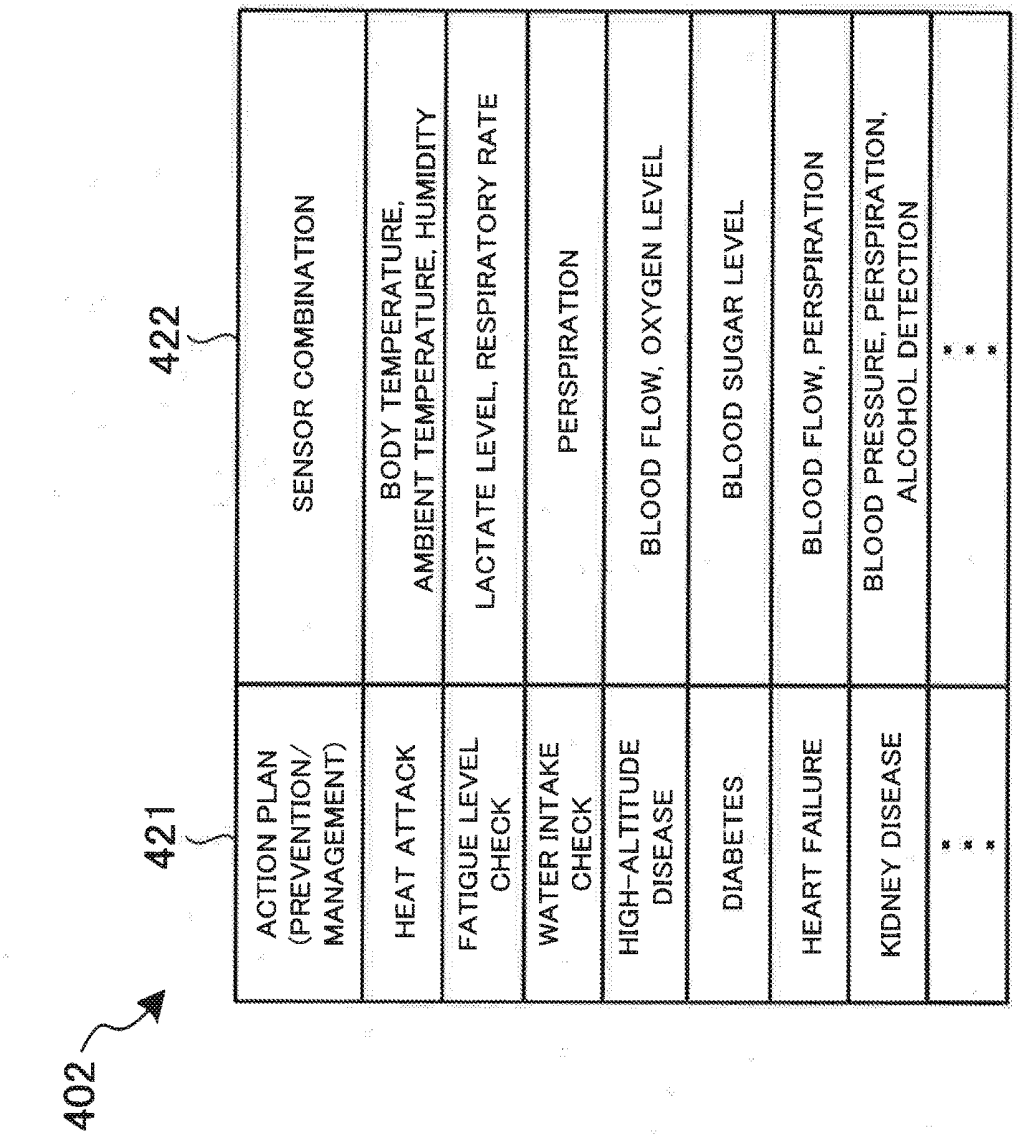

402
421
422
ACTION PLAN (PREVENTION/ MANAGEMENT)
SENSOR COMBINATION
HEAT ATTACK
BODY TEMPERATURE, AMBIENT TEMPERATURE, HUMIDITY
FATIGUE LEVEL CHECK
LACTATE LEVEL, RESPIRATORY RATE
WATER INTAKE CHECK
PERSPIRATION
HIGH-ALTITUDE DISEASE
BLOOD FLOW, OXYGEN LEVEL
DIABETES
BLOOD SUGAR LEVEL
HEART FAILURE
BLOOD FLOW, PERSPIRATION
KIDNEY DISEASE
BLOOD PRESSURE, PERSPIRATION, ALCOHOL DETECTION

Fig. 4B

Fig. 4C

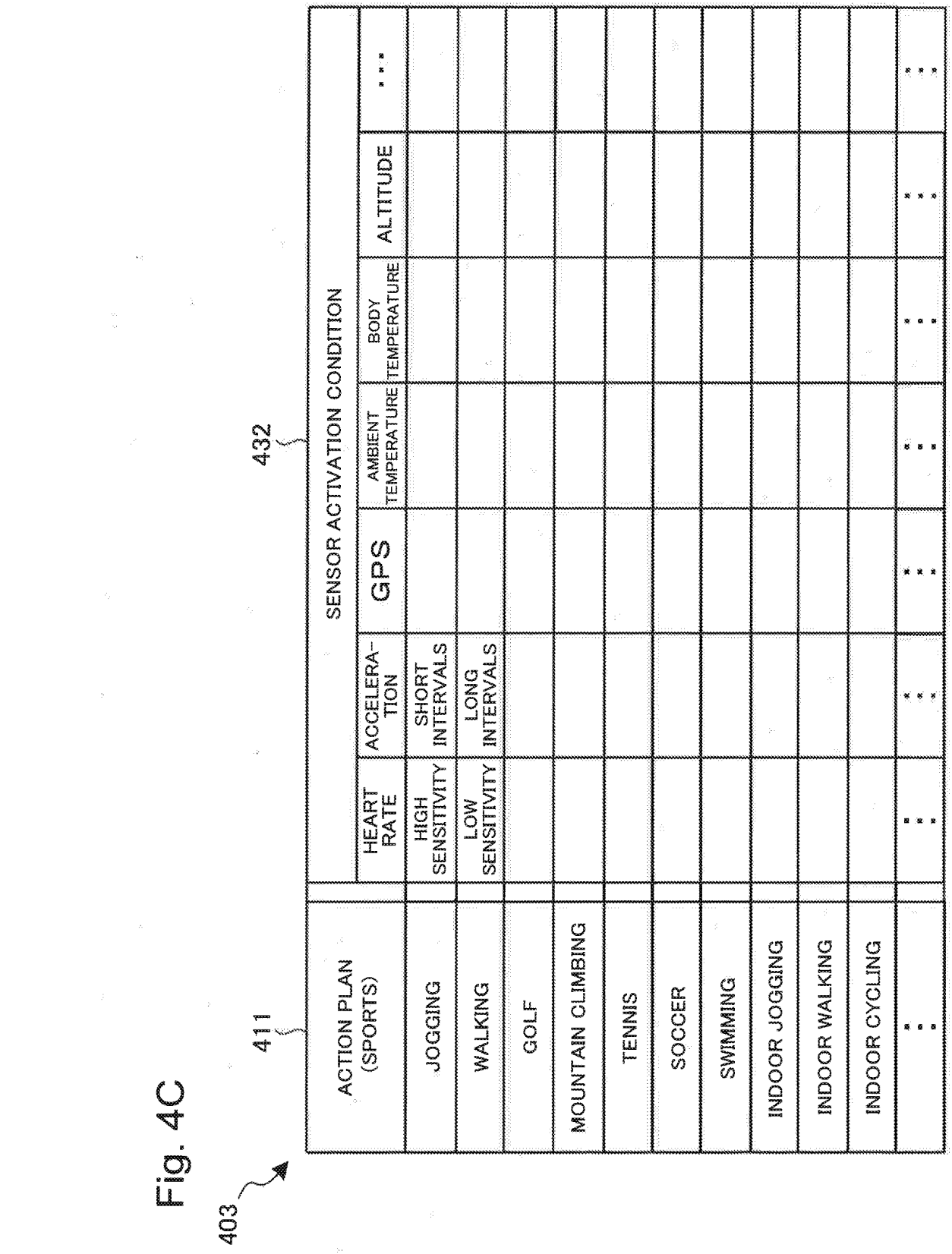

403
411
432
ACTION PLAN (SPORTS)
SENSOR ACTIVATION CONDITION
HEART RATE
HIGH SENSITIVITY
LOW SENSITIVITY
ACCELERATION
SHORT INTERVALS
LONG INTERVALS
GPS
AMBIENT TEMPERATURE
BODY TEMPERATURE
ALTITUDE
JOGGING
WALKING
GOLF
MOUNTAIN CLIMBING
TENNIS
SOCCER
SWIMMING
INDOOR JOGGING
INDOOR WALKING
INDOOR CYCLING

Fig. 5

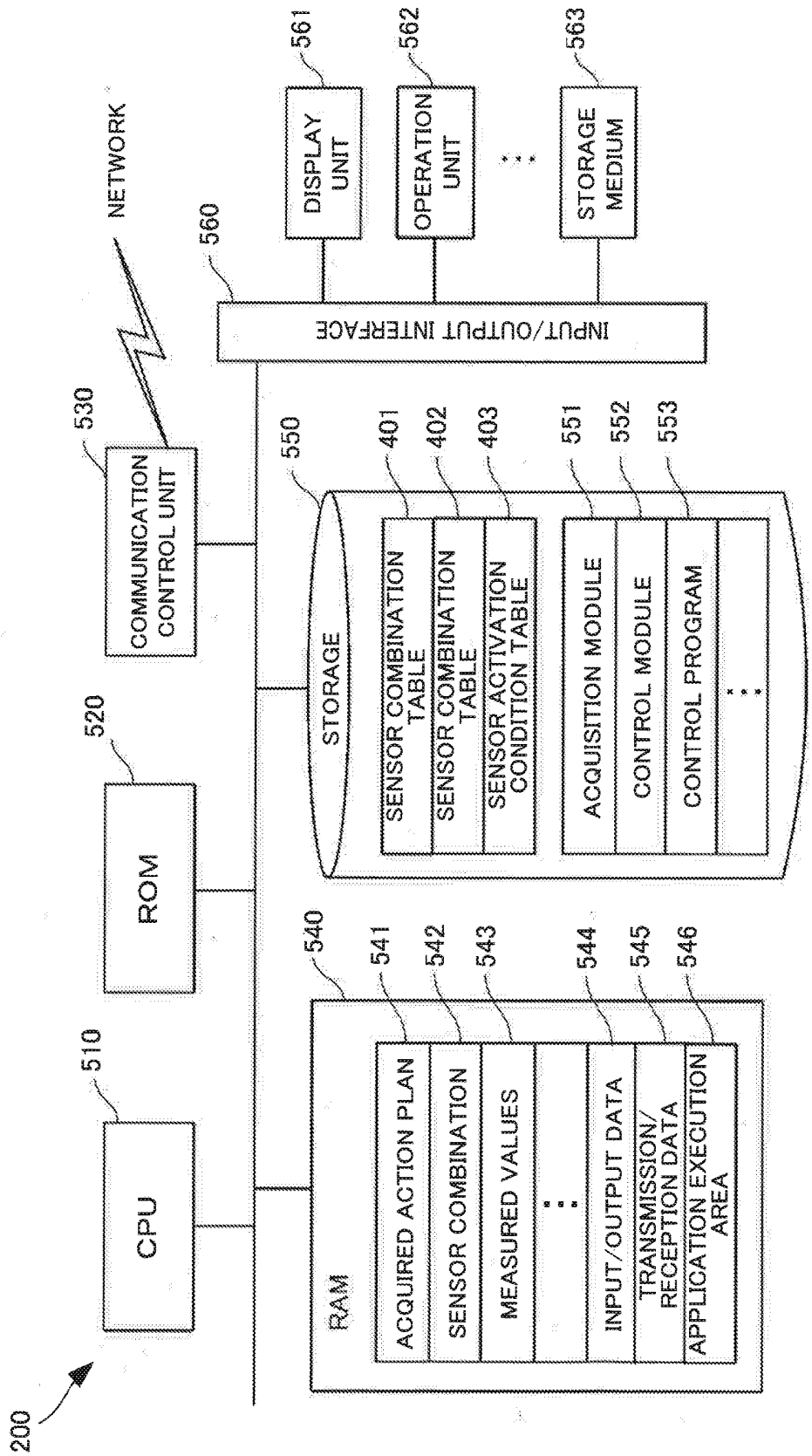
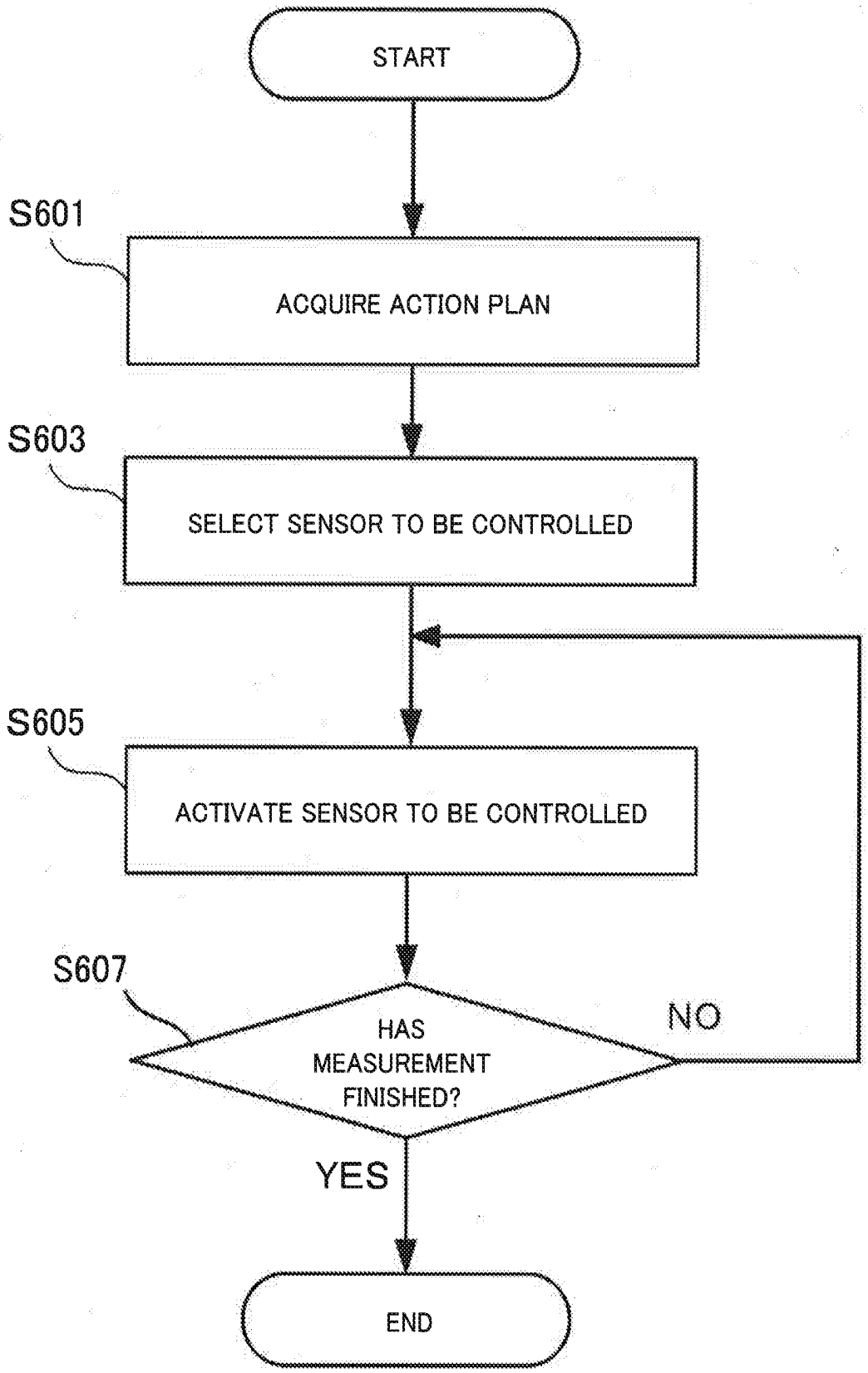

200
CPU
510
ROM
520
COMMUNICATION CONTROL UNIT
530
NETWORK
INPUT/OUTPUT INTERFACE
560
DISPLAY UNIT
561
OPERATION UNIT
562
STORAGE MEDIUM
563
RAM
540
ACQUIRED ACTION PLAN
541
SENSOR COMBINATION
542
MEASURED VALUES
543
INPUT/OUTPUT DATA
544
TRANSMISSION/ RECEPTION DATA
545
APPLICATION EXECUTION AREA
546
STORAGE
550
SENSOR COMBINATION TABLE
401
SENSOR COMBINATION TABLE
402
SENSOR ACTIVATION CONDITION TABLE
403
ACQUISITION MODULE
551
CONTROL MODULE
552
CONTROL PROGRAM
553

Fig. 6


START
S601
ACQUIRE ACTION PLAN
S603
SELECT SENSOR TO BE CONTROLLED
S605
ACTIVATE SENSOR TO BE CONTROLLED
S607
HAS MEASUREMENT FINISHED?
NO
YES
END

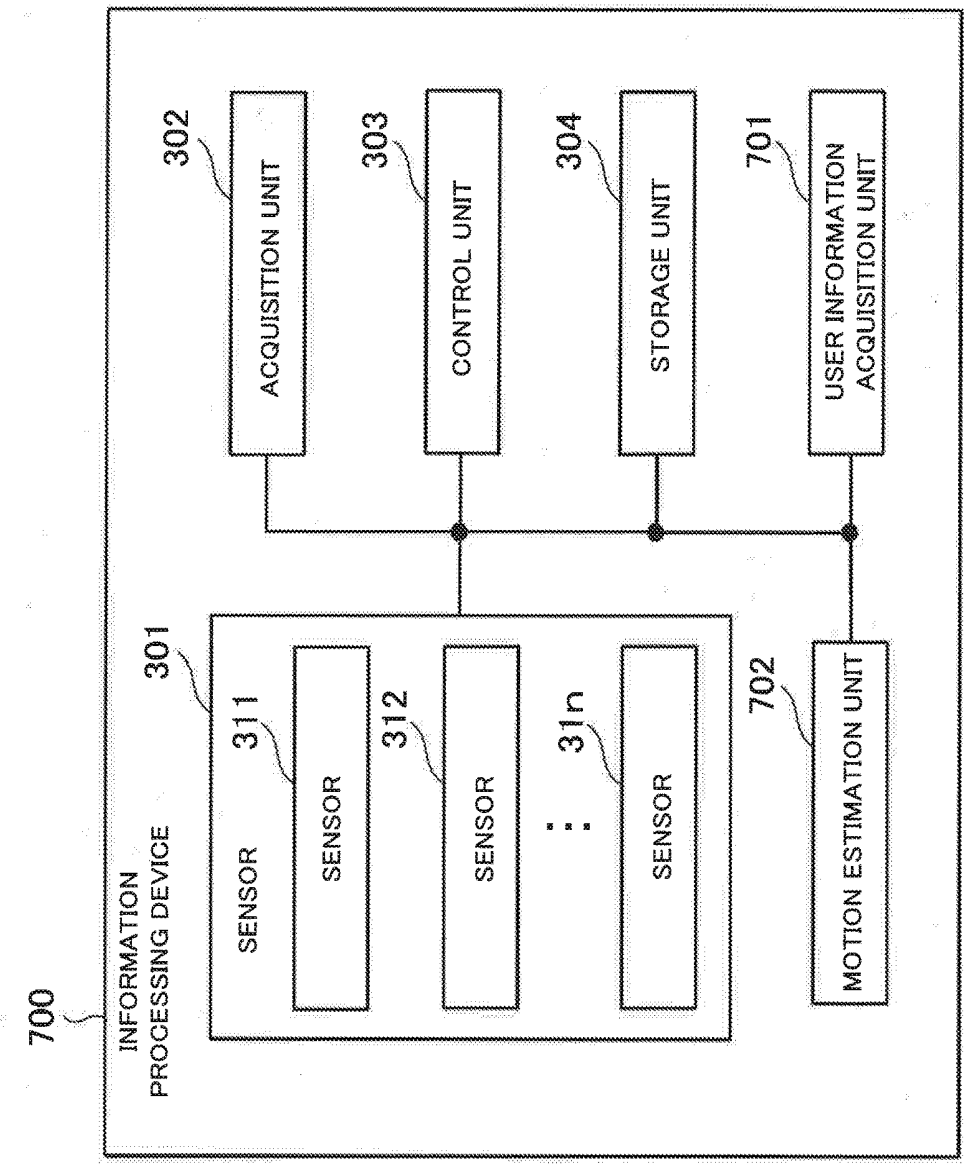

700
INFORMATION PROCESSING DEVICE
301
SENSOR
311
SENSOR
312
SENSOR
31n
SENSOR
302
ACQUISITION UNIT
303
CONTROL UNIT
304
STORAGE UNIT
701
USER INFORMATION ACQUISITION UNIT
702
MOTION ESTIMATION UNIT

Fig. 7

Fig. 8

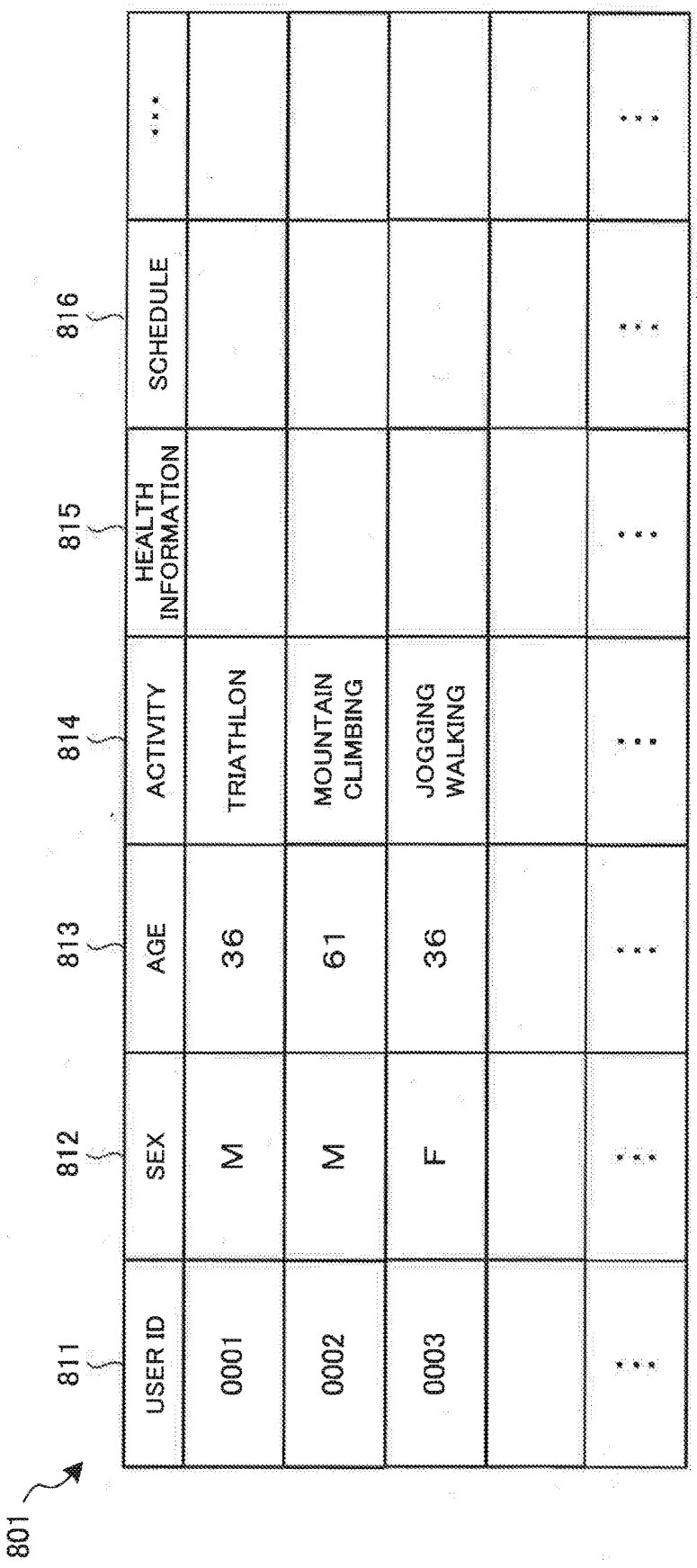

801
811
812
813
814
815
816
USER ID
SEX
AGE
ACTIVITY
HEALTH INFORMATION
SCHEDULE
0001
M
36
TRIATHLON
0002
M
61
MOUNTAIN CLIMBING
0003
F
36
JOGGING WALKING

Fig. 9

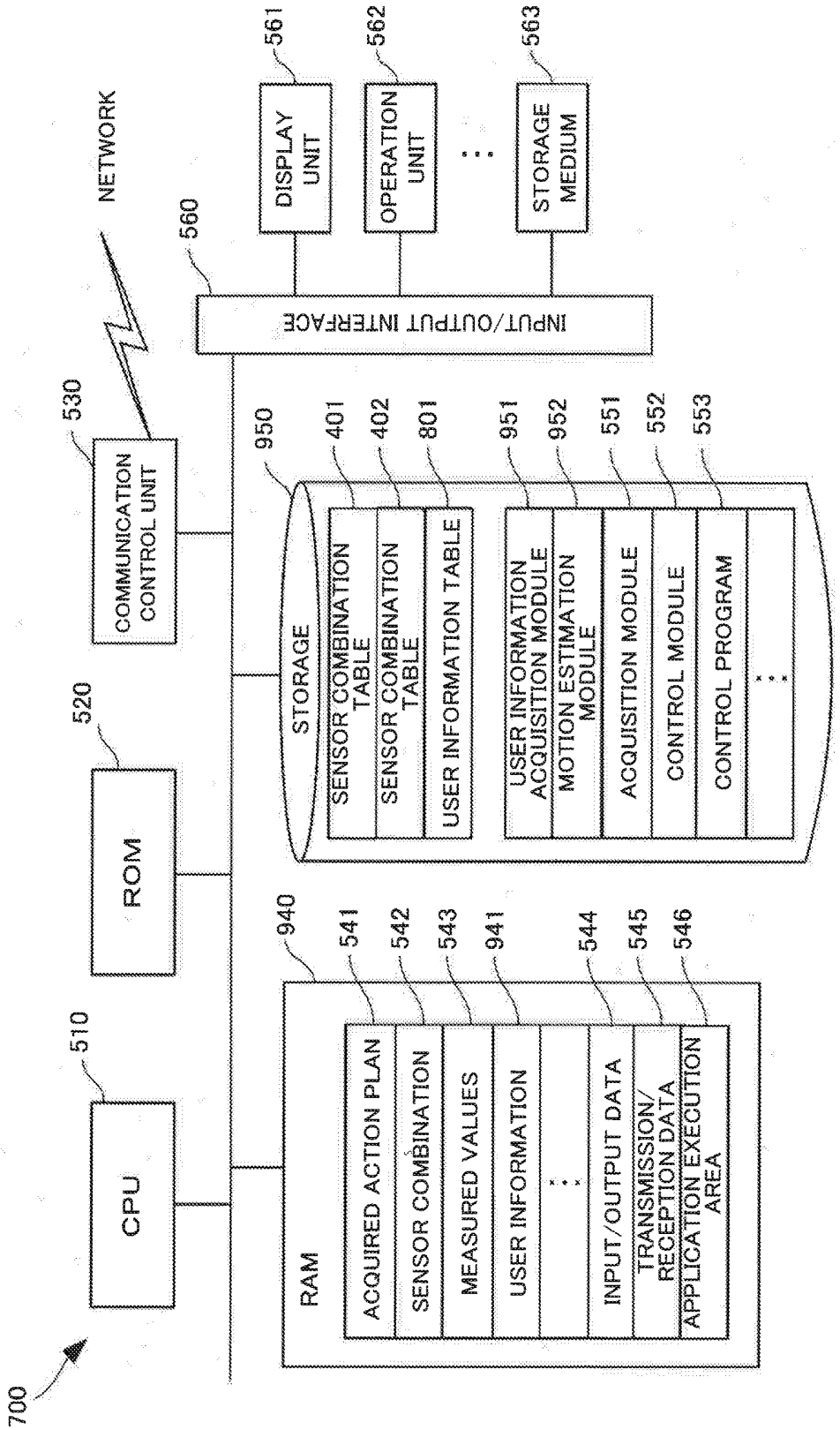

700
CPU
510
ROM
520
COMMUNICATION CONTROL UNIT
530
NETWORK
INPUT/OUTPUT INTERFACE
560
DISPLAY UNIT
561
OPERATION UNIT
562
STORAGE MEDIUM
563
RAM
940
ACQUIRED ACTION PLAN
SENSOR COMBINATION
MEASURED VALUES
USER INFORMATION
INPUT/OUTPUT DATA
TRANSMISSION/ RECEPTION DATA
APPLICATION EXECUTION AREA
541
542
543
941
544
545
546
STORAGE
950
SENSOR COMBINATION TABLE
SENSOR COMBINATION TABLE
USER INFORMATION TABLE
401
402
801
USER INFORMATION ACQUISITION MODULE
MOTION ESTIMATION MODULE
ACQUISITION MODULE
CONTROL MODULE
CONTROL PROGRAM
951
952
551
552
553

Fig. 10A

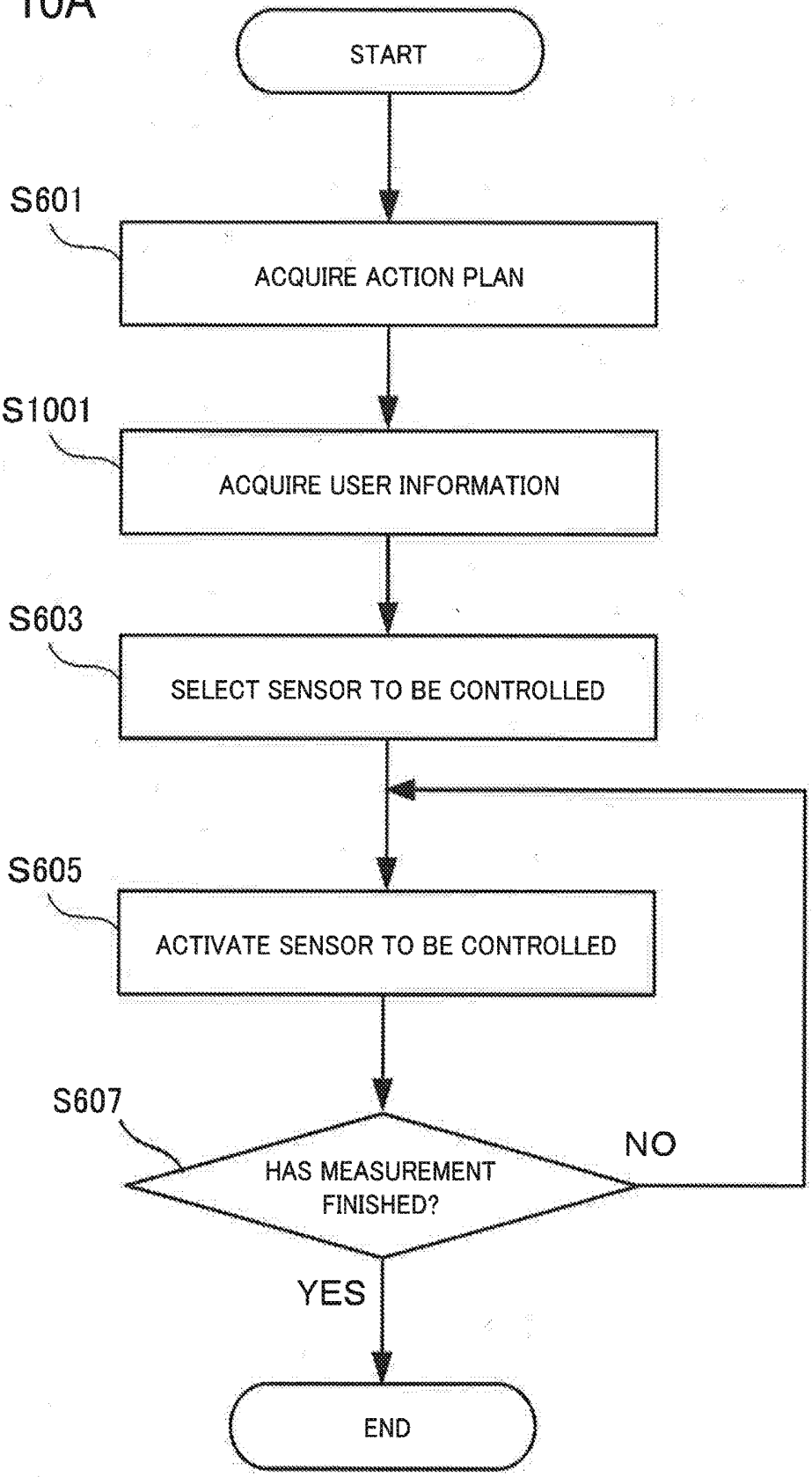
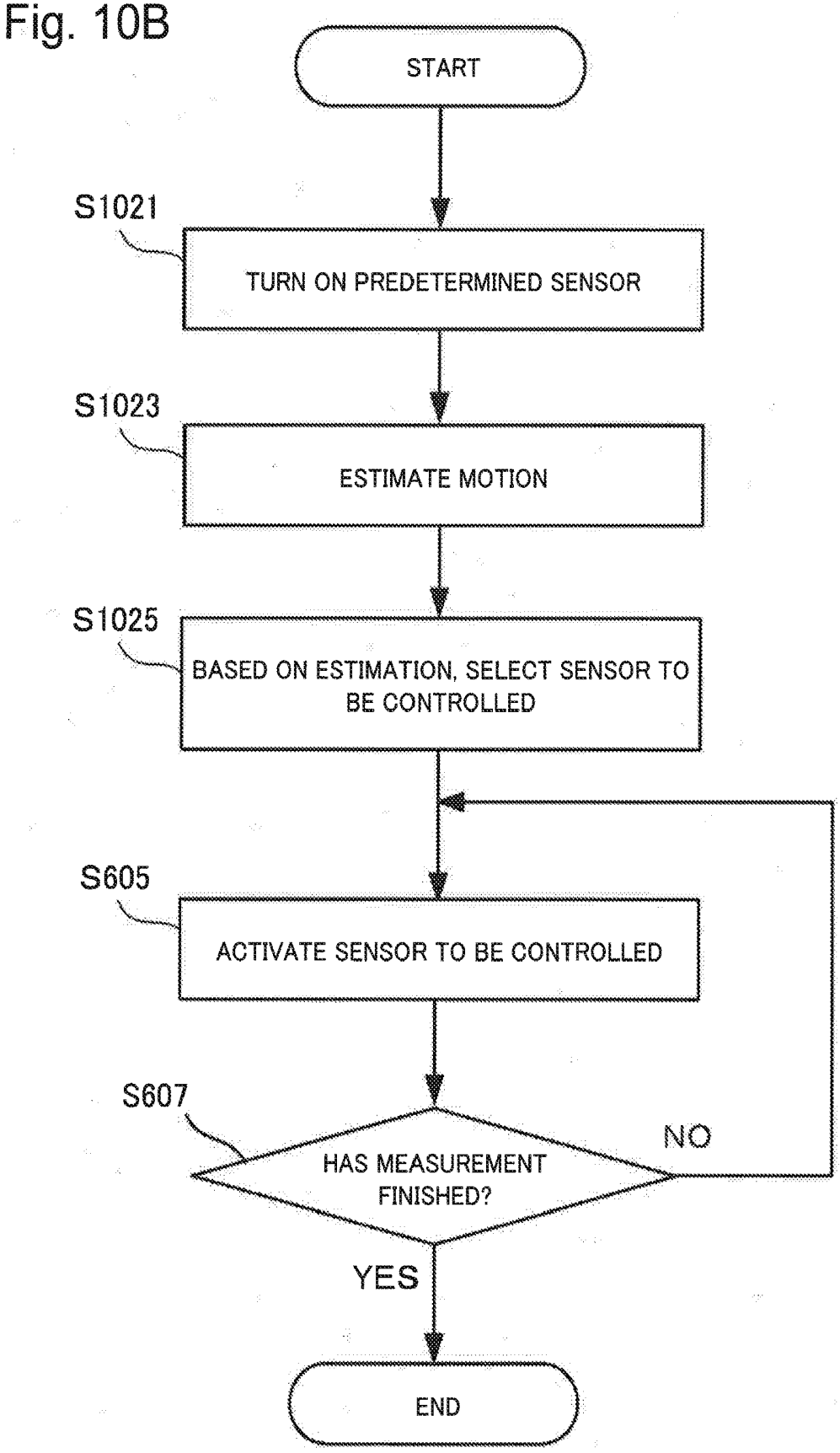

START
S601
ACQUIRE ACTION PLAN
S1001
ACQUIRE USER INFORMATION
S603
SELECT SENSOR TO BE CONTROLLED
S605
ACTIVATE SENSOR TO BE CONTROLLED
S607
HAS MEASUREMENT FINISHED?
NO
YES
END

Fig. 10B


START
S1021
TURN ON PREDETERMINED SENSOR
S1023
ESTIMATE MOTION
S1025
BASED ON ESTIMATION, SELECT SENSOR TO BE CONTROLLED
S605
ACTIVATE SENSOR TO BE CONTROLLED
S607
HAS MEASUREMENT FINISHED?
NO
YES
END

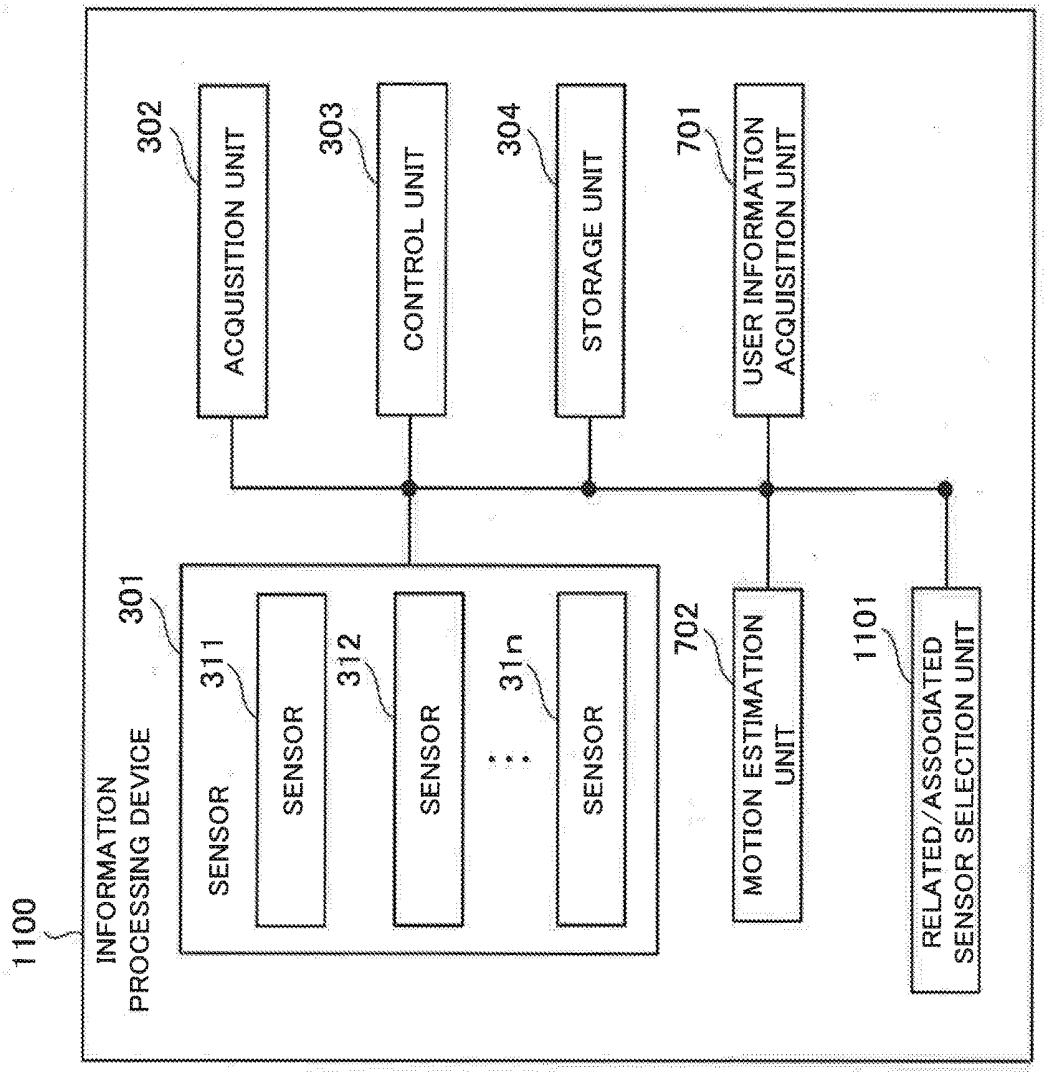
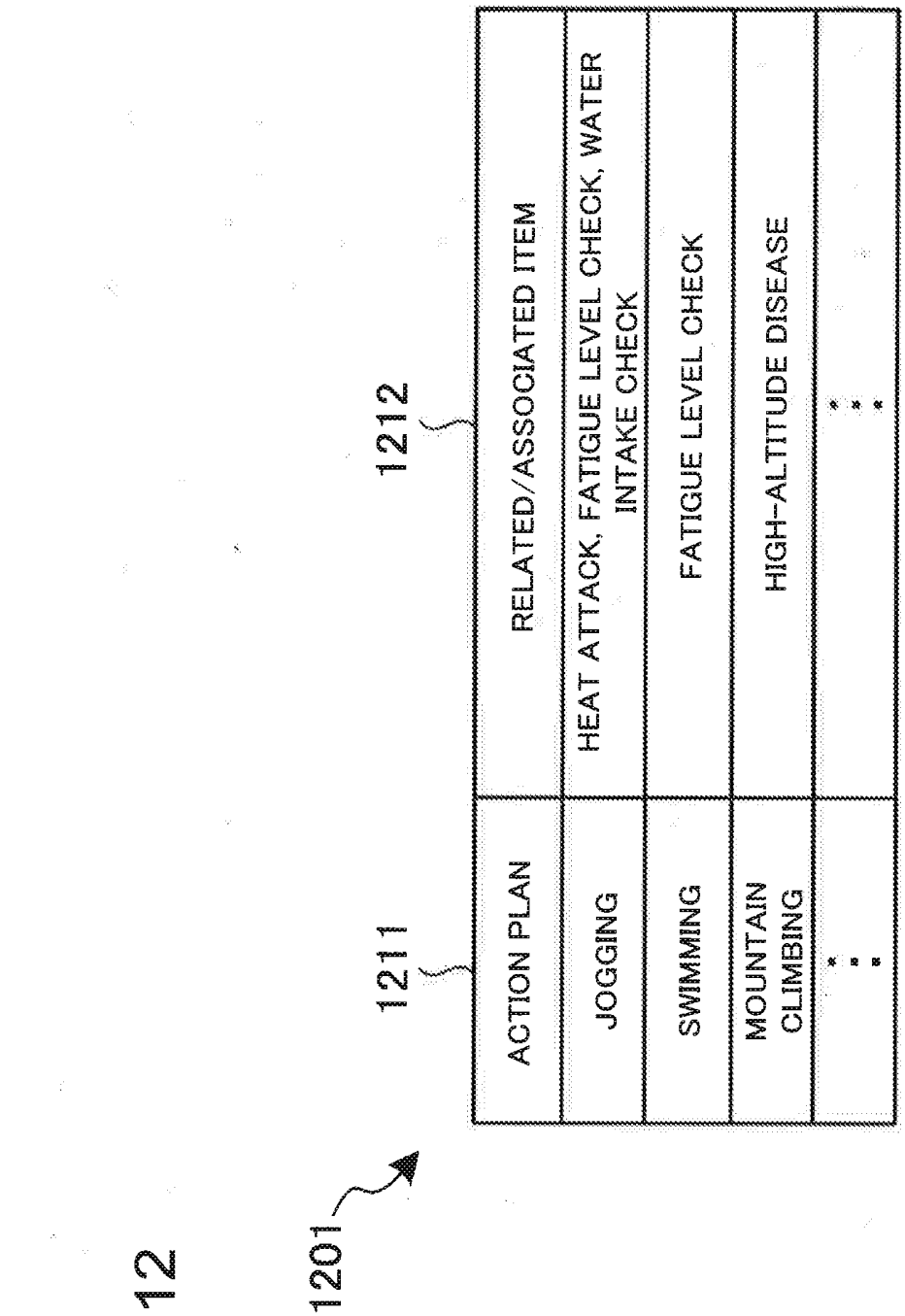

1100
INFORMATION PROCESSING DEVICE
301
SENSOR
311
SENSOR
312
SENSOR
31n
SENSOR
302
ACQUISITION UNIT
303
CONTROL UNIT
304
STORAGE UNIT
701
USER INFORMATION ACQUISITION UNIT
702
MOTION ESTIMATION UNIT
1101
RELATED/ASSOCIATED SENSOR SELECTION UNIT

Fig. 11

Fig. 12


1201
1211
1212
ACTION PLAN
RELATED/ASSOCIATED ITEM
JOGGING
HEAT ATTACK, FATIGUE LEVEL CHECK, WATER INTAKE CHECK
SWIMMING
FATIGUE LEVEL CHECK
MOUNTAIN CLIMBING
HIGH-ALTITUDE DISEASE

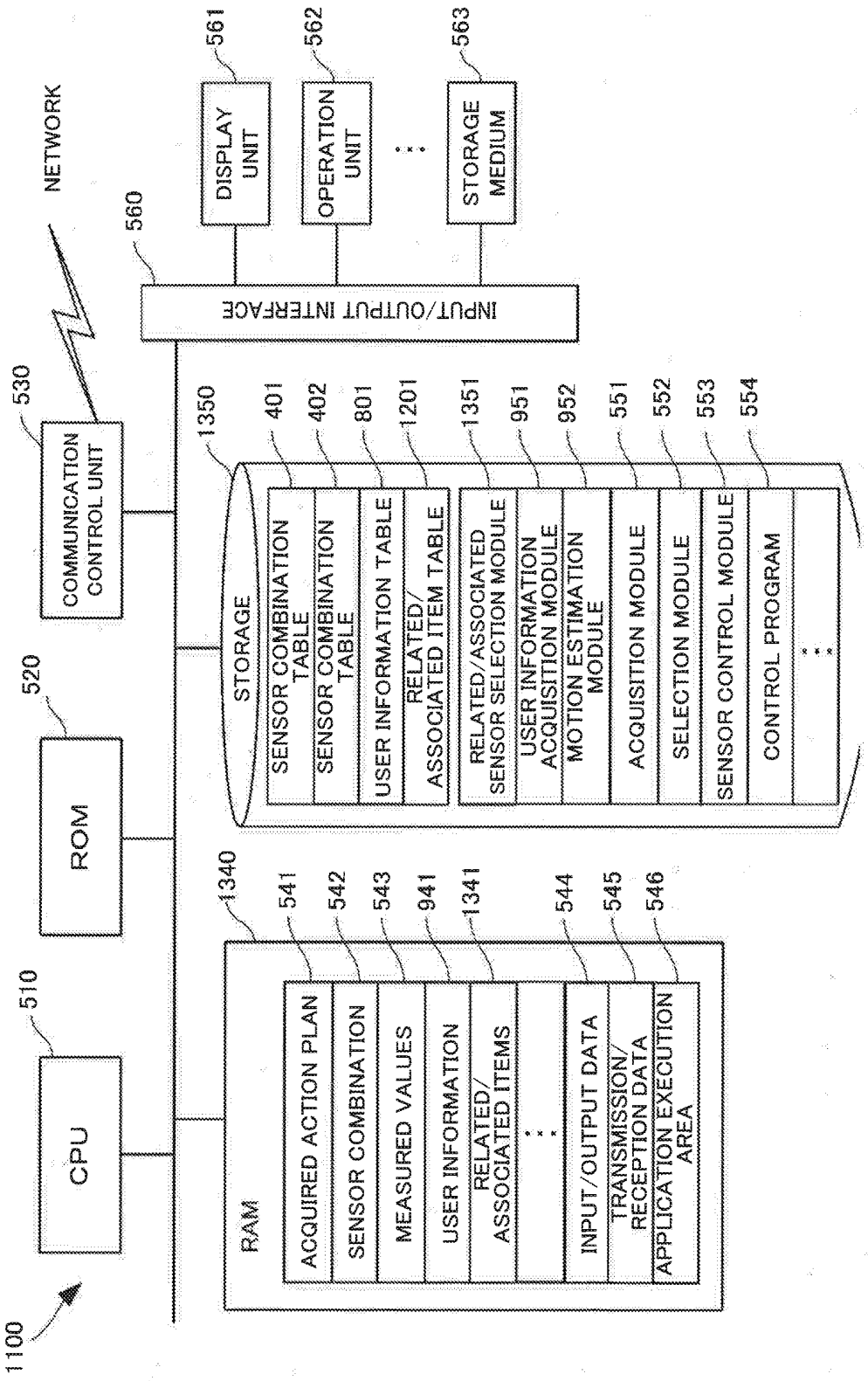
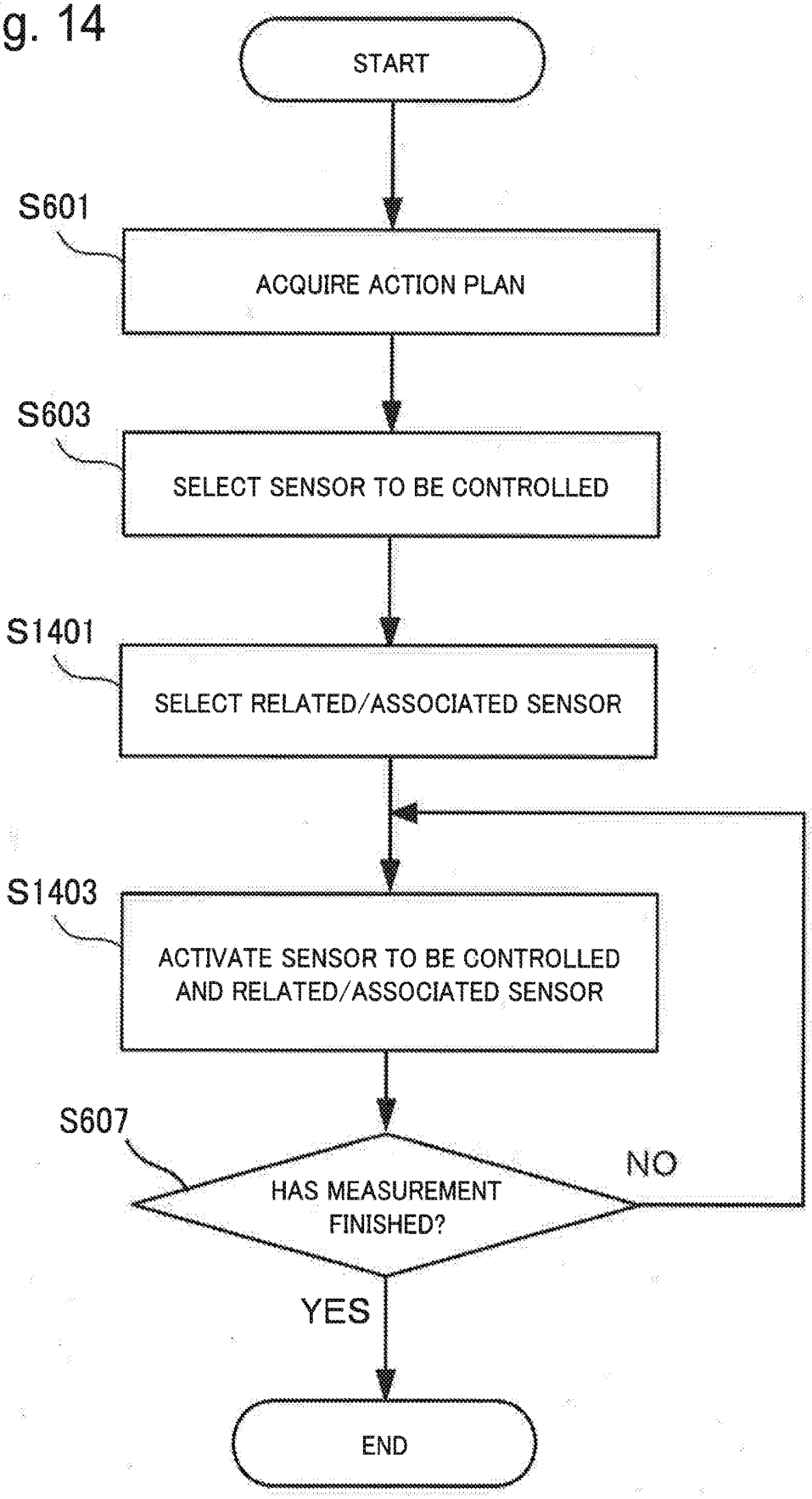

1100
CPU
510
ROM
520
COMMUNICATION CONTROL UNIT
530
NETWORK
INPUT/OUTPUT INTERFACE
560
DISPLAY UNIT
561
OPERATION UNIT
562
STORAGE MEDIUM
563
RAM
1340
ACQUIRED ACTION PLAN
541
SENSOR COMBINATION
542
MEASURED VALUES
543
USER INFORMATION
941
RELATED/ ASSOCIATED ITEMS
1341
INPUT/OUTPUT DATA
544
TRANSMISSION/ RECEPTION DATA
545
APPLICATION EXECUTION AREA
546
STORAGE
1350
SENSOR COMBINATION TABLE
401
SENSOR COMBINATION TABLE
402
USER INFORMATION TABLE
801
RELATED/ ASSOCIATED ITEM TABLE
1201
RELATED/ASSOCIATED SENSOR SELECTION MODULE
1351
USER INFORMATION ACQUISITION MODULE
951
MOTION ESTIMATION MODULE
952
ACQUISITION MODULE
551
SELECTION MODULE
552
SENSOR CONTROL MODULE
553
CONTROL PROGRAM
554

Fig. 13

Fig. 14


START
S601
ACQUIRE ACTION PLAN
S603
SELECT SENSOR TO BE CONTROLLED
S1401
SELECT RELATED/ASSOCIATED SENSOR
S1403
ACTIVATE SENSOR TO BE CONTROLLED AND RELATED/ASSOCIATED SENSOR
S607
HAS MEASUREMENT FINISHED?
NO
YES
END

INFORMATION PROCESSING DEVICE, CONTROL METHOD FOR INFORMATION PROCESSING DEVICE, AND STORAGE MEDIUM

TECHNICAL FIELD

[0001] The present invention relates to an information processing device, a control method for the information processing device, and a control program for the information processing device.

BACKGROUND ART

[0002] In the technical field described above, PTL 1 discloses a technique that determines, by using a second timer, whether or not a measurement has been executed at a preset timing by using a first timer. PTL 2 discloses a technique that determines an optimum combination of motion measurement devices for identifying an action of a person depending on a location of the subject and identifies an action of the person, based on measured values from the determined motion measurement devices. PTL 3 discloses a technique in which, when a first sensor out of two sensors of the same type is operating, a second sensor is deactivated and, when the second sensor is operating, the first sensor is deactivated. PTL 4 discloses a technique in which power management depending on a result of actual measurement of biological information is performed. PTL 5 discloses a technique in which, in order to measure biological information required for each individual user during a required period of time, a sensor is activated and a measurement is executed for a predetermined period of time in a particular state.

CITATION LIST

Patent Literature

[0003] [PTL 1] International Publication No. WO 2014/057625

[PTL 2] Japanese Laid-open Patent Publication No. 2009-134590

[0004] [PTL 3] International Publication No. WO 2012/079052

[PTL 4] Japanese Laid-open Patent Publication No. 2015-123300

[PTL 5] Japanese Laid-open Patent Publication No. 2015-112209

SUMMARY OF INVENTION

Technical Problem

[0005] However, none of the techniques described in the literatures cited above is capable of selecting a sensor to be controlled from among a plurality of sensors, based on an action plan of a user.

[0006] An object of the present invention is to provide a technique that solves the problem described above.

Solution to Problem

[0007] To achieve the above object, an information processing device configured to be attached to a body of a user. The device includes:

[0008] a plurality of sensors;

[0009] an acquisition means that acquires an action plan of the user; and

[0010] a control means that selects a sensor to be controlled among the plurality of sensors, based on the acquired action plan.

[0011] To achieve the above object, a control method for an information processing device that includes a plurality of sensors and is configured to be attached to a body of a user. The control method includes:

[0012] an acquisition step of acquiring an action plan of the user; and

[0013] a control step of selecting a sensor to be controlled among the plurality of sensors, based on the acquired action plan.

[0014] To achieve the above object, a control program for an information processing device includes a plurality of sensors and is configured to be attached to a body of a user. The control program causes a computer to execute:

[0015] an acquisition step of acquiring an action plan of the user; and

[0016] a control step of selecting a sensor to be controlled among the plurality of sensors, based on the acquired action plan.

Advantageous Effects of Invention

[0017] According to the present invention, a sensor to be controlled can be selected from among a plurality of sensors, based on an action plan of a user.

BRIEF DESCRIPTION OF DRAWINGS

[0018] FIG. **1** is a block diagram illustrating a configuration of an information processing device according to a first example embodiment of the present invention.

[0019] FIG. **2** is a diagram illustrating an overview of an operation of an information processing device according to a second example embodiment of the present invention.

[0020] FIG. **3** is a block diagram illustrating a configuration of the information processing device according to the second example embodiment of the present invention.

[0021] FIG. **4**A is a diagram illustrating one example of a sensor combination table provided in the information processing device according to the second example embodiment of the present invention.

[0022] FIG. **4**B is a diagram illustrating one example of a sensor combination tale provided in the information processing device according to the second example embodiment of the present invention.

[0023] FIG. **4**C is a diagram illustrating one example of a sensor activation condition table provided in the information processing device according to the second example embodiment of the present invention.

[0024] FIG. **5** is a block diagram illustrating a hardware configuration of the information processing device according to the second example embodiment of the present invention.

[0025] FIG. **6** is a flowchart illustrating a procedure of processing performed by the information processing device according to the second example embodiment of the present invention.

[0026] FIG. **7** is a block diagram illustrating a configuration of an information processing device according to a third example embodiment of the present invention.

[0027] FIG. **8** is a diagram illustrating one example of a user information table provided in the information processing device according to the third example embodiment of the present invention.

[0028] FIG. **9** is a block diagram illustrating a hardware configuration of the information processing device according to the third example embodiment of the present invention.

[0029] FIG. **10**A is a flowchart illustrating a procedure of processing performed by the information processing device according to the third example embodiment of the present invention

[0030] FIG. **10**B is another example of a flowchart illustrating a procedure of processing performed by the information processing device according to the third example embodiment of the present invention.

[0031] FIG. **11** is a block diagram illustrating a configuration of an information processing device according to a fourth example embodiment of the present invention.

[0032] FIG. **12** is a diagram illustrating one example of a related/associated mode table provided in the information processing device according to the fourth example embodiment of the present invention.

[0033] FIG. **13** is a block diagram illustrating a hardware configuration of the information processing device according to the fourth example embodiment of the present invention.

[0034] FIG. **14** is a flowchart illustrating a procedure of processing performed by the information processing device according to the fourth example embodiment of the present invention.

DESCRIPTION OF EMBODIMENTS

[0035] Example embodiments for carrying out the present invention will be described below in detail by way of illustration with reference to drawings. However, configurations, numerical values, processing flows, functional elements and the like are illustrative only and are not intended to limit the technical scope of the present invention to the following description, and variations and modifications thereof may be arbitrarily made. Note that the term "action plan of a user" as used herein encompasses all activities that use sensors provided in an information processing device.

First Example Embodiment

[0036] An information processing device **100** as a first example embodiment of the present invention will be described using FIG. **1**. The information processing device **100** is a device that is intended to be attached to the body of a user and selects a sensor to be controlled in accordance with an action plan of the user.

[0037] As illustrated in FIG. **1**, the information processing device **100** includes sensors **101**, an acquisition unit **102**, and a control unit **103**. The sensors **101** include a plurality of sensors **111** to **11***n*. The acquisition unit **102** acquires an action plan of a user. The control unit **103** selects a sensor to be controlled from among the plurality of sensors **111** to **11***n* based on the acquired action plan.

[0038] According to the present example embodiment, a sensor to be controlled can be selected from among a plurality of sensors based on an action plan of a user.

Second Example Embodiment

[0039] An information processing device according to a second example embodiment of the present invention will be described next using FIGS. **2** to **6**. FIG. **2** is a diagram illustrating an overview of an operation of an information processing device **200** according to the present example embodiment. Note that while the information processing device **200** will be described below by taking a wristwatch-type wearable terminal as an example, wearable terminals that are applicable as the information processing device **200** are not limited to this. The information processing device **200** may be a wearable terminal of a type such as a spectacle-type, shoe-type, and clothing-type.

[0040] Assume for example that a user **210** wearing an information processing device **200** such as a wearable device round his/her left wrist is going to go jogging. Then the user **210** wants to measure and record conditions of the user **210** doing the exercise by using various sensors provided in the wearable device and functions of the wearable device. In such a case, it is very troublesome for the user **210** to find out which of the sensor is to be activated in accordance with the exercise or the activity that the user **210** is going to perform and make a setting to turn on or off each individual sensor. In the case of jogging, the user **210** has to perform operations to turn on, for example, a heart rate sensor, an acceleration sensor, and a global positioning system (GPS) sensor among the various sensors and operations to turn off the other sensors.

[0041] To address this, in the present example embodiment, once a user **210** inputs, sets or otherwise chooses an action plan of the user **210**, the user **210** does not need to perform an operation to set each individual sensor and the information processing device **200** selects sensors to be controlled in accordance with the acquired action plan.

[0042] FIG. **3** is a block diagram illustrating a configuration of the information processing device **200** according to the present example embodiment. The information processing device **200** includes sensors **301**, an acquisition unit **302**, a control unit **303** and a storage unit **304**. The sensors **301** include sensors **311** to **31***n*.

[0043] The sensors **301** are a set of a plurality of sensors **311** to **31***n*, which may be sensors of different types that detect different phenomena or may include several sensors of the same type that detect the same phenomenon. For example, the sensors **311** to **31***n* may be a heart rate sensor, an acceleration sensor, a GPS sensor, an ambient temperature sensor, a body temperature sensor, an altitude sensor, a humidity sensor, a lactate level sensor, a respiratory rate sensor, a blood flow sensor, an oxygen level sensor, a blood-sugar-level sensor, a perspiration sensor, an alcohol sensor and the like. However, the sensors **311** to **31***n* are not limited to these sensors and may be any sensors that are capable of measuring some physical quantities.

[0044] The acquisition unit **302** acquires an action plan of the user **210**. Action plans of the user **210** include, for example, sports, healthcare, disease prevention and the like. These action plans are displayed on a screen for selecting an action plan of the user **210** or the like, as modes such as a

sports mode, a healthcare mode, and a disease prevention mode, for example. Action plans included in the sports mode include, but not limited to, action plans such as jogging, walking, cycling, golf, mountain climbing, tennis, soccer, baseball, swimming, indoor jogging, indoor walking, and indoor cycling. Action plans included in healthcare mode include action plans such as fatigue level check and water intake check, for example. Action plans included in the disease prevention mode include action plans such as heat attack, high-altitude disease, diabetes, heart failure, and kidney disease, for example. Action plans included in the healthcare mode and disease prevention mode are not limited to these action plans.

[0045] The control unit **303** selects a sensor **301** to be controlled from among the plurality of sensors **311** to **31***n* based on an action plan of the user **210** acquired by the acquisition unit **302**. For example, when the user **210** selects jogging in the sports mode as an action plan, the control unit **303** selects and activates the heart rate sensor, the acceleration sensor and the GPS sensor as sensors to be controlled. Thus, the control unit **303** includes the aspect of selecting and activating sensors **301** to be controlled and, conversely, includes the aspect of turning off sensors **301** that are not to be controlled. In other words, the control unit **303** activates sensors suitable for an action plan among the plurality of sensors **311** to **31***n* and, conversely, deactivates sensors that are not suitable for the action plan.

[0046] The control unit **303** also controls the sensitivity, precision, resolution, detection intervals, detection frequency and the like of the sensors **301**. For example, when the user **210** is performing an exercise such as jogging at a constant speed, the control unit **303** lengthens the intervals of detection of acceleration by the acceleration sensor or decreases the frequency of detection by the acceleration sensor.

[0047] Further, when the user **210** wearing the information processing device **200** selects the jogging mode, for example, and it is raining at the start of the jogging or it starts raining during the jogging, it is detected that the user **210** is heavily sweating, due to perspiration and the rainwater. To address this, sensor control unit **303** may lower the sensitivity of the perspiration sensor or stop detection by the perspiration sensor.

[0048] Further, the number of sensors **311** to **31***n*, such as the perspiration sensor, attached to the body of the user **210** is not limited to one but a plurality of sensors may be attached to the body of the user **210**. For example, when a plurality of perspiration sensors are attached to the body, the amounts of perspiration at different parts of the body can be measured.

[0049] The storage unit **304** stores action plans of the user **210** and sensors **301** to be controlled in association with each other.

[0050] FIG. **4**A is a diagram illustrating one example of a sensor combination table **401** provided in the information processing device **200** according to the present example embodiment. The sensor combination table **401** stores sensor combinations **412** in association with action plans (sports) **411**.

[0051] The sensor combinations **412** are combinations of sensors **301** that are related to action plans (sports) **411**, i.e. examples of combinations of sensors to be controlled. For example, when an action plan (sports) **411** is jogging, a combination of sensors **301** is the combination of three sensors: a heart rate sensor, an acceleration sensor, and a GPS sensor, which is a combination of sensors to be controlled. When an action plan (sports) **411** is golf, a combination of sensors **301** is the combination of the acceleration sensor and the GPS sensor; when an action plan (sports) **411** is mountain climbing, a combination of sensors is the combination of the heart rate sensor, the acceleration sensor, the GPS sensor, an ambient temperature sensor and an altitude sensor, which is a combination of sensors to be controlled.

[0052] The control unit **303** refers to the sensor combination table **401** and selects and controls a combination of sensors **301** that are related to an action plan. The method by which the control unit **303** selects a combination of sensors **301** is not limited to this. The control unit **303** may select and control sensors **301** to be used for an action plan acquired by the information processing device **200** that are suitable for the action plan on a case-by-case basis.

[0053] FIG. **4**B is a diagram illustrating one example of a sensor combination table **402** provided in the information processing device **200** according to the present example embodiment. The sensor combination table **402** stores sensor combinations **422** in association with action plans (prevention/management) **421**.

[0054] The sensor combinations **422** are combinations of sensors **301** related to action plans (prevention/management) **421**, i.e. examples of sensors to be controlled. For example, when an action plan (prevention/management) **421** is heat attack, a combination of sensors **301** to be controlled is a combination of three sensors: a body temperature sensor, an ambient temperature sensor and a humidity sensor. When an action plan (prevention/management) **421** is diabetes, a sensor **301** to be controlled is a blood-sugar-level sensor. The blood-sugar-level sensor measures a blood sugar level of the user **210** by irradiating an arm of the user **210** with light, for example. Likewise, the lactate level sensor and the blood flow sensor measure a lactate level and a blood flow, respectively, by irradiating an arm of the user **210** with light. The selection unit **303** selects a combination of sensors **301** with reference to the sensor combination table **402**.

[0055] FIG. **4**C is a diagram illustrating one example of a sensor activation condition table **403** provided in the information processing device **200** according to the present example embodiment. The sensor activation condition table **403** stores sensor activation conditions **432** in association with action plans (sports) **411**.

[0056] For example, as illustrated in FIG. **4**A, sensors **301** to be controlled are the same for jogging and walking; similarly, sensors **301** to be controlled are the same for tennis and soccer. However, conditions for activating the sensors **301** are different for jogging and walking and for tennis and soccer. For example, in the case of jogging, it is preferable to set a higher sensor sensitivity for the heart rate sensor and shorter detection intervals for the acceleration sensor since jogging is a relatively heavy exercise. On the other hand, in the case of walking, it is preferable to set a lower sensor sensitivity for the heart rate sensor and longer detection intervals for the acceleration sensor since walking is a relatively light exercise. The control unit **303** refers to the sensor activation condition table **403** and changes conditions for activating sensors, such as the sensor sensitivities and detection intervals of sensors **301** to be controlled, as appropriate in accordance with an action plan.

[0057] FIG. **5** is a block diagram illustrating a hardware configuration of the information processing device **200** according to the present example embodiment. A central processing unit (CPU) **510** is a processor for computation and control and executes a program to implement the functional components of the information processing device **200** in FIG. **3**. A read only memory (ROM) **520** stores initial data, fixed data for programs and the like, and programs. A communication control unit **530** communicates with external devices via a network. Note that the CPU **510** is not limited to a single CPU but may be a plurality of CPUs or may include a graphics processing unit (GPU) for image processing. Desirably, the communication control unit **530** has a CPU independent of the CPU **510** and writes or reads transmission/reception data in an area in a random access memory (RAM) **504**. Further, desirably, a direct memory access controller (DMAC) that transfers data between the RAM **540** and a storage **550** is provided (not depicted). In addition, desirably, an input/output interface **560** has a CPU independent of the CPU **510** and writes or reads input/output data in an area in the RAM **540**. The CPU **510** therefore recognizes that data has been received or transferred in the RAM **540** and processes the data. Further, the CPU **510** provides a result of processing in the RAM **540** and allows the communication control unit **530**, the DMAC, or the input/output interface **560** to transmit or transfer the result.

[0058] The RAM **540** is a random access memory used by the CPU **510** as a temporary-storage work area. An area for storing data required for implementing the present example embodiment is reserved in the RAM **540**. An acquired action plan **541** is an action plan of the user **210** acquired by the information processing device **200**. A sensor combination **542** is a combination of sensors **301** selected as sensors to be controlled, based on an acquired action plan. Measured values **543** are values measured by individual sensors **301**. Input/output data **544** is data input and output via the input/output interface **560**. Transmission/reception data **545** is data transmitted and received via the communication control unit **530**. An application execution area **546** is an area used by an application in processing other than storage control.

[0059] The storage **550** stores a database and various parameters, or data or programs which will be described below, required for implementing the present example embodiment. Sensor combination tables **401**, **402** and a sensor activation condition table **403** are tables configured as illustrated in FIGS. **4**A to **4**C.

[0060] The storage **550** further stores an acquisition module **551** and a control module **552**. The acquisition module **551** is a module that acquires an action plan of the user **210**. The control module **552** is a module that selects and controls sensors **301** to be controlled from among a plurality of sensors **301** based on an income↓ action plan. The modules **551** and **552** are loaded by the CPU **510** into the application execution area **546** of the RAM **540** and executed in the application execution area **546**. A control program **553** is a program for controlling the entire information processing device **200**.

[0061] The input/output interface **560** interfaces input/output data with input/output devices. A display unit **561** and an operation unit **562** are connected to the input/output interface **560**. A storage medium **563** may also be connected to the input/output interface **560**. In addition, a speaker, which is an audio output unit, a microphone, which is an audio input unit, or a GPS positioning unit may be connected to the input/output interface **560**. Note that programs and data relating to general-purpose functions and other implementable functions of the information processing device **200** are not depicted in the RAM **540** and the storage **550** illustrated in FIG. **5**.

[0062] FIG. **6**A is a flowchart illustrating a procedure of processing performed by the information processing device **200** according to the present example embodiment. The flowchart is executed by the CPU **510** in FIG. **5** by using the RAM **540** and implements the functional components of the information processing device **200** in FIG. **3**.

[0063] In step S**601**, the acquisition unit **302** acquires an action plan of the user **210**. In step S**603**, the control unit **303** selects a sensor to be controlled from among the plurality of sensors **301** based on the acquired action plan. In step S**605**, the control unit **303** activates the sensor to be controlled and makes a measurement. In step S**607**, the information processing device **200** determines whether to end the measurement. When the information processing device **200** determines not to end the measurement (NO in step S**607**), the information processing device **200** repeats step S**605** and the subsequent step. When the information processing device **200** determines to end the measurement (YES in step S**607**), the information processing device **200** ends the processing. The determination as to whether to end the measurement may be based on, but not limited to, whether or not the user **210** has performed an operation to end the measurement, for example.

[0064] According to the present example embodiment, a sensor to be controlled among the plurality of sensors can be controlled, based on an action plan of a user. Further, since a sensor to be controlled is selected and activated from among a plurality of sensors in accordance with an action plan of a user, sensors can be automatically activated without the user having to find out sensors to be activated and perform on/off operations. Consequently, the user can know his/her performance and goal achievement level and the like of an exercise or an activity without having to make detailed settings of the information processing device.

Third Example Embodiment

[0065] An information processing device according to a third example embodiment of the present invention will be described next using FIGS. **7** to **10**. FIG. **7** is a block diagram for explaining a configuration of an information processing device **700** according to the present example embodiment. The information processing device **700** according to the present example embodiment differs from the second example embodiment described above in that the information processing device **700** includes a user information acquisition unit and a motion estimation unit. The rest of the configuration and operations are similar to the configuration and operations of the second example embodiment and therefore like configurations and operations will be given like reference numerals and detailed description thereof will be omitted.

[0066] The information processing device **700** includes a user information acquisition unit **701** and a motion estimation unit **702**. The user information acquisition unit **701** acquires user information such as personal information and health conditions of a user. For example, when the user **210** is diabetic, a control unit **303** selects and activates a sensor

301 to be controlled, based on an action plan and user information acquired by the information processing device 200.

[0067] For example, the user 210 who is a diabetic and is measuring his/her blood sugar level at predetermined intervals or continuously by using the information processing device 700 sets jogging as an action plan. Then, the control unit 303 of the information processing device 700 selects and activates a heart rate sensor, an acceleration sensor and a GPS sensor since jogging is set. However, by doing this, a blood-sugar-level sensor is turned off and the diabetic user 210 cannot measure his/her blood sugar level at predetermined intervals or otherwise. The control unit 303 therefore selects and activates the blood-sugar-level sensor in addition to the heart rate sensor, the acceleration sensor and the GPS sensor as sensors 301 to be controlled by taking into consideration the user information acquired by the user information acquisition unit 701. Since the control unit 303 controls sensors in this way, the blood-sugar-level sensor is prevented from automatically turning off, thereby allowing the user 210 to measure his/her blood sugar level even during jogging.

[0068] Further, the control unit 303 may select and activate a sensor 301 to be controlled, based on a schedule of the user 210 that is contained in user information. For example, the user information acquisition unit 701 acquires a schedule of the user 210 from a scheduler installed in the information processing device 700 and automatically collects an action plan of the user from the acquired schedule. Based on the automatically collected action plan of the user 210, the control unit 303 selects and activates a sensor 301 to be controlled. For example, in the case where the user 210 habitually starts jogging at 7 a.m. every morning, once the user 210 registers information indicating that the user 210 starts jogging at 7 a.m. in the scheduler, then, at 7 a.m., controller 303 selects and activates sensors to be controlled during jogging. In this way, the information processing device 700 automatically activates sensors 301 at 7 a.m. every morning without the user 210 having to operate the information processing device 700 to set a jogging mode at 7 a.m. every morning.

[0069] The motion estimation unit 702 estimates a motion of the user 210 from measured values from active sensors 301. For example, when the acceleration sensor and the GPS sensor are in the on state and the user 210 starts to move, the motion estimation unit 702 estimates a motion that the user 210 may make from acceleration measured by the acceleration sensor, speed derived from the acceleration, or a length of move, travel time, and the like derived from the measured value from the GPS sensor. For example, when the user 210 has traveled a significant distance in a short time or the acceleration increases in a short time and the average movement rate increases, the motion estimation unit 702 can estimate that the user 210 has started jogging. Then the information processing device 700 estimates an action plan of the user 210 and automatically selects sensors 301 to be controlled without the user 210 having to set jogging as an action plan. In this way, the motion estimation unit 702 estimates a motion of the user 210 to allow the user 210 to measure his/her performance of an exercise when the user 210 feel like doing so, without having to set an action plan.

[0070] FIG. 8 is a diagram illustrating one example of a user information table 801 provided in the information processing device 700 according to the present example embodiment. The user information table 801 stores information such as the sex 812, the age 813, an activity 814, health information 815, and a schedule 816 in association with a user identifier (ID) 811. The user information acquisition unit 701 refers to the user information table 801 and acquires user information concerning the user 210 wearing the information processing device 700. Note that the method by which the user information acquisition unit 701 acquires user information is not limited to this. For example, the user information acquisition unit 701 may acquire user information from data manually input by the user 201.

[0071] The control unit 303 may determine, based on the user information acquired by the user information acquisition unit 701, what kind of exercise or activity the user 210 does and may select and activate sensors 301 to be controlled.

[0072] FIG. 9 is a block diagram illustrating a hardware configuration of the information processing device 700 according to the present example embodiment. A RAM 940 is a random access memory used by the CPU 510 as a temporary-storage work area. An area for storing data required for implementing the present example embodiment is reserved in the RAM 940. User information 941 is information such as personal information and health information concerning the user 210 wearing the information processing device 700 and is temporarily stored in the RAM 940. The user information 941 may be loaded from a database that stores user information, not depicted, into the RAM 940.

[0073] A storage 950 stores a database and various parameters, or data or programs, which will be described below, required for implementing the present example embodiment. A user information table 801 is a table configured as illustrated in FIG. 8 and is stored in the storage 950.

[0074] The storage 950 further stores a user information acquisition module 951 and a motion estimation module 952. The user information acquisition module 951 is a module that acquires user information. The motion estimation module 952 is a module that estimates a motion of the user 210. The modules 951 and 952 are loaded by the CPU 510 into an application execution area 546 of the RAM 940 and is executed in the application execution area 546.

[0075] FIG. 10A is a flowchart illustrating a procedure of processing performed by the information processing device 700 according to the present example embodiment. The flowchart is executed by the CPU 510 in FIG. 9 by using the RAM 940 and implements the functional components of the information processing device 700 in FIG. 7. In step S1001, the user information acquisition unit 701 acquires user information concerning the user 210 wearing the information processing device 700.

[0076] FIG. 10B is another example of a flowchart illustrating a procedure of processing performed by the information processing device 700 according to the present example embodiment. The flowchart is executed by the CPU 510 in FIG. 9 by using the RAM 940 and implements the functional components of the information processing device 700 in FIG. 7.

[0077] In step S1021, the information processing device 700 turns on predetermined sensors, for example the acceleration sensor and the GPS sensor and the like. In step S1023, the motion estimation unit 702 estimates a motion of the user by using the sensors 301 that are turned on. In step

S1025, based on the motion estimation, the control unit **303** selects and activates a sensor **301** to be controlled.

[0078] According to the present example embodiment, a combination of sensors to be activated can be selected from among a plurality of sensors in accordance with a purpose of use of the information processing device. Further, a sensor to be activated can be selected based on user information. Moreover, a combination of sensors to be activated can be selected by estimating a motion of the user. Accordingly, the user can measure and evaluate his/her performance and goal achievement level of an exercise and an activity without having to perform complicated setting operations of the information processing device.

Fourth Example Embodiment

[0079] An information processing device according to a fourth example embodiment of the present invention will be described next using FIGS. **11** to **14**. FIG. **11** is a block diagram for explaining a configuration of an information processing device **1100** according to the present example embodiment. The information processing device **1100** according to the present example embodiment differs from the third example embodiment described above in that the information processing device **1100** includes a related/associated sensor selection unit. The rest of the configuration and operations are similar to the configuration and operations of the third example embodiment and therefore like configurations and operations will be given like reference numerals and detailed description thereof will be omitted.

[0080] A related/associated sensor selection unit **1101** selects a sensor that is associated with a combination of sensors **301** selected by a selection unit **303**. For example, when a user **210** sets jogging, associated or related sensors are a combination of sensors **301** capable of detecting heat attack or a combination of sensors **301** capable of checking a fatigue level.

[0081] FIG. **12** is a diagram illustrating one example configuration of a related/associated item table **1201** provided in the information processing device **1100** according to the present example embodiment. The related/associated item table **1201** stores related/associated items **1212** in association with purposes **1211**. A related/associated item **1212** is not a main sensor or a main measurement item for a purpose **1211** but is an item about which the user **210** needs to be careful in an exercise or activity and is an item related to or associated with the main purpose. For example, in the case where the purpose **1211** is jogging, the related/associated items **1212** are heat attack, fatigue level check, water intake check and the like. The related/associated sensor selection unit **1101** refers to the related/associated item table **1201** to determine a related/associated item **1212** for a main purpose and selects a combination of sensors **301** to be used for the determined related/associated item **1212**.

[0082] FIG. **13** is a block diagram illustrating a hardware configuration of the information processing device **1100** according to the present example embodiment. A RAM **1340** is a random access memory used by the CPU **510** as a temporary-storage work area. An area for storing data required for implementing the present example embodiment is reserved in the RAM **1340**. The related/associated items **1341** are loaded from the related/associate item table **1201** stored in a storage **1350**, for example.

[0083] The storage **1350** stores a database and various parameters, or data or programs, which will be described below, required for implementing the present example embodiment. The related/associated item table **1201** is a table configured as illustrated in FIG. **12**.

[0084] The storage **1350** further stores a related/associated sensor selection module **1351**. The related/associate sensor selection module **1351** is a module that selects a sensor related to or associated with an acquired action plan. The related/associated sensor selection module **1351** is loaded by the CPU **510** into an application execution area **547** in the RAM **940** and executed in the application execution area **547**.

[0085] FIG. **14** is a flowchart illustrating a procedure of processing performed by the information processing device **1100** according to the present example embodiment. The flowchart is executed by the CPU **510** in FIG. **13** using the RAM **940** and implements the functional components of the information processing device **1100** in FIG. **11**. In step S**1401**, the related/associate sensor selection **1101** selects a sensor **301** that is related to or associated with an action plan. In step S**1403**, the information processing device **1100** activates a sensor to be controlled and the related/associated sensor.

[0086] According to the present example embodiment, a combination of sensors can be selected in accordance with an action plan of a user and, in addition, a sensor associated with the selected sensors can be selected. Accordingly, the user can know predictive signals of an accident and injury due to an exercise, and disease, in addition to measuring his/her performance and the like and can prevent such an accident, injury and disease.

OTHER EXAMPLE EMBODIMENTS

[0087] While the present invention has been described with reference to example embodiments, the present invention is not limited to the example embodiments described above. Various modifications that can be understood by those skilled in the art can be made to configurations and details of the present invention within the scope of the present invention.

[0088] Further, systems and devices that are any combinations of different features included in the example embodiments also fall within the scope of the present invention.

[0089] The present invention may be applied to a system made up of a plurality of devices or may be applied to a single device. Moreover, the present invention is also applicable to a case where an information processing program that implements functions of an example embodiment is provided directly or remotely to a system or a device. Accordingly, a program installed in a computer in order to implement functions of the present invention by the computer, or a medium that stores the program, and a World Wide Web (WWW) server that allows the program to be downloaded also fall within the scope of the present invention. In particular, a non-transitory computer readable medium that stores a program that causes a computer to execute processing steps included in at least the example embodiments described above falls within the scope of the present invention.

[0090] This application is based upon and claims the benefit of priority from the Japanese Patent Application No. 2015-186278 filed on Sep. 24, 2015, the entire disclosure of which is incorporated herein.

1. An information processing device configured to be attached to a body of a user, comprising:
a plurality of sensors;
an acquisition unit configured to acquire an action plan of the user; and
a control unit configured to select a sensor to be controlled among the plurality of sensors, based on the acquired action plan.

2. The information processing device according to claim 1, wherein
the control unit activates a sensor that is suitable for the action plan among the plurality of sensors.

3. The information processing device according to claim 1, wherein
the control unit deactivates a sensor that is not suitable for the action plan among the plurality of sensors.

4. The information processing device according to claim 1, further comprising a storage unit configured to store the action plan and the sensor to be controlled in association with each other.

5. The information processing device according to claim 1, further comprising a user information acquisition unit configured to acquire user information concerning the user, wherein
the control unit selects the sensor to be controlled, further based on the user information.

6. The information processing device according to claim 1, further comprising an estimation means that estimates a motion of the user, wherein
the control unit configured to select the sensor to be controlled, further based on a result of estimation by the estimation means.

7. The information processing device according to claim 1 further comprising a related/associated sensor selection unit configured to select a sensor related to or associated with the acquired action plan among the plurality of sensors.

8. The information processing device according to claim 1, wherein
the control unit controls at least one of sensitivity, a detection interval, and a detection frequency of the sensor.

9. The information processing device according to claim 1, wherein
the plurality of sensors include at least one of a heart rate sensor, an acceleration sensor, a GPS sensor, an ambient temperature sensor, a body temperature sensor, an altitude sensor, a humidity sensor, a lactate level sensor, a respiratory rate sensor, a blood flow sensor, an oxygen level sensor, a blood-sugar-level sensor, a perspiration sensor, and an alcohol sensor.

10. A control method for an information processing device that includes a plurality of sensors and is configured to be attached to a body of a user, the control method comprising:
acquiring an action plan of the user; and
selecting a sensor to be controlled among the plurality of sensors, based on the acquired action plan.

11. A non-transitory computer readable storage medium that stores control program for an information processing device that includes a plurality of sensors and is configured to be attached to a body of a user, the control program causing a computer to execute:
acquiring an action plan of the user; and
selecting a sensor to be controlled among the plurality of sensors, based on the acquired action plan.

12. The information processing device according to any one of claim 2, further comprising a storage unit configured to store the action plan and the sensor to be controlled in association with each other.

13. The information processing device according to any one of claim 3, further comprising a storage unit configured to store the action plan and the sensor to be controlled in association with each other.

14. The information processing device according to any one of claim 2, further comprising a user information acquisition unit configured to acquire user information concerning the user, wherein
the control unit selects the sensor to be controlled, further based on the user information.

15. The information processing device according to any one of claim 3, further comprising a user information acquisition unit configured to acquire user information concerning the user, wherein
the control unit selects the sensor to be controlled, further based on the user information.

16. The information processing device according to any one of claim 4, further comprising a user information acquisition unit configured to acquire user information concerning the user, wherein
the control unit selects the sensor to be controlled, further based on the user information.

17. The information processing device according to claim 2, further comprising an estimation means that estimates a motion of the user, wherein
the control unit configured to select the sensor to be controlled, further based on a result of estimation by the estimation means.

18. The information processing device according to claim 3, further comprising an estimation means that estimates a motion of the user, wherein
the control unit configured to select the sensor to be controlled, further based on a result of estimation by the estimation means.

19. The information processing device according to claim 4, further comprising an estimation means that estimates a motion of the user, wherein
the control unit configured to select the sensor to be controlled, further based on a result of estimation by the estimation means.

20. The information processing device according to claim 5, further comprising an estimation means that estimates a motion of the user, wherein
the control unit configured to select the sensor to be controlled, further based on a result of estimation by the estimation means.

* * * * *

专利名称(译)	信息处理设备，信息处理设备的控制方法和存储介质		
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摘要(译)

该信息处理设备根据用户的活动计划选择要控制的传感器。信息处理设备附着在用户的身体上。信息处理设备具有：多个传感器;用于获取用户的活动计划的获取装置;控制装置，基于所获取的活动计划从多个传感器中选择要控制的传感器。控制装置从多个传感器中激活适合于活动计划的传感器，并且使多个传感器中的不适合活动计划的传感器不活动。