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(54) **Sample measuring device and sample measuring system**

Messvorrichtung und Messsystem für Proben

Dispositif de mesure et système de mesure pour échantillons

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention:

[0001] The present invention relates to a sample measuring device and a sample measuring system.

2. Description of the Related Art:

[0002] Fig. 14 illustrates an example of sample measuring system (see Patent Document 1, for example). The sample measuring system 900 shown in the figure comprises a sample measuring device 91 and a personal computer 93 (hereinafter referred to as "PC 93"). For instance, the sample measuring device 91 is a self-monitoring blood glucose meter (SMBG meter) which enables users to measure their own blood glucose levels. Measurement by the sample measuring device 91 is performed by inserting a sensor strip 92 into the sample measuring device 91 and applying blood to the sensor strip 92. Before or after the measurement, the sample measuring device 91 is connected to the PC 93 via a cable 94. The measurement data obtained by the sample measuring device 91 is sent to the PC 93 via the cable 94 and stored in the PC 93. The PC 93 is capable of storing data of a plurality of measurements. The stored measurement data can be checked by e.g. a doctor so that the doctor can provide treatment or medicine suitable for the diabetes symptoms of the user.

[0003] However, it is troublesome to connect the sample measuring device 91 and the PC 93 via the cable 94 at each time of measurement. When the user fails to connect the sample measuring device 91 via the cable 94, the measurement data is not stored in the PC 93. In such a case, it may be difficult for the doctor to provide the user with proper treatment or medicine.

[0004] Patent Document 1: JP-A1-2008-136437

[0005] Background art is provided in US 2011/063094 A1, US 2010/312082 A1, EP 2 001 188 A1, US 2008/318624 A1 and US 2010/305421 A1.

[0006] US 2011/063094 A1 discloses an electronic device configured to communicate wirelessly with another electronic device. The electronic device includes a first processor configured to control only wireless communications with the another device but not operations associated only with the electronic device, a second processor configured to control the operations associated only with the electronic device but not the wireless communications with the another device, and a memory device connected between the first and second processors. The first and second processors may each be configured to exchange information with the memory device separately and independently of the exchange of information by the other of the first and second processors with the memory device.

[0007] US 2010/312082 A1 discloses an embeddable module for measuring a blood glucose level, which module may be embedded in an external host and may comprise a host interface, a microcontroller, an ASIC, a temperature measuring element, and a measurement strip port. The host interface permits electrical communication between the host and the microcontroller. The microcontroller and ASIC can communicate with each other and work together to measure the blood glucose level of a blood sample. The measurement strip port can receive a removable measurement strip having the blood sample. The ASIC can communicate with the measurement strip port such that the ASIC can receive signals from the measurement strip port related to the blood glucose level of the blood sample.

[0008] EP 2 001 188 A1 discloses a method for authenticating a medical device, in particular an infusion pump, and a remote device, wherein the medical device and the remote device are placed in communication range and an authentication phase is performed, the authentication phase comprising the steps of generating and displaying a PIN code by the medical device, waiting for a user input of the displayed PIN code into the remote device, checking the authentication of the entered PIN code by the medical device, generating a key by the medical device, sending the key encrypted to the remote device, checking the authentication of the sent key by the medical device and upon successful authentication storing the key in a non-volatile memory of the medical device and of the remote device.

[0009] US 2008/318624 A1 discloses a personal virtual assistant. The personal virtual assistant includes a medical device and remote station that is connectable via a wireless network to a server containing a control processor and rules engine. The medical device is used to provide physiological information to the remote station. The remote station communicates the physiological information and other related information to the server that monitors the information for a number of reasons, including determining whether the physiological information has a trend. Based on the detrimental trend, the server communicates back to the remote station virtual assistance in the form of advice to help facilitate halting or reversing the trend.

[0010] US 2010/305421 A1 discloses a glucose monitor having only a test strip reader and wireless transmission to a remote hand held calculation processor. All glucose data processing occurs in a remote hand held calculator processor with the glucose monitor providing only sensing and wireless transfer of data. In an embodiment, the glucose monitor includes a button for use in wirelessly pairing the monitor to a smart phone for data communication with a non-proprietary communication protocol, and a light source to communicate the progress of the pairing. In a further embodiment, the glucose monitor includes a switch coupled to the strip reader such that power is applied to the monitor when a test strip is inserted and power is removed with the withdrawal of the test strip. In another embodiment, inserting the test strip and

activating the switch also places the glucose monitor into the pairing search mode to communication with a host remote processor.

SUMMARY OF THE INVENTION

[0011] The present invention has been proposed under the circumstances described above. It is therefore an object of the present invention to provide a sample measuring device and a sample measuring system capable of reducing burdens on the user.

[0012] The present invention is a sample measuring device as defined in claim 1 of the appended claims. Also provided is a sample measuring system as defined in claim 9.

[0013] According to a first aspect of the present invention, there is provided a sample measuring device including a measuring unit for performing measurement with respect to a particular component contained in a sample, a measurement data storage unit for storing measurement data obtained by the measuring unit, a display unit for displaying the measurement data, a sensor strip detector for detecting insertion and removal of a sensor strip to which the sample is applied, and a first data transmitter/receiver for transmitting the measurement data via wireless communication. The first data transmitter/receiver performs an initial authentication process for wireless communication after insertion of the sensor strip is detected by the sensor strip detector. The sample measuring device is configured such that, when the first data transmitter/receiver detects the presence of a plurality of communication devices with which wireless connection can be established, the plurality of communication devices are identified and indicated on the display unit as a possible connection target devices, either periodically one-by-one, or as a list of names with a frame that moves periodically to alternately surround each of the names in the list. The first data transmitter/receiver is further configured to perform the initial authentication process with respect to the one of the plurality of communication devices which is being indicated on the display unit when there is a change in a detection state of the sensor strip detector due to removal and subsequent re-insertion of the sensor strip with respect to the sample measuring device.

[0014] In a preferred embodiment of the present invention, when insertion of the sensor strip is detected by the sensor strip detector, the sample measuring device switches from a standby state in which the measurement is not possible to an operation state in which the measurement is possible.

[0015] In a preferred embodiment of the present invention, when removal of the sensor strip is detected by the sensor strip detector, the sample measuring device switches from the operation state to the standby state.

[0016] In a preferred embodiment of the present invention, the sample measuring device further includes an authentication code storage portion for storing an authentication code to be used for the initial authentication process, and the authentication code is displayed on the display unit in the initial authentication process.

[0017] In a preferred embodiment of the present invention, the sample measuring device further includes an authentication code print portion in which an authentication code to be used for the initial authentication process is printed.

[0018] In a preferred embodiment of the present invention, the authentication code is a product identification code.

[0019] In a preferred embodiment of the present invention, the first data transmitter/receiver performs wireless communication based on Bluetooth (registered trademark) standard.

[0020] In a preferred embodiment of the present invention, the particular component is blood sugar, and the sample measuring device is structured as a self-monitoring blood glucose meter.

[0021] According to a second aspect of the present invention, there is provided a sample measuring system including the sample measuring device provided according to the first aspect of the present invention, and a communication device including a second data transmitter/receiver which is a target for the initial authentication process performed by the first data transmitter/receiver of the sample measuring device.

[0022] In a preferred embodiment of the present invention, the communication device includes an input unit for inputting an authentication code provided by the sample measuring device.

[0023] According to the present invention, when the user inserts the sensor strip into the sample measuring device to perform measurement, whether or not the pairing has been completed is determined automatically, and if not completed, the pairing process occurs automatically. Thus, establishment of the connection between the sample measuring device and the communication device does not require any special work by the user. The user can transmit measurement data from the sample measuring device to the communication device without worrying about whether or not the connection with the communication device has been established.

[0024] Other features and advantages of the present invention will become more apparent from detailed description given below with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025]

Fig. 1 is a perspective view showing an example of sample measuring device and sample measuring system according to the present invention;

Fig. 2 is a system block diagram of the example of sample measuring device according to the present invention;

Fig. 3 is a system block diagram of a communication device used for the example of sample measuring system according to the present invention;
Fig. 4 is a flowchart showing the operation of the example of sample measuring device according to the present invention;
Fig. 5 is a flowchart showing the pairing process of the example of sample measuring system according to the present invention;
Fig. 6 is a front view of the example of sample measuring device, showing the insertion and removal of a sensor strip;
Fig. 7 is a front view of a display in a step for selecting a pairing target device in the pairing process of the example of sample measuring system according to the present invention;
Fig. 8 is a front view of a display in a step for showing a passkey in the pairing process of the example of sample measuring system according to the present invention;
Fig. 9 is a front view of a display in a step for inputting a passkey in the pairing process of the example of sample measuring system according to the present invention;
Fig. 10 is a rear view of a variation of sample measuring device according to the present invention;
Fig. 11 is a flowchart showing a variation of pairing process of the sample measuring system according to the present invention;
Fig. 12 is a front view showing an example of display of the sample measuring device in a step for selecting a pairing target device in the pairing process shown in Fig. 11;
Fig. 13 is a front view showing another example of display of the sample measuring device in a step for selecting a pairing target device in the pairing process shown in Fig. 11;
Fig. 14 is a perspective view showing an example of conventional sample measuring device and sample measuring system.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0026] Preferred embodiments of the present invention are described below with reference to the accompanying drawings.

[0027] Fig. 1 shows an example of sample measuring device and sample measuring system according to the present invention. The sample measuring system 101 of this embodiment includes a sample measuring device 201 and a communication device 301.

[0028] The sample measuring device 201 is structured as e.g. a self-monitoring blood glucose meter (SMBG meter) used for self-measurement of blood glucose level by the user. As shown in Figs. 1 and 2, the sample measuring device 201 includes a case 210, a measurement unit 220, a measurement data storage unit 225, a display 230, a sensor strip detector 240, a controller 260, an authentication code storage portion 270 and a communication unit 280. The sample measuring device 201 uses a sensor strip 290 for measurement. The sensor strip 290 has a sample application portion 291. To perform measurement with the sample measuring device 201, the sensor strip 290 is inserted into the insertion port 211, and blood of the user is applied to the sample application portion 291.

[0029] The case 210 is made of e.g. resin and defines the outer configuration of the sample measuring device 201. The case 210 has the insertion port 211 into which the sensor strip 290 is to be inserted. The sensor strip detector 240 is provided behind the insertion port 211 and detects the insertion of the sensor strip 290. For instance, the sensor strip detector 240 may comprise a mechanical lever (not shown) which pivots when the sensor strip 290 is inserted or a pair of detection electrodes (not shown) which are electrically connected to each other when the sensor strip 290 is inserted.

[0030] The measurement unit 220 serves to measure the blood glucose level. For instance, the measurement unit 220 includes a terminal (not shown) to be electrically connected to the sensor strip 290 to which blood has been applied and measures the blood glucose level by an electrical method. The measurement data storage unit 225 comprises e.g. a memory and stores the measurement data obtained by the measurement unit 220. The display 230 is an example of the display unit according to the present invention and serves to show measurement data and so on. For instance, the display 230 comprises a liquid crystal display panel.

[0031] The controller 260 controls each part of the sample measuring device 201 during the measurement operation, and comprises e.g. a CPU.

[0032] The communication unit 280 is an example of the first data transmitter/receiver according to the present invention and serves to transmit and receive data via wireless communication. In this embodiment, the communication unit 280 performs wireless communication based on the Bluetooth standard. Thus, the communication unit 280 is capable of performing interactive wireless communication.

[0033] The authentication code storage portion 270 serves to store a passkey (authentication code) necessary for the pairing process (initial authentication process) for establishing a connection between the sample measuring device 201 and the communication device 301. In the wireless communication based on the Bluetooth standard, after the pairing process is performed once, communication between the paired devices is allowed when the devices are located within a predetermined distance from each other.

[0034] The communication device 301 is e.g. a mobile phone and has a function to receive and store the measurement data transmitted from the sample measuring device 201 and transmit the measurement data to e.g. a server device (not shown) via a public communication

network. As shown in Figs. 1 and 3, the communication device 301 includes a communication unit 310, a communication unit 315, a controller 320, a display 330 and an operation unit 360.

[0035] The communication unit 310 is an example of the second data transmitter/receiver according to the present invention and serves to transmit and receive data via wireless communication. In this embodiment, the communication unit 310 performs wireless communication based on the Bluetooth standard. Thus, the communication unit 310 is capable of performing interactive wireless communication. The communication unit 315 serves to make access to a mobile phone network via wireless communication. Thus, the communication device 301 is capable of making access to the mobile phone network and to the Internet via the mobile phone network.

[0036] The controller 320 controls each portion of the communication device 301 during the measurement operation, and comprises e.g. a CPU. For instance, the display 330 comprises a liquid crystal display panel. The operation unit 360 comprises e.g. dial keys or arrow keys.

[0037] The operation of the sample measuring device 201 and the sample measuring system 101 are described below with reference to Figs. 4-9.

[0038] Fig. 4 is a flowchart showing the operation of the sample measuring device 201. The operation of the sample measuring device 201 starts from Step S0. In Step S0, the display 230 is in a non-display state, and the sample measuring device 201 is in a so-called "power-off state". In this state, however, the sensor strip detector 240 is in a state capable of detecting the sensor strip 290. Specifically, when the sensor strip detector 240 is designed to detect the sensor strip 290 by an electrical method, the sensor strip detector 240 is supplied with electric power. When the sensor strip detector 240 does not require electric power, power supply may be completely shut off. This state, which corresponds to a so-called "power-off state" and in which the sensor strip detector 240 is ready to detect, is defined as the "standby state" in the present invention.

[0039] Then, in Step S1, whether or not the sensor strip 290 is inserted is detected by the sensor strip detector 240. When the sensor strip 290 is inserted as shown in Fig. 6, an insertion detection signal is transmitted from the sensor strip detector 240 to the controller 260 (see Fig. 2). Upon receiving the signal, the controller 260 starts to supply electric power to the entirety of the sample measuring device 201. Thus, in Step S2 in Fig. 4, the sample measuring device 201 switches to a so-called "power-on state". This state is defined as the "operation state" in the present invention.

[0040] Then, in Step S4, whether or not the pairing has been completed is determined. Specifically, the controller 260 receives a status signal of the communication unit 280, and, when it is determined that the pairing has not been completed, causes the pairing process of Step S40 to start. Instead of this automatic proceeding from Step S4 to Step S40 based on the determination by the controller 260, the sample measuring device 201 may be designed such that the process proceeds from Step S4 to Step S40 when the sensor strip 290 is once removed and then inserted again by the user.

[0041] Fig. 5 is a flowchart showing the pairing process between the sample measuring device 201 and the communication device 301. In the sample measuring device 201, the pairing process is started in Step S41. In the communication device 301, the pairing process is started in Step S42 by the user' s predetermined operation using e.g. the operation unit 360.

[0042] In Step S411, an identification signal is sent out from the communication unit 280 of the sample measuring device 201. The identification signal is a signal for allowing the communication device 301 to detect the presence of the sample measuring device 201. When the communication unit 310 of the communication device 301 receives the identification signal in Step S421, the controller 320 displays on the display 330 the information contained in the identification signal in Step S422, as shown in Fig. 7. In this embodiment, the identification signal contains the name of the sample measuring device 201, which is "SMBG1" in this example, so that "SMBG1" is shown on the display 330 as a possible pairing target device.

[0043] Then, in Step S423 shown in Fig. 5, the pairing target device is selected. Specifically, in this embodiment, names of a plurality of devices which can be paired with the communication device 301, including "SMBG1", are listed on the display 330 as possible pairing target devices, as shown in Fig. 7. In this instance, the frame in the display 330 which surrounds one of the names of the devices can be moved up and down by e.g. pressing an arrow key of the operation unit 360. Thus, by positioning the frame around the name of the desired device and then pressing the decision button of the operation unit 360, the desired device is selected as the pairing target device for the communication device 301. In this embodiment, "SMBG1" is selected.

[0044] When selection of the pairing target device is completed in Step S423 in Fig. 5, input of the passkey is requested in Step S424 in the communication device 301. On the other hand, in the sample measuring device 201, when Step S411 is completed, the passkey is shown in Step S412. Specifically, the passkey stored in the authentication code storage portion 270 is shown on the display 230 of the measuring device 201 as shown in Fig. 8 in Step S412, while a message to prompt the user to input the passkey is shown on the display 330 of the communication device 301 as shown in Fig. 9 in Step S424. In Step S424, the passkey shown on the display 230 is inputted into the communication device 301 by using e.g. numeric keys of the operation unit 360.

[0045] Then, in Step S425, the controller 320 of the communication device 301 sends out the passkey, inputted in Step S424, from the communication unit 310. In Step S413, the sample measuring device 201 receives the passkey through the communication unit 280. Then,

in Step S414, the passkey received is checked against the passkey stored in the authentication code storage portion 270. When these keys match with each other, the sample measuring device 201 sends out a pairing enabling signal from the communication unit 280 in Step S415. The communication device 301 receives the pairing enabling signal through the communication unit 310 in Step S426. After the pairing process is completed in this way in Step S43, the sample measuring device 201 and the communication device 301 can perform interactive wireless communication based on the Bluetooth standard.

[0046] Thereafter, in Step S5 in Fig. 4, the blood glucose level is measured by the measurement unit 220. The blood glucose level data obtained is stored in the measurement data storage unit 225. In Step S6, the blood glucose level data is transmitted from the communication unit 280 to the communication device 301. This data transmission may be performed automatically when the connection between the sample measuring device 201 and the communication device 301 is established or may be performed by the selection operation by the user. Thereafter, when removal of the sensor strip 290 is detected by the sensor strip detector 240 in Step S7, the sample measuring device 201 is switched to the power-off state in Step S8.

[0047] The advantages of the sample measuring device 201 and the sample measuring system 101 are described below.

[0048] According to the present invention, when the user inserts the sensor strip 290 into the sample measuring device 201 to perform measurement, whether or not the pairing has been completed is determined automatically, and if not completed, the pairing process occurs automatically. Thus, establishment of the connection between the sample measuring device 201 and the communication device 301 does not require any special work by the user. The user can transmit measurement data from the sample measuring device 201 to the communication device 301 without worrying about whether or not the connection with the communication device 301 has been established.

[0049] With the use of the wireless communication based on the Bluetooth standard for data transmission between the sample measuring device 201 and the communication device 301, when the sample measuring device 201 and the communication device 301 are within a predetermined distance from each other, the data transmission can be started automatically, so that the user does not need to worry about whether or not the connection has been established. The sample measuring device 201 switches between the power-on state and the power-off state in accordance with the insertion and removal of the sensor strip 290. This means that switching of the sample measuring device 201 between the power-on state and the power-off state occurs in accordance with the user's intention to perform measurement, just by the operation essential to the measurement, and without the need for any additional operation. Thus, according to the sample measuring device 201, the measurement and the communication with the communication device 301 can be started easily as the user desires.

[0050] Since the passkey stored in the authentication code storage portion 270 is shown on the display 230 of the sample measuring device 201, the user does not need to check the manual or the like of the sample measuring device 201 for the passkey. Since the passkey generally consists of a relatively small number of alphanumeric characters, the display 230 does not need to be made large to show the passkey.

[0051] Figs . 10-13 show variations of the sample measuring device and the sample measuring system according to the present invention. In these figures, the elements which are identical or similar to those of the foregoing embodiment are designated by the same reference signs as those used for the foregoing embodiment.

[0052] Fig. 10 shows a variation of the sample measuring device 201. The sample measuring device 201 of this variation includes an authentication code print portion 275 instead of the authentication code storage portion 270. The authentication code print portion 275 comprises e.g. a label which is attached to the back surface of the case 210 and on which the passkey is printed. In the pairing process according to this variation, displaying the passkey in Step S412 is performed not at the display 230 but at the authentication code print portion 275. In Step S424, the user inputs the passkey printed on the authentication code print portion 275.

[0053] According to this variation again, the user can transmit measurement data from the sample measuring device 201 to the communication device 301 without worrying about whether the connection with the communication device 301 has been established. Further, reading the passkey printed on the authentication code print portion 275 such as a label may be easier for some users, such as elderly people, than reading the passkey shown on the display.

[0054] Fig. 11 shows a variation of the pairing process of the sample measuring system 101. In this variation, selection of the pairing target device is performed not only by the communication device 301 but also by the sample measuring device 201. Specifically, the communication device 301 sends out an identification signal in Step S427. The identification signal sent out by the communication device 301 is received by the sample measuring device 201 in Step S416, and the name of the communication device 301 is shown in Step S417 on the display 230 of the sample measuring device 201. In this example, the name "Phone 1" of the communication device 301 is shown. In this step, when there are other possible target devices which can be paired with the sample measuring device 201, a plurality of device names, including the name "Phone 1", are shown on the display 230 alternately, each for a certain period of time. In Step S418 shown in Fig. 11, the user selects the desired pairing target device by once pulling out and then inserting

again the sensor strip 290 when the name of the desired pairing target device ("Phone 1" in this example) is shown on the display 230.

[0055] Fig. 13 shows another way of displaying the names of pairing target devices in Step S417. In this instance, the names of a plurality of possible pairing target devices are shown as a list on the display 230. In the display 230, there is shown a frame surrounding one of the names of the possible pairing target devices. The frame moves periodically to alternately surround each of the names of the possible pairing target devices . In Step S418 shown in Fig. 11, the user selects the desired pairing target device by once pulling out and then inserting again the sensor strip 290 when the name of the desired pairing target device ("Phone 1" in this example) is surrounded by the frame.

[0056] According to this variation again, the user can transmit measurement data from the sample measuring device 201 to the communication device 301 without worrying about whether the connection with the communication device 301 has been established. Moreover, when there a plurality of devices of the type similar to the communication device 301 are present, pairing the sample measuring device 201 erroneously with an undesired communication device is prevented more reliably.

[0057] The sample measuring device and sample measuring system according to the present invention is not limited to the foregoing embodiments. The specific structure of each part of the sample measuring device and sample measuring system according to the present invention can be varied in design in many ways.

[0058] The communication device according to the present invention is not limited to a mobile phone, and any devices which can perform wireless communication with the sample measuring device can be used. For instance, a personal computer designed to transmit and receive data via wireless communication based on the Bluetooth standard may be used as the communication device. Moreover, the sample measuring device according to the present invention is not limited to a SMBG meter. The invention is applicable to various devices for performing measurement for which transmission of measurement data to a communication device or collection of measurement data via a communication device is desirable. The wireless communication in the present invention is not limited to that based on the Bluetooth standard, and any kind of wireless communication can be used as long as it can realize data transmission and reception between the sample measuring device and the communication device.

Claims

1. A sample measuring device (201) comprising:

a measuring unit (220) for performing measurement with respect to a particular component contained in a sample;
a measurement data storage unit (225) for storing measurement data obtained by the measuring unit (220);
a display unit (230) for displaying the measurement data;
a sensor strip detector (240) for detecting insertion and removal of a sensor strip (290) to which the sample is applied; and
a first data transmitter/receiver (280) for transmitting the measurement data via wireless communication;
wherein the first data transmitter/receiver (280) is configured to perform an initial authentication process for wireless communication after insertion of the sensor strip (290) is detected by the sensor strip detector (240);
wherein the sample measuring device (201) is configured such that, when the first data transmitter/receiver (280) detects the presence of a plurality of communication devices (301) with which wireless connection can be established, the plurality of communication devices (301) are identified and indicated on the display unit (230) as possible connection target devices, either periodically one-by-one, or as a list of names with a frame that moves periodically to alternately surround each of the names in the list; and
wherein the first data transmitter/receiver (280) is further configured to perform the initial authentication process with respect to the one of the plurality of communication devices (301) which is being indicated on the display unit (230) when there is a change in a detection state of the sensor strip detector (240) due to removal and subsequent re-insertion of the sensor strip (290) with respect to the sample measuring device (201).

2. The sample measuring device (201) according to claim 1, wherein, when insertion of the sensor strip (290) is detected by the sensor strip detector (240), the sample measuring device (201) is configured to switch from a standby state in which the measurement is not possible to an operation state in which the measurement is possible.

3. The sample measuring device (201) according to claim 2, wherein, when removal of the sensor strip (290) is detected by the sensor strip detector (240), the sample measuring device (201) is configured to switch from the operation state to the standby state.

4. The sample measuring device (201) according to any one of claims 1-3, further comprising an authentication code storage portion (270) for storing an authentication code to be used for the initial authentication process, wherein the authentication code is

displayed on the display unit (230) in the initial authentication process.

5. The sample measuring device (201) according to any one of claims 1-3, further comprising an authentication code print portion (275) in which an authentication code to be used for the initial authentication process is printed.

6. The sample measuring device (201) according to claim 5, wherein the authentication code is a product identification code.

7. The sample measuring device (201) according to any one of claims 1-6, wherein the first data transmitter/receiver (280) is configured to perform wireless communication based on Bluetooth (registered trademark) standard.

8. The sample measuring device (201) according to any one of claims 1-7, wherein the particular component is blood sugar, and the sample measuring device (201) is structured as a self-monitoring blood glucose meter.

9. A sample measuring system (101) comprising:

the sample measuring device (201) as set forth in any one of claims 1-8; and
a communication device (301) including a second data transmitter/receiver (310) which is a target for the initial authentication process performed by the first data transmitter/receiver (280) of the sample measuring device (201).

10. The sample measuring system (101) according to claim 9, wherein the communication device (301) includes an input unit (360) for inputting an authentication code provided by the sample measuring device (201).

Patentansprüche

1. Probenmessvorrichtung (201), die Folgendes umfasst:

eine Messeinheit (220) zum Durchführen einer Messung in Bezug auf eine bestimmte Komponente, die in einer Probe enthalten ist;
eine Messdaten-Speichereinheit (225) zum Speichern von Messdaten, die von der Messeinheit (220) erhalten werden;
eine Anzeigeeinheit (230) zum Anzeigen der Messdaten;
einen Sensorstreifendetektor (240) zum Erfassen des Einführens und Entfernens eines Sensorstreifens (290), auf den die Probe aufgebracht wird; und
einen ersten Datensender/-empfänger (280) zum Übertragen der Messdaten über eine drahtlose Kommunikation;
wobei der erste Datensender/-empfänger (280) dafür konfiguriert ist, einen anfänglichen Authentifizierungsprozess für die drahtlose Kommunikation auszuführen, nachdem der Sensorstreifen (290) durch den Sensorstreifendetektor (240) erfasst wurde;
wobei die Probenmessvorrichtung (201) dafür konfiguriert ist, dass, wenn der erste Datensender/- empfänger (280) das Vorhandensein mehrerer Kommunikationsvorrichtunge (301) erfasst, mit denen eine drahtlose Verbindung hergestellt werden kann, die Vielzahl von Kommunikationsvorrichtungen (301) als mögliche Verbindungszielvorrichtungen identifiziert und auf der Anzeigeeinheit (230) angezeigt werden, entweder periodisch eine nach der anderen oder als Liste von Namen mit einem Rahmen, der sich periodisch bewegt und jeden der Namen in der Liste abwechselnd umgibt; und
wobei der erste Datensender/-empfänger (280) ferner dafür konfiguriert ist, den anfänglichen Authentifizierungsprozess in Bezug auf die eine der Vielzahl von Kommunikationsvorrichtungen (301) durchzuführen, die auf der Anzeigeeinheit (230) angezeigt wird, wenn sich ein Erfassungszustand des Sensorstreifendetektors (240) aufgrund des Entfernens und anschließenden Wiedereinsetzens des Sensorstreifens (290) in Bezug auf die Probenmessvorrichtung (201) ändert.

2. Probenmessvorrichtung (201) nach Anspruch 1, wobei, wenn das Einsetzen des Sensorstreifens (290) durch den Sensorstreifendetektor (240) erfasst wird, die Probenmessvorrichtung (201) dafür konfiguriert ist, von einem Bereitschaftszustand, in dem die Messung nicht möglich ist, in einen Betriebszustand, in dem die Messung möglich ist, umzuschalten.

3. Probenmessvorrichtung (201) nach Anspruch 2, wobei, wenn das Entfernen des Sensorstreifens (290) durch den Sensorstreifendetektor (240) erfasst wird, die Probenmessvorrichtung (201) dafür konfiguriert ist, von dem Betriebszustand in den Bereitschaftszustand umzuschalten.

4. Probenmessvorrichtung (201) nach einem der Ansprüche 1 bis 3, dier ferner einen Authentifizierungscode-Speicherabschnitt (270) zum Speichern eines Authentifizierungscodes umfasst, der für den anfänglichen Authentifizierungsprozess verwendet werden soll, wobei der Authentifizierungscode auf der Anzeigeeinheit (230) im anfänglichen Authentifizierungsprozess angezeigt wird.

5. Probenmessvorrichtung (201) nach einem der Ansprüche 1 bis 3, die ferner einen Authentifizierungscodedruckabschnitt (275) umfasst, in dem ein Authentifizierungscode gedruckt wird, der für den anfänglichen Authentifizierungsprozess verwendet werden soll.

6. Probenmessvorrichtung (201) nach Anspruch 5, wobei der Authentifizierungscode ein Produktidentifikationscode ist.

7. Probenmessvorrichtung (201) nach einem der Ansprüche 1 bis 6, wobei der erste Datensender/-empfänger (280) dafür konfiguriert ist, eine drahtlose Kommunikation basierend auf dem Bluetooth-Standard (eingetragene Marke) durchzuführen.

8. Probenmessvorrichtung (201) nach einem der Ansprüche 1 bis 7, wobei die bestimmte Komponente Blutzucker ist und die Probenmessvorrichtung (201) als selbstüberwachende Blutzuckermessvorrichtung strukturiert ist.

9. Probenmesssystem (101), das Folgendes umfasst:

die Probenmessvorrichtung (201) nach einem der Ansprüche 1 bis 8; und
eine Kommunikationsvorrichtung (301) mit einem zweiten Datensender/-empfänger (310), der ein Ziel für den anfänglichen Authentifizierungsprozess ist, der von dem ersten Datensender/-empfänger (280) der Probenmessvorrichtung (201) durchgeführt wird.

10. Probenmesssystem (101) nach Anspruch 9, wobei die Kommunikationsvorrichtung (301) eine Eingabeeinheit (360) zum Eingeben eines Authentifizierungscodes umfasst, der von der Probenmessvorrichtung (201) bereitgestellt wird.

Revendications

1. Dispositif de mesure d'échantillon (201) comprenant :

une unité de mesure (220) destinée à réaliser une mesure par rapport à un composant particulier contenu dans un échantillon ;
une unité de stockage de données de mesure (225) destinée à stocker des données de mesure obtenues par l'unité de mesure (220) ;
une unité d'affichage (230) destinée à afficher les données de mesure ;
un détecteur de bandelette de capteur (240) destiné à détecter l'insertion et le retrait d'une bandelette de capteur (290) sur laquelle l'échantillon est appliqué ; et
un premier émetteur/récepteur de données (280) destiné à émettre les données de mesure via une communication sans fil ;
dans lequel le premier émetteur/récepteur de données (280) est configuré pour réaliser un procédé d'authentification initiale destiné à la communication sans fil après que l'insertion de la bandelette de capteur (290) est détectée par le détecteur de bandelette de capteur (240) ;
dans lequel le dispositif de mesure d'échantillon (201) est configuré de sorte que, quand le premier émetteur/récepteur de données (280) détecte la présence d'une pluralité de dispositifs de communication (301) avec lesquels une connexion sans fil peut être établie, la pluralité de dispositifs de communication (301) sont identifiés et indiqués sur l'unité d'affichage (230) comme des dispositifs cibles de connexion possibles, soit périodiquement un par un, ou comme une liste de noms avec un cadre qui se déplace périodiquement pour entourer de manière alternée chacun des noms dans la liste ; et
dans lequel le premier émetteur/récepteur de données (280) est configuré en outre pour réaliser le procédé d'authentification initiale par rapport à l'un de la pluralité de dispositifs de communication (301) qui est indiqué sur l'unité d'affichage (230) quand il y a un changement de l'état de détection du détecteur de bandelette de capteur (240) en raison du retrait et de la réinsertion ultérieure de la bandelette de capteur (290) par rapport au dispositif de mesure d'échantillon (201).

2. Dispositif de mesure d'échantillon (201) selon la revendication 1, dans lequel, quand l'insertion de la bandelette de capteur (290) est détectée par le détecteur de bandelette de capteur (240), le dispositif de mesure d'échantillon (201) est configuré pour commuter d'un état de veille dans lequel la mesure n'est pas possible à un état de fonctionnement dans lequel la mesure est possible.

3. Dispositif de mesure d'échantillon (201) selon la revendication 2, dans lequel, quand le retrait de la bandelette de capteur (290) est détecté par le détecteur de bandelette de capteur (240), le dispositif de mesure d'échantillon (201) est configuré pour commuter de l'état de fonctionnement à l'état de veille.

4. Dispositif de mesure d'échantillon (201) selon l'une quelconque des revendications 1 à 3, comprenant en outre une partie de stockage de code d'authentification (270) destinée à stocker un code d'authentification devant être utilisé pour le procédé d'authentification initiale, dans lequel le code d'authentification est affiché sur l'unité d'affichage (230) dans le procédé d'authentification initial.

5. Dispositif de mesure d'échantillon (201) selon l'une quelconque des revendications 1 à 3, comprenant en outre une partie d'impression de code d'authentification (275) dans lequel un code d'authentification devant être utilisé pour le procédé d'authentification initiale est imprimé.

6. Dispositif de mesure d'échantillon (201) selon la revendication 5, dans lequel le code d'authentification est un code d'identification de produit.

7. Dispositif de mesure d'échantillon (201) selon l'une quelconque des revendications 1 à 6, dans lequel le premier émetteur/récepteur de données (280) est configuré pour réaliser une communication sans fil basée sur une norme Bluetooth (marque de fabrique enregistrée).

8. Dispositif de mesure d'échantillon (201) selon l'une quelconque des revendications 1 à 7, dans lequel le composant particulier est la glycémie, et le dispositif de mesure d'échantillon (201) est structuré comme un glucomètre sanguin d'auto-surveillance.

9. Système de mesure d'échantillon (101) comprenant :

le dispositif de mesure d'échantillon (201) tel que décrit dans l'une quelconque des revendications 1 à 8 ; et
un dispositif de communication (301) incluant un deuxième émetteur/récepteur de données (310) qui est une cible pour le procédé d'authentification initiale réalisé par le premier émetteur/récepteur de données (280) du dispositif de mesure d'échantillon (201).

10. Système de mesure d'échantillon (101) selon la revendication 9, dans lequel le dispositif de communication (301) inclut une unité d'entrée (360) pour entrer un code d'authentification fourni par le dispositif de mesure d'échantillon (201).

FIG.1

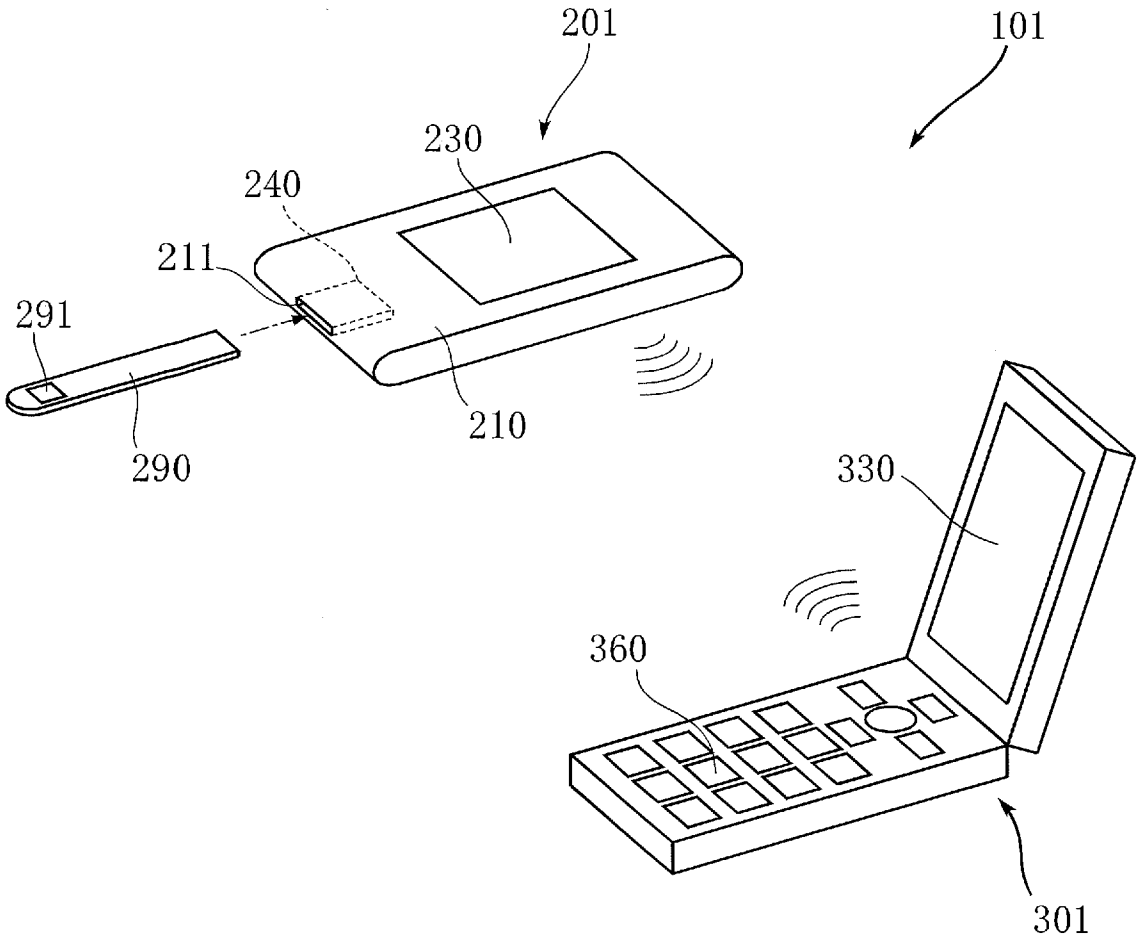


FIG.2

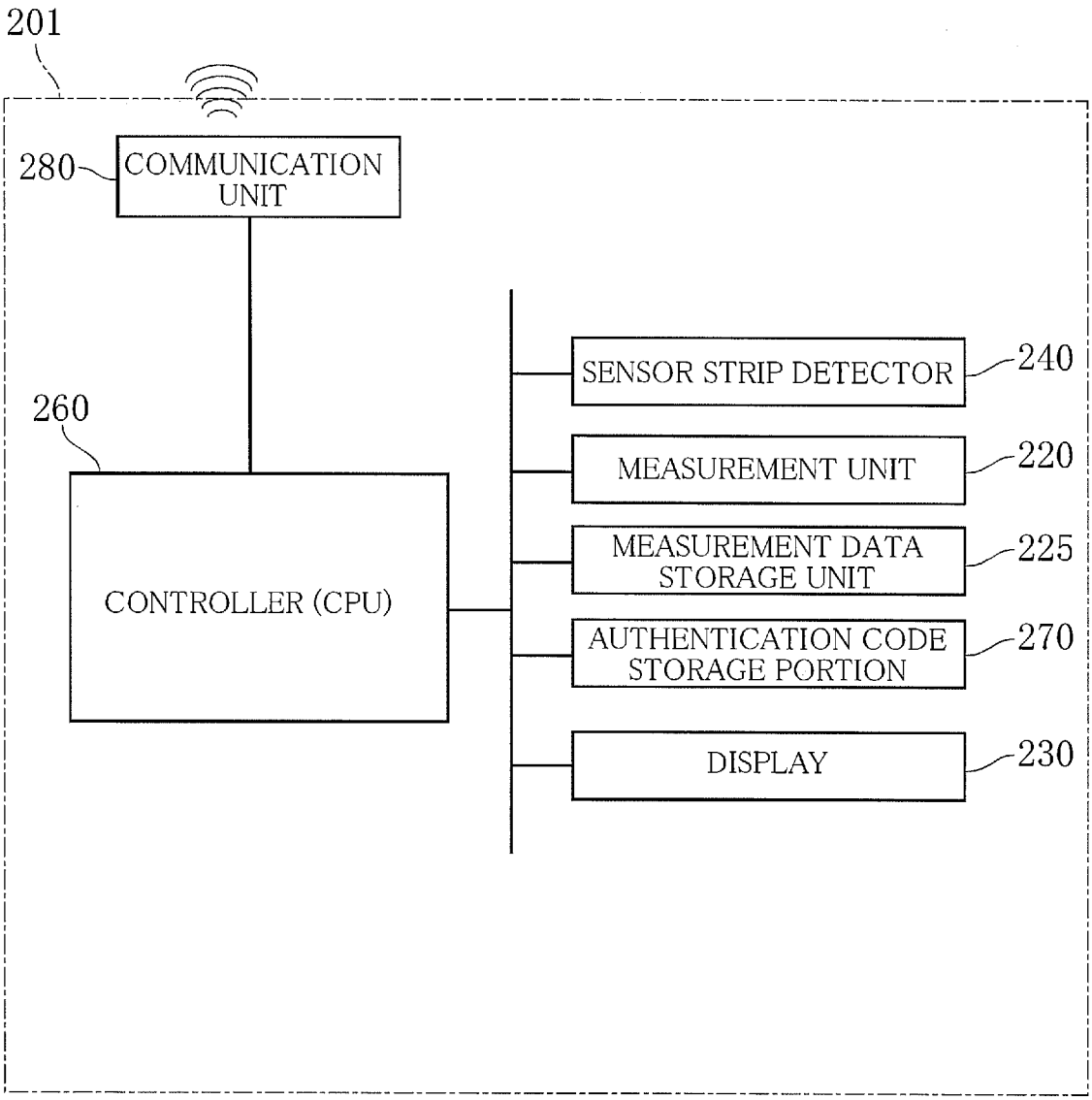

201
280
COMMUNICATION UNIT
260
CONTROLLER (CPU)
SENSOR STRIP DETECTOR
240
MEASUREMENT UNIT
220
MEASUREMENT DATA STORAGE UNIT
225
AUTHENTICATION CODE STORAGE PORTION
270
DISPLAY
230

FIG.3

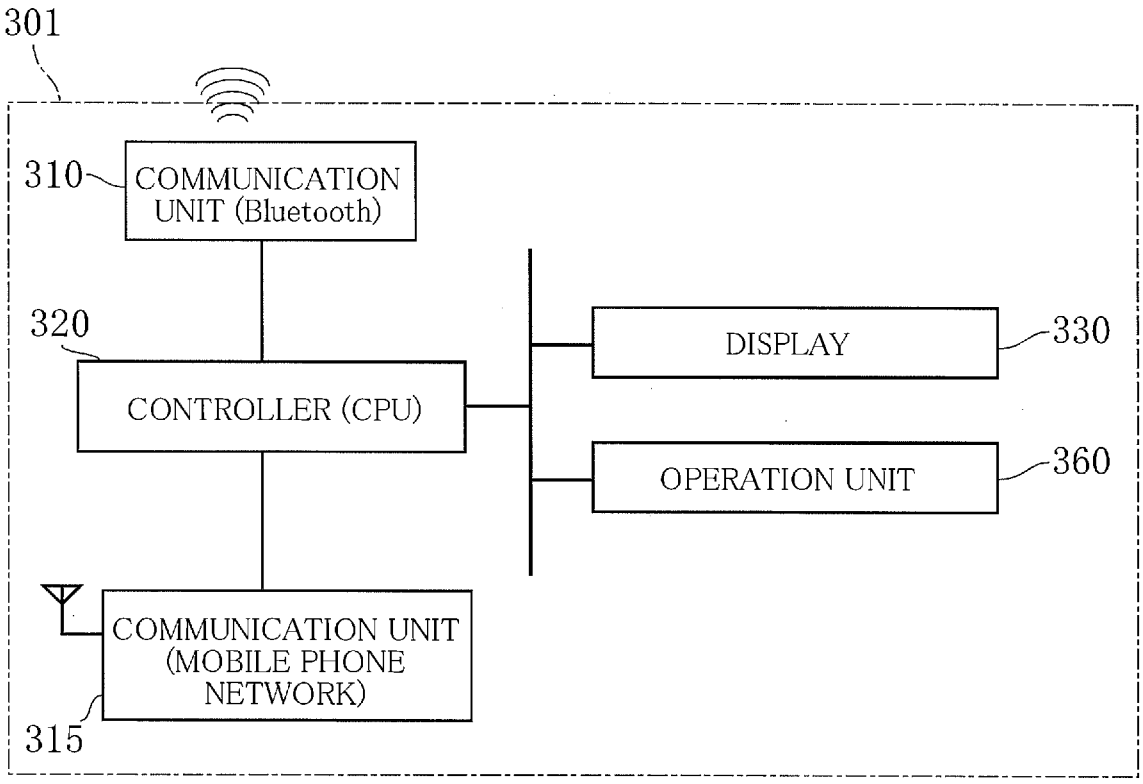

301
310
COMMUNICATION UNIT (Bluetooth)
320
CONTROLLER (CPU)
DISPLAY
330
OPERATION UNIT
360
COMMUNICATION UNIT (MOBILE PHONE NETWORK)
315

FIG.4

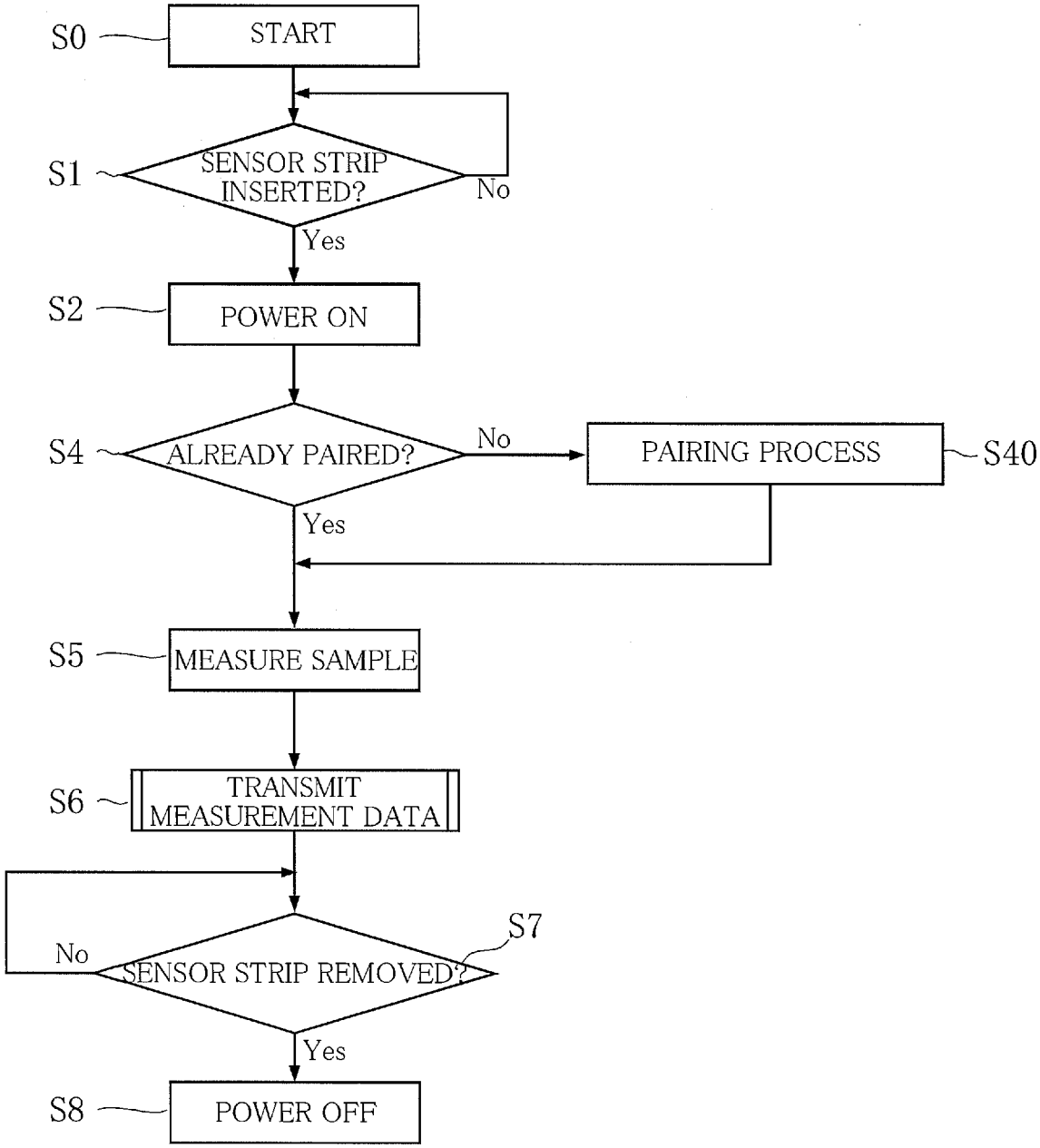

S0
START
S1
SENSOR STRIP INSERTED?
No
Yes
S2
POWER ON
S4
ALREADY PAIRED?
No
PAIRING PROCESS
S40
Yes
S5
MEASURE SAMPLE
S6
TRANSMIT MEASUREMENT DATA
S7
No
SENSOR STRIP REMOVED?
Yes
S8
POWER OFF

FIG.5

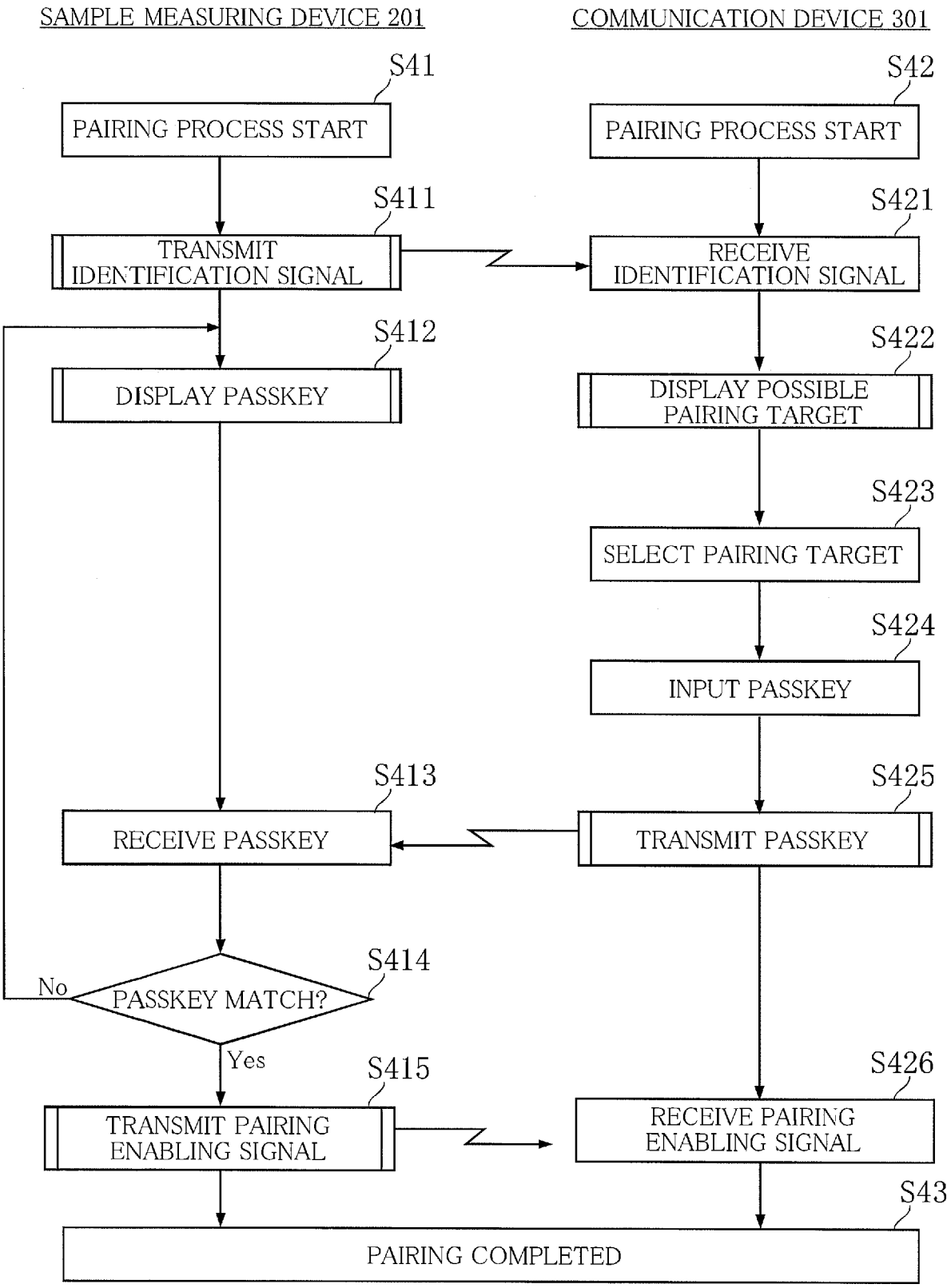

SAMPLE MEASURING DEVICE 201
COMMUNICATION DEVICE 301
S41
PAIRING PROCESS START
S42
PAIRING PROCESS START
S411
TRANSMIT IDENTIFICATION SIGNAL
S421
RECEIVE IDENTIFICATION SIGNAL
S412
DISPLAY PASSKEY
S422
DISPLAY POSSIBLE PAIRING TARGET
S423
SELECT PAIRING TARGET
S424
INPUT PASSKEY
S413
RECEIVE PASSKEY
S425
TRANSMIT PASSKEY
S414
No
PASSKEY MATCH?
Yes
S415
TRANSMIT PAIRING ENABLING SIGNAL
S426
RECEIVE PAIRING ENABLING SIGNAL
S43
PAIRING COMPLETED

FIG.6

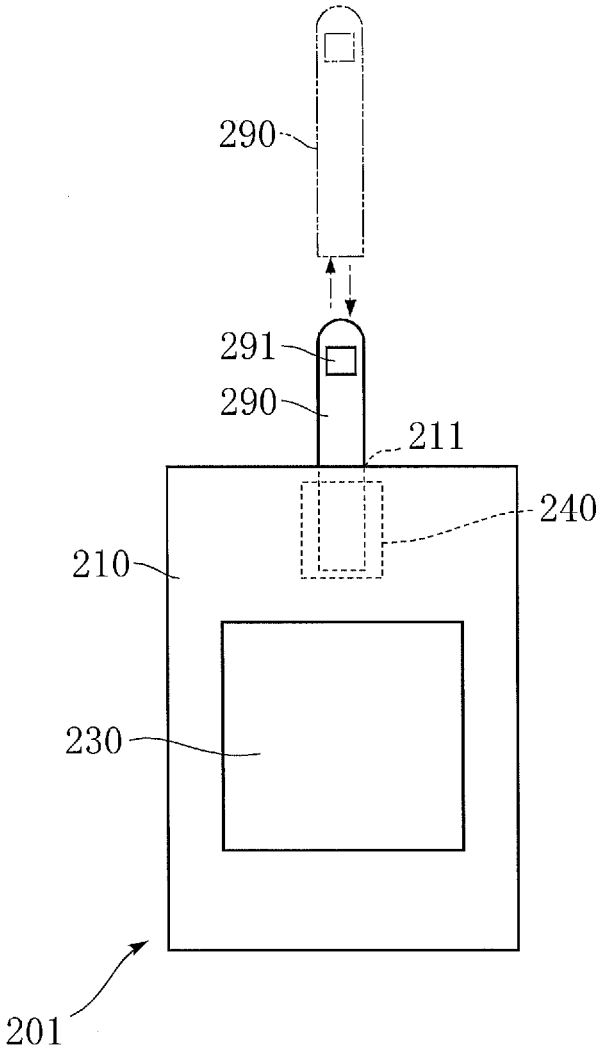


FIG.7

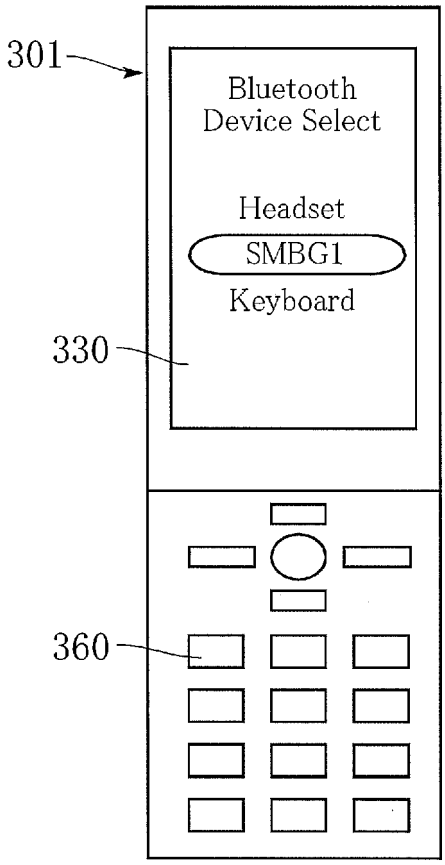

301
Bluetooth
Device Select
Headset
SMBG1
Keyboard
330
360

FIG.8

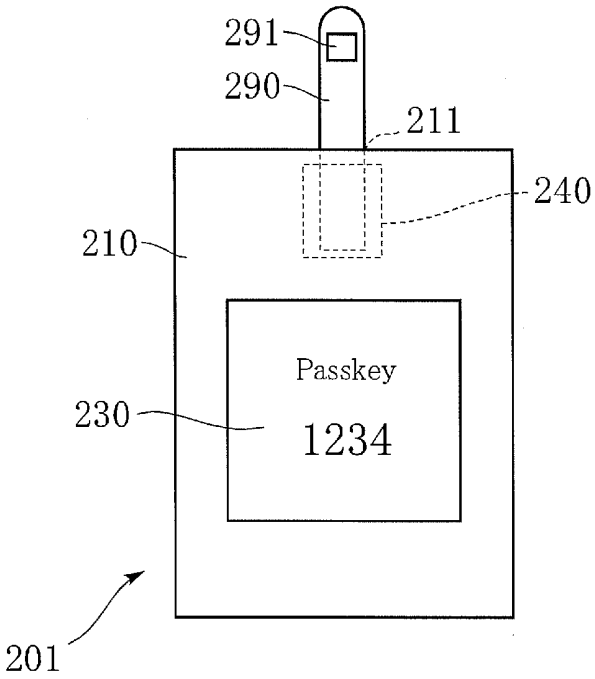

291
290
211
240
210
Passkey
230
1234
201

FIG.9

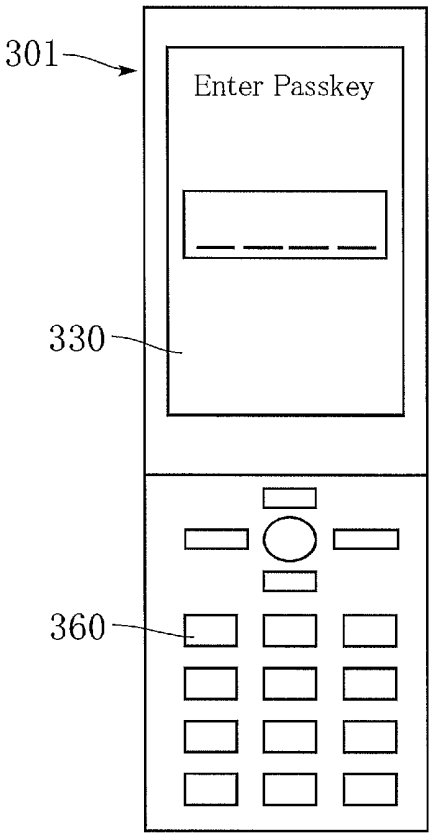

301
Enter Passkey
330
360

FIG.10

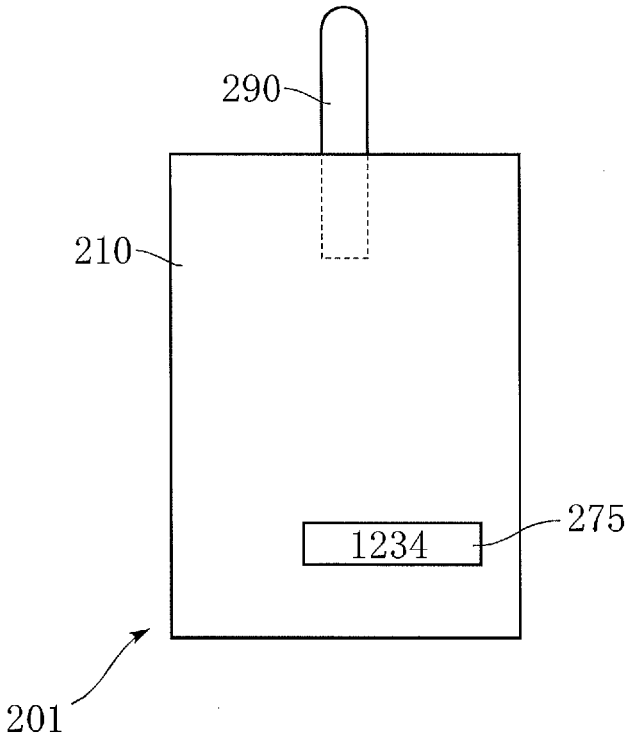


FIG.11

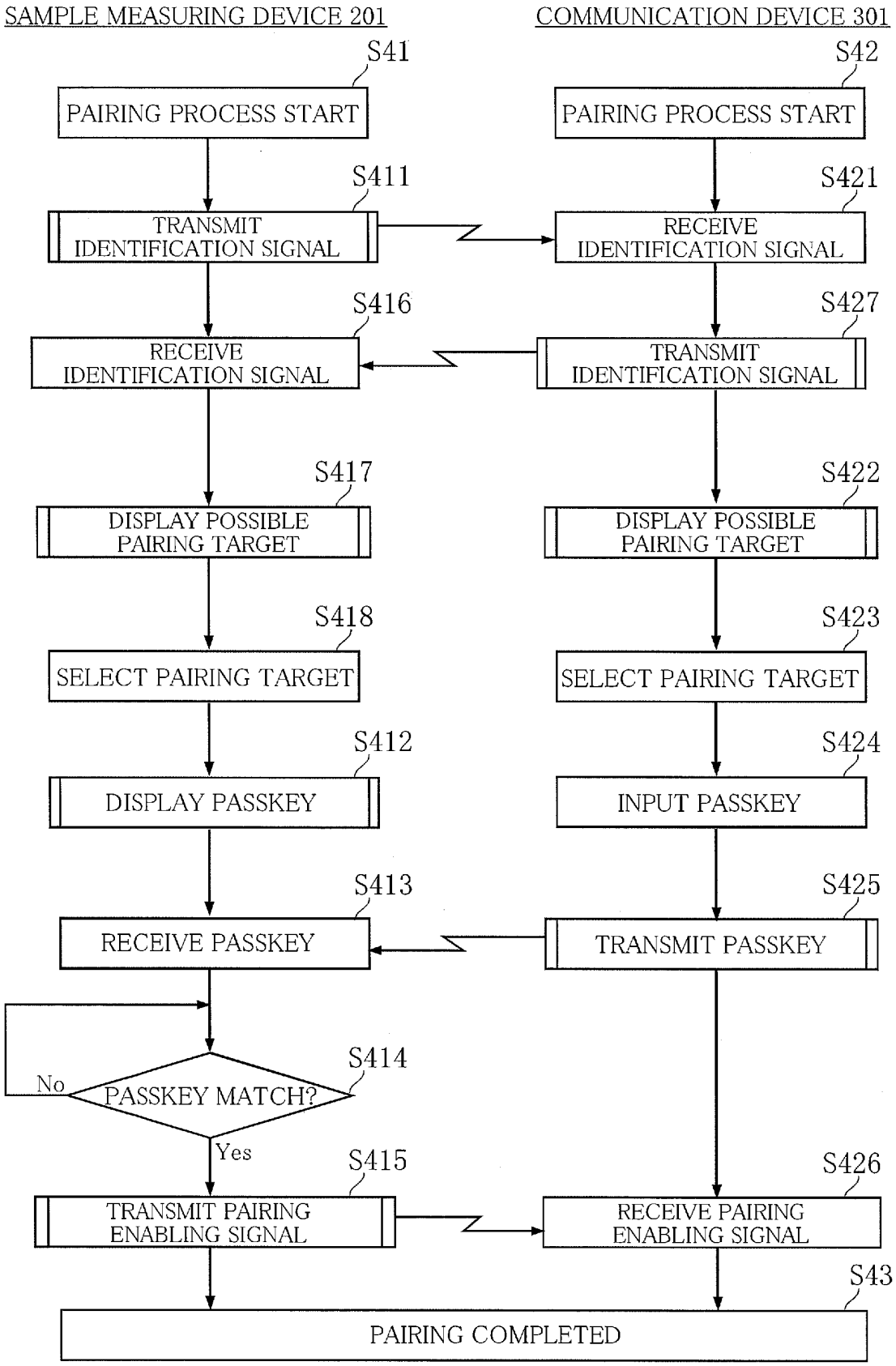

SAMPLE MEASURING DEVICE 201
COMMUNICATION DEVICE 301
S41
PAIRING PROCESS START
S42
PAIRING PROCESS START
S411
TRANSMIT IDENTIFICATION SIGNAL
S421
RECEIVE IDENTIFICATION SIGNAL
S416
RECEIVE IDENTIFICATION SIGNAL
S427
TRANSMIT IDENTIFICATION SIGNAL
S417
DISPLAY POSSIBLE PAIRING TARGET
S422
DISPLAY POSSIBLE PAIRING TARGET
S418
SELECT PAIRING TARGET
S423
SELECT PAIRING TARGET
S412
DISPLAY PASSKEY
S424
INPUT PASSKEY
S413
RECEIVE PASSKEY
S425
TRANSMIT PASSKEY
S414
No
PASSKEY MATCH?
Yes
S415
TRANSMIT PAIRING ENABLING SIGNAL
S426
RECEIVE PAIRING ENABLING SIGNAL
S43
PAIRING COMPLETED

FIG.12

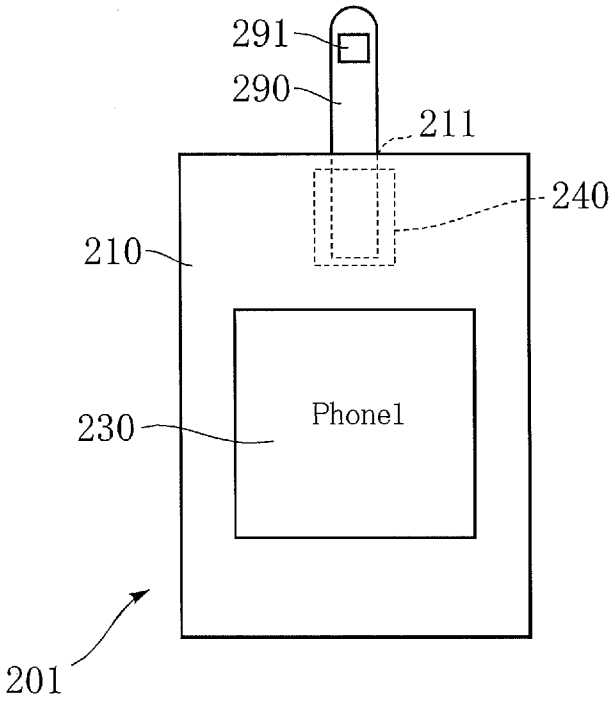

291
290
211
240
210
Phone1
230
201

FIG.13

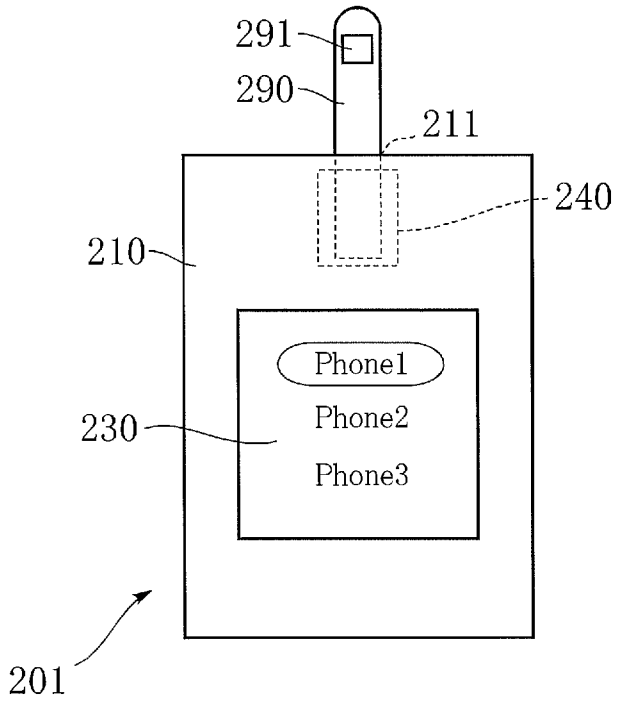
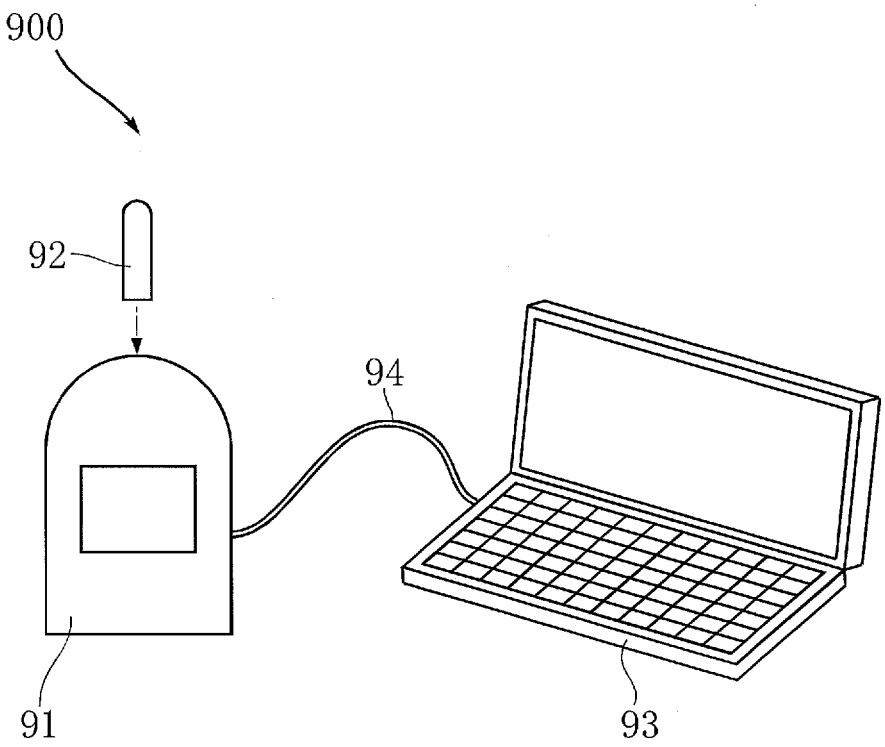

291
290
211
240
210
Phone1
Phone2
Phone3
230
201

FIG.14



REFERENCES CITED IN THE DESCRIPTION

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- US 2010305421 A1 **[0005] [0010]**

专利名称(译)	样品测量装置和样品测量系统		
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[标]申请(专利权)人(译)	爱科来株式会社		
申请(专利权)人(译)	ARKRAY，INC.		
当前申请(专利权)人(译)	ARKRAY，INC.		
[标]发明人	KAI AKINORI WADA ATSUSHI		
发明人	KAI, AKINORI WADA, ATSUSHI		
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CPC分类号	A61B5/0002 A61B5/14532 G06F19/00 G16H40/63		
优先权	2011100409 2011-04-28 JP		
其他公开文献	EP2517620A1		
外部链接	Espacenet		

摘要(译)

根据本发明的样本测量装置包括：测量单元，用于对包含在样本中的特定成分进行测量;测量数据存储单元，用于存储由测量单元获得的测量数据;显示单元，用于显示测量数据传感器条带检测器，用于检测应用样品的传感器条带的插入和移除，以及用于通过无线通信传输测量数据的第一数据发送器/接收器。在传感器条带检测器检测到传感器条带的插入之后，第一数据发送器/接收器执行用于无线通信的初始认证过程。

FIG.1