US010540013B2

(12) **United States Patent**
Ryu et al.

(10) **Patent No.: US 10,540,013 B2**
(45) **Date of Patent: Jan. 21, 2020**

(54) **METHOD OF PERFORMING FUNCTION OF DEVICE AND DEVICE FOR PERFORMING THE METHOD**

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(73) Assignee: **SAMSUNG ELECTRONICS CO., LTD.**, Suwon-si (KR)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 590 days.

(21) Appl. No.: **14/167,226**

(22) Filed: **Jan. 29, 2014**

(65) **Prior Publication Data**

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(30) **Foreign Application Priority Data**

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Jul. 17, 2013 (KR) 10-2013-0084384

(51) **Int. Cl.**
G06F 3/01 (2006.01)
G06F 3/038 (2013.01)
(Continued)

(52) **U.S. Cl.**
CPC ***G06F 3/017*** (2013.01); ***G06F 1/1626*** (2013.01); ***G06F 1/1694*** (2013.01); ***G06F 3/038*** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC G06F 3/017; G06F 2200/1637; G06F 3/0346; G06F 3/0488; G06F 3/0412;
(Continued)

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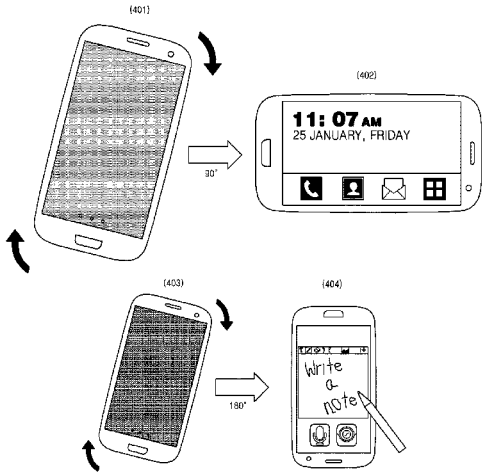
Primary Examiner — Gerald Johnson
(74) *Attorney, Agent, or Firm* — Sughrue Mion, PLLC

(57) **ABSTRACT**

A method of performing a function of a device based on motion information of the device in a standby mode of the device, a device for performing the method are provided. The device includes a sensor configured to detect movement of the device in a standby mode of the device; a storage configured to store motion information based on information related to the movement and at least one piece of function information corresponding to the motion information; and a processor configured to control the device to perform a function corresponding to the motion information in the standby mode based on the information related to the movement, the motion information, and the at least one piece of function information.

20 Claims, 33 Drawing Sheets



IPR2023-00560
Apple EX1004 Page 1

(51) **Int. Cl.**

G06F 3/0346	(2013.01)
H04M 1/725	(2006.01)
G06F 1/16	(2006.01)
G06F 3/041	(2006.01)

(52) **U.S. Cl.**

CPC ***G06F 3/0346*** (2013.01); ***G06F 3/041*** (2013.01); ***H04M 1/72569*** (2013.01); *G06F 3/013* (2013.01); *G06F 2200/1637* (2013.01); *H04M 2250/12* (2013.01)

(58) **Field of Classification Search**

CPC G06F 1/1686; G06F 1/1694; G06F 1/3206; G06F 3/0416; G06F 3/0487; G05D 1/0274; G05D 1/0038

See application file for complete search history.

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FIG. 1

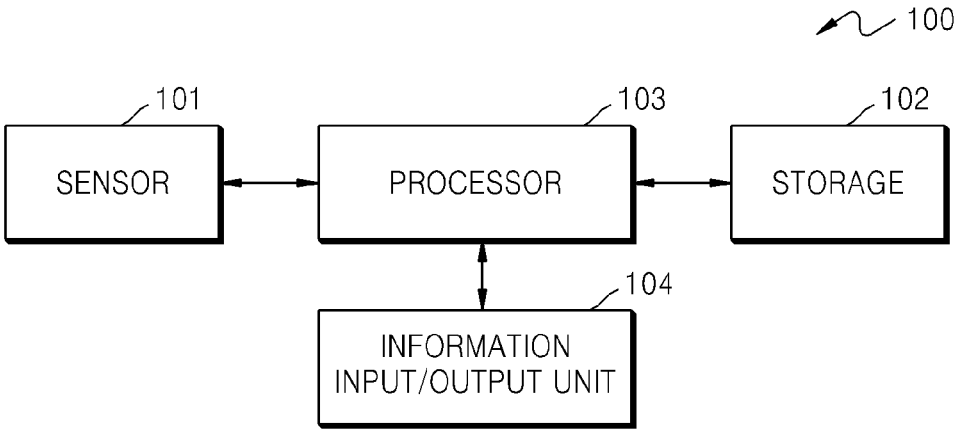
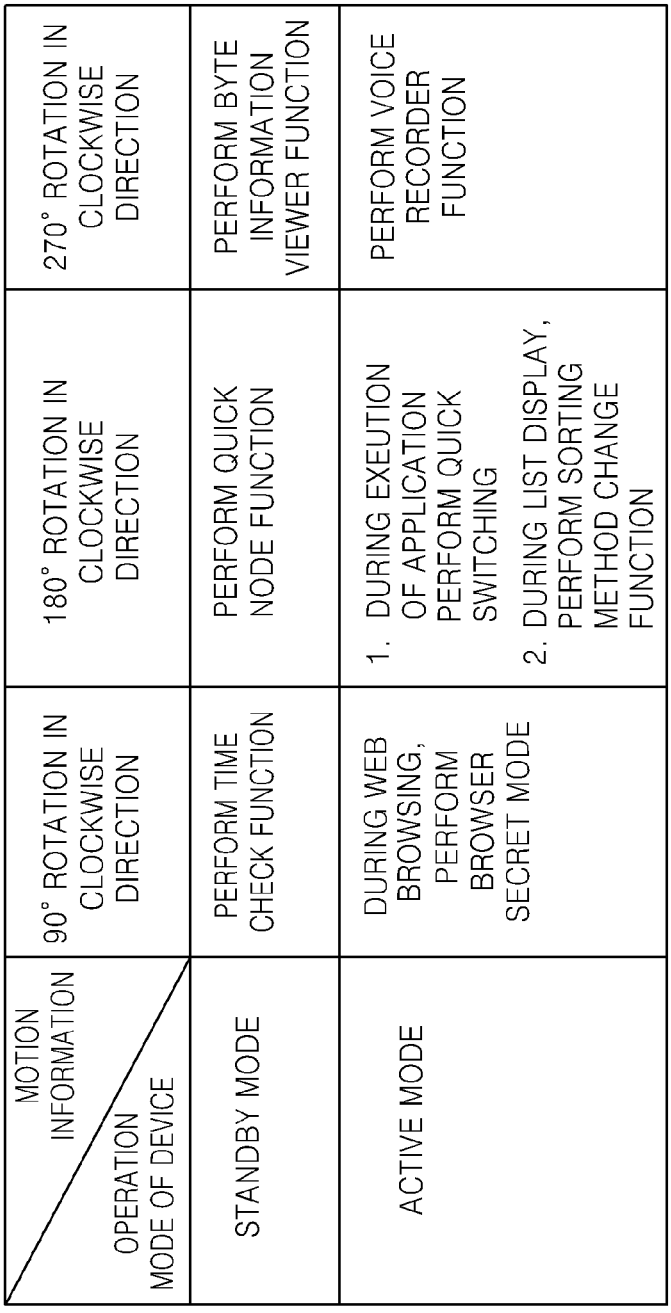

100
101
SENSOR
103
PROCESSOR
102
STORAGE
104
INFORMATION
INPUT/OUTPUT UNIT

FIG. 2


MOTION INFORMATION
OPERATION MODE OF DEVICE
90° ROTATION IN CLOCKWISE DIRECTION
180° ROTATION IN CLOCKWISE DIRECTION
270° ROTATION IN CLOCKWISE DIRECTION
STANDBY MODE
PERFORM TIME CHECK FUNCTION
PERFORM QUICK NODE FUNCTION
PERFORM BYTE INFORMATION VIEWER FUNCTION
ACTIVE MODE
DURING WEB BROWSING, PERFORM BROWSER SECRET MODE
1. DURING EXEUTION OF APPLICATION PERFORM QUICK SWITCHING
2. DURING LIST DISPLAY, PERFORM SORTING METHOD CHANGE FUNCTION
PERFORM VOICE RECORDER FUNCTION

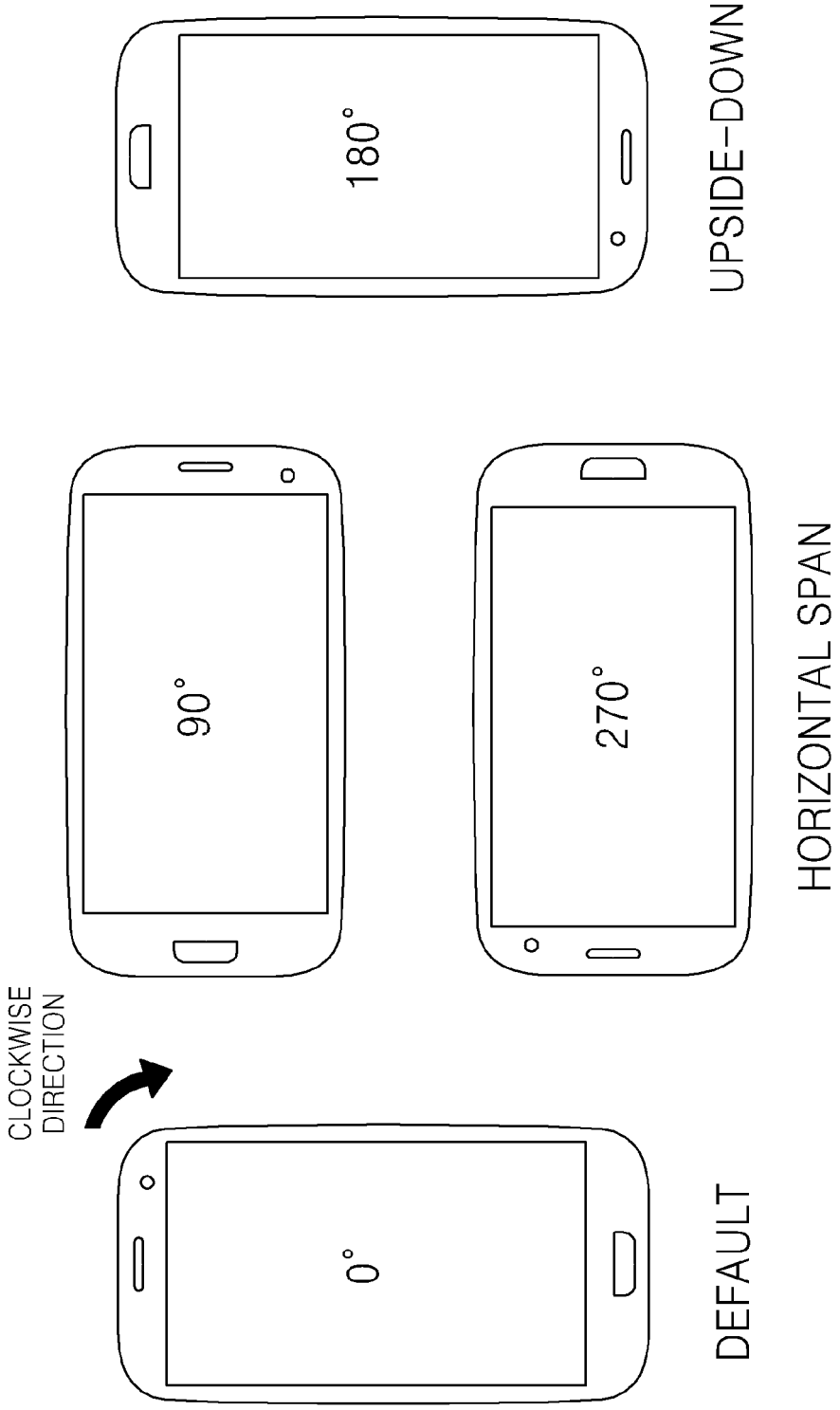

180°
UPSIDE-DOWN
90°
270°
HORIZONTAL SPAN
CLOCKWISE DIRECTION
0°
DEFAULT

FIG. 3A

FIG. 3B

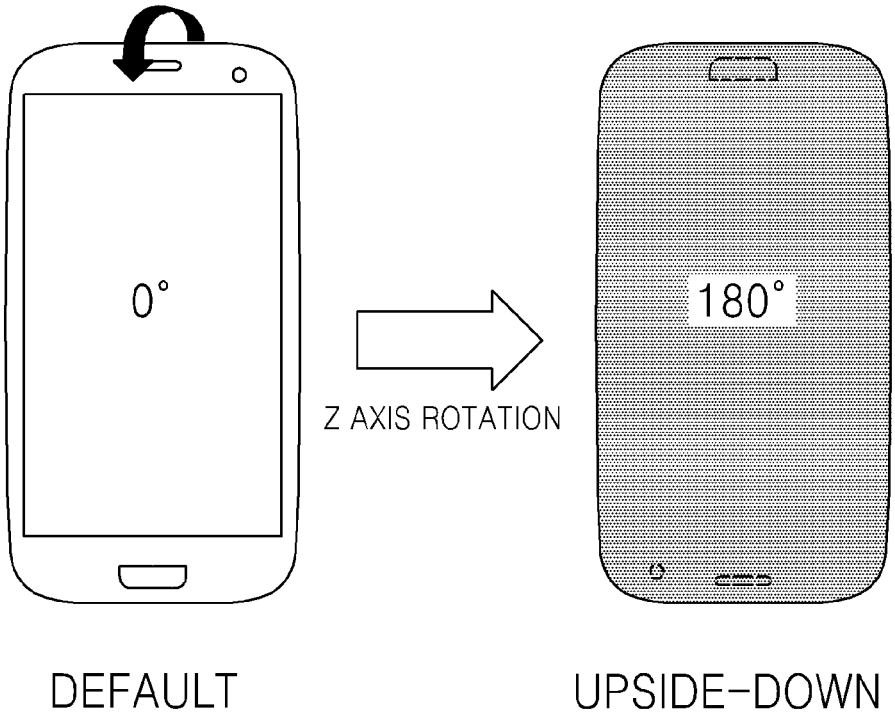


FIG. 4A

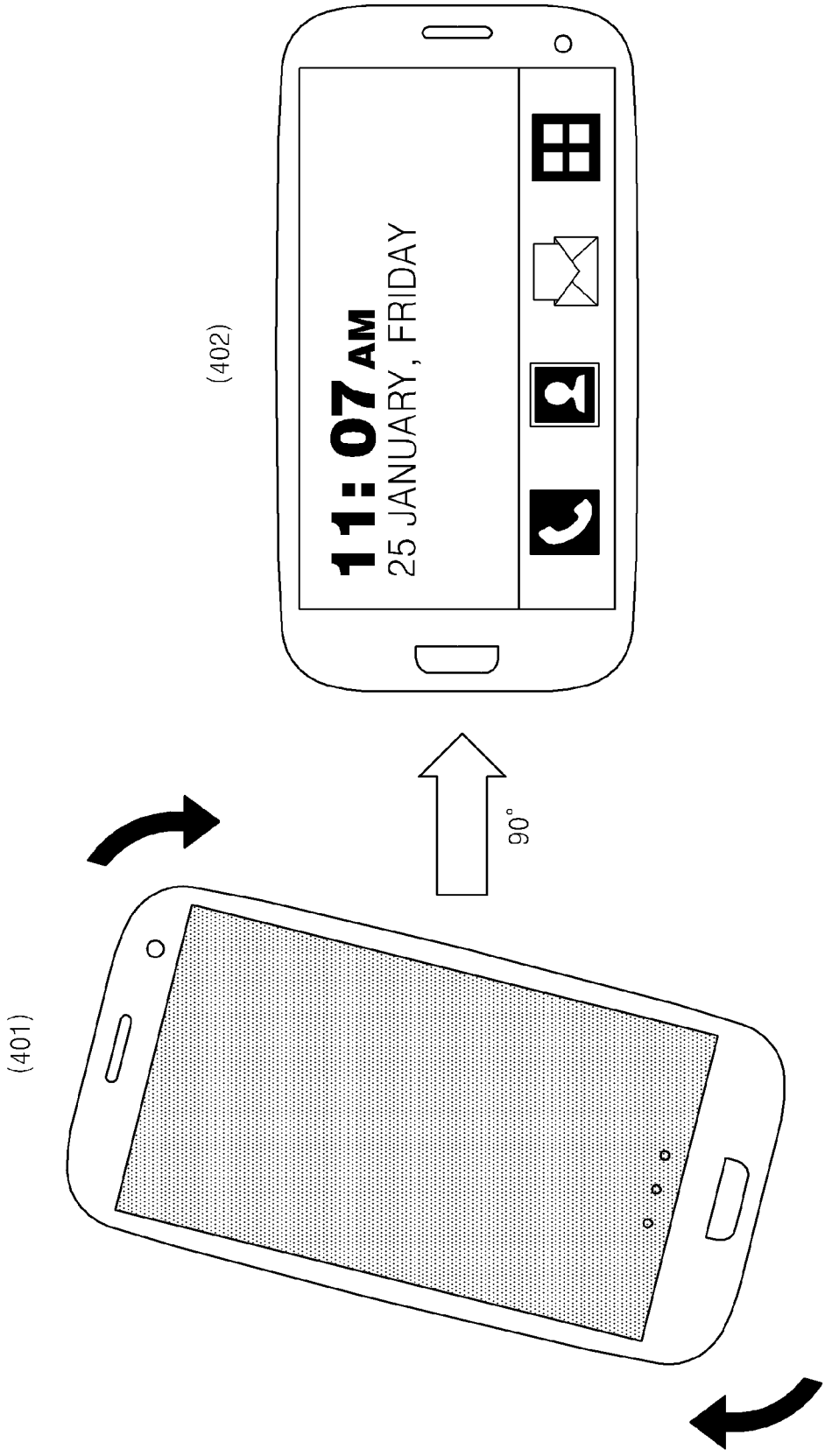


FIG. 4B

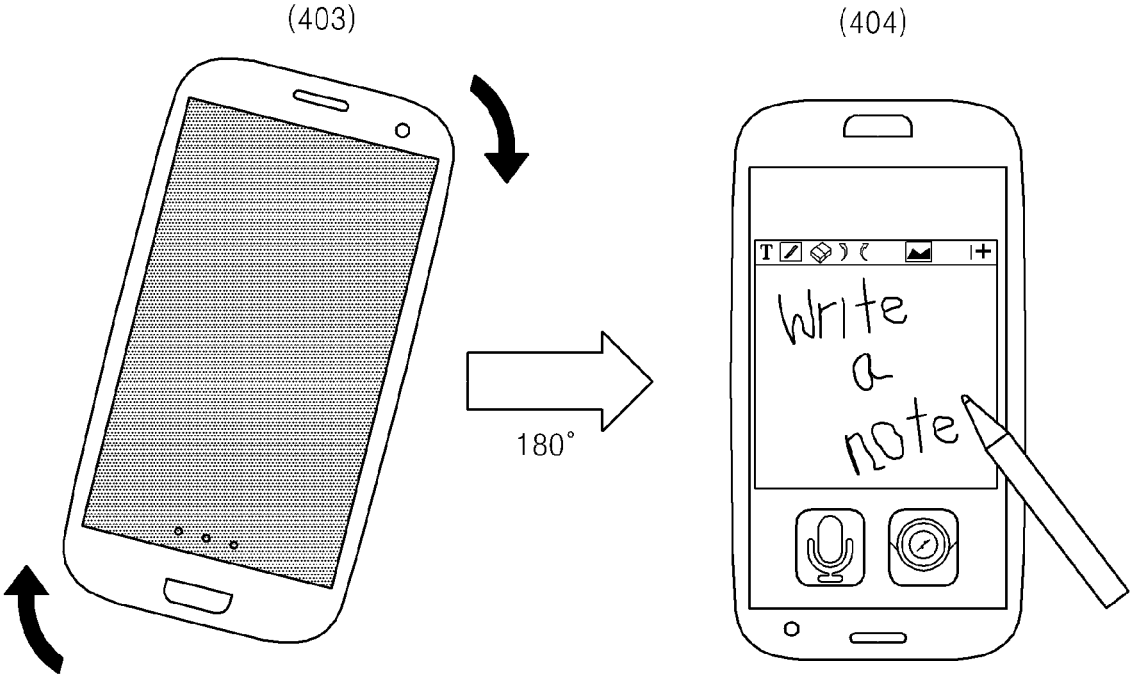


FIG. 4C

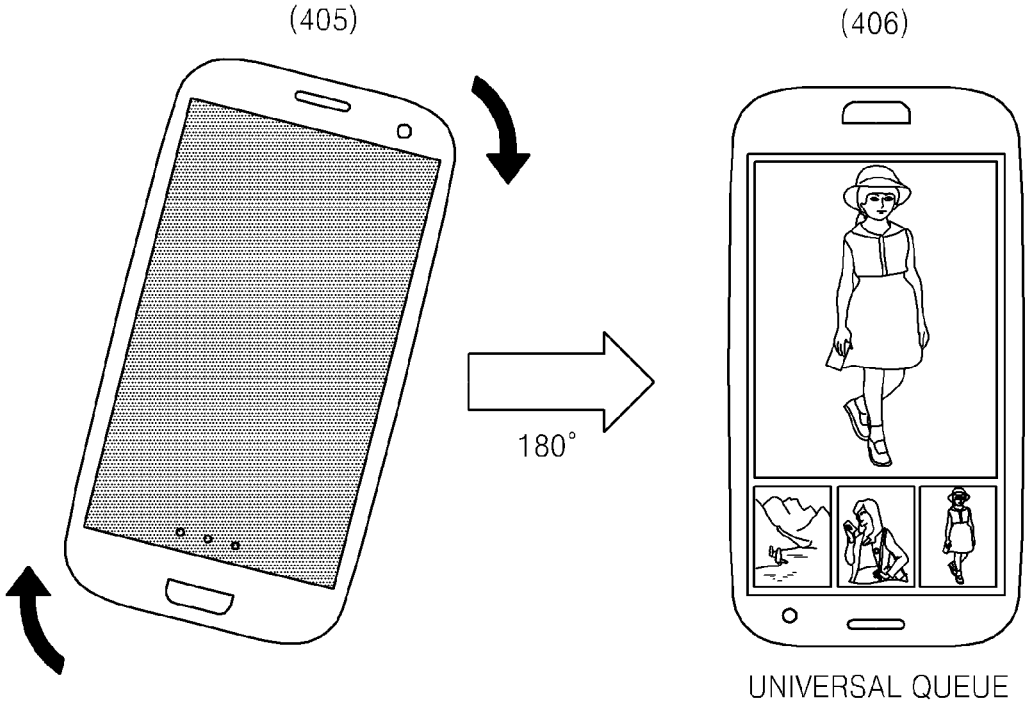


FIG. 4D

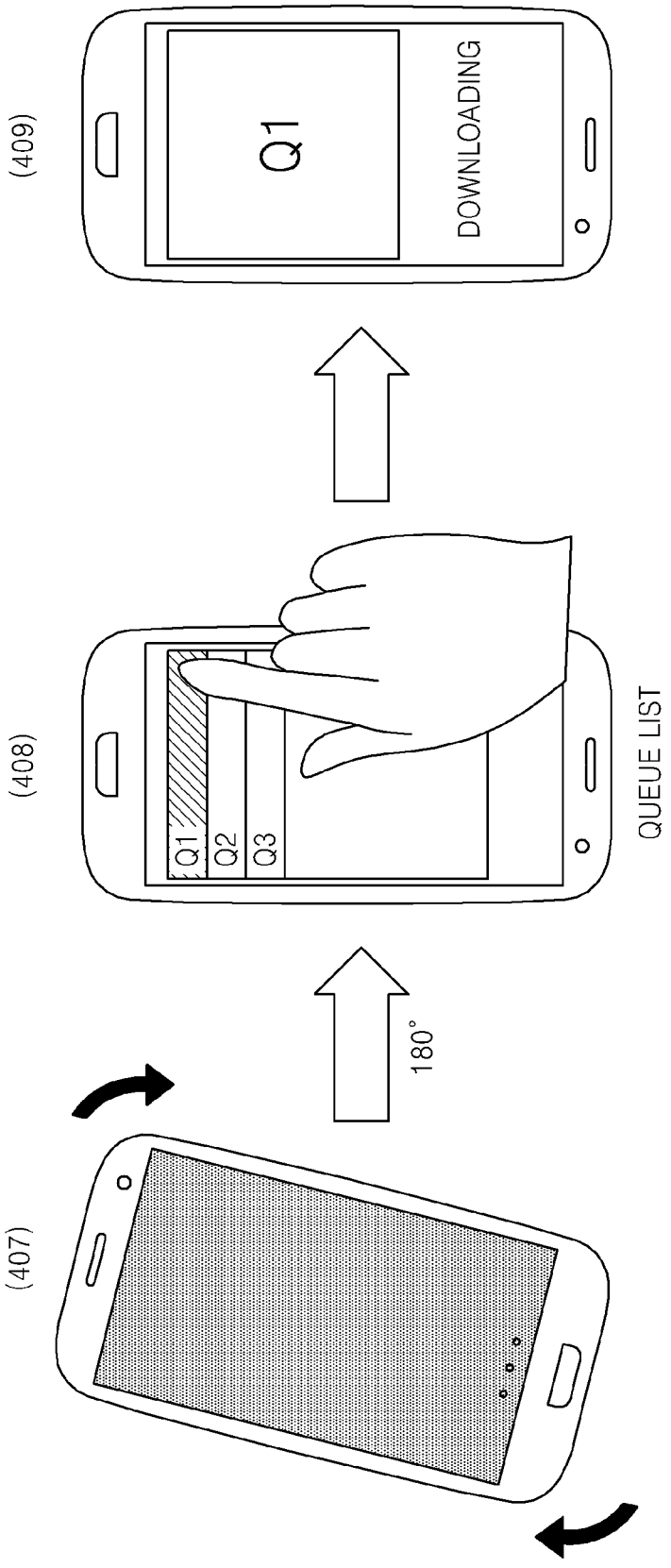


FIG. 4E

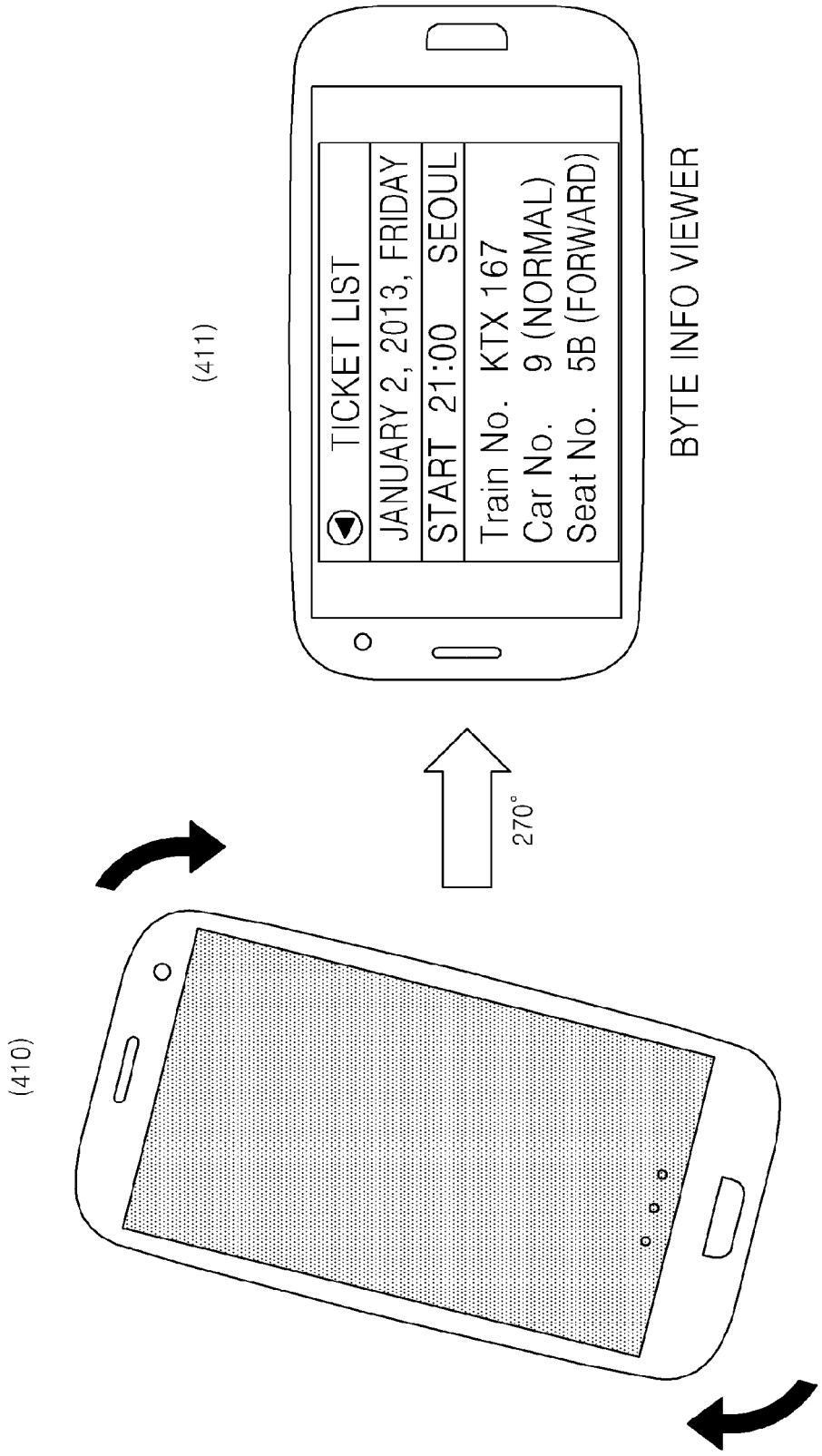

(410)
270°
(411)
TICKET LIST
JANUARY 2, 2013, FRIDAY
START 21:00 SEOUL
Train No. KTX 167
Car No. 9 (NORMAL)
Seat No. 5B (FORWARD)
BYTE INFO VIEWER

FIG. 4F

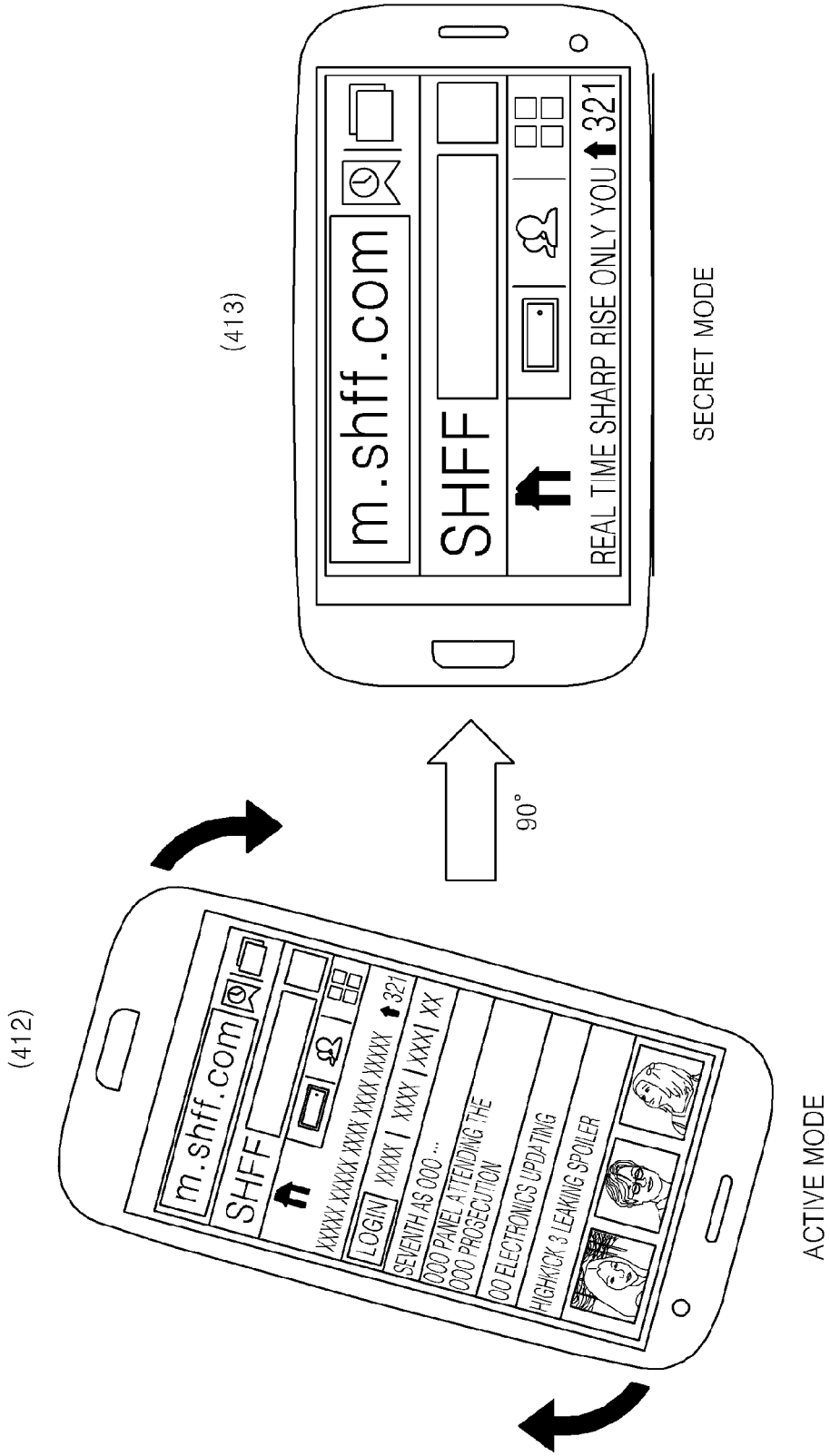

(412)
m.shff.com
SHFF
XXXXX XXXXX XXXX XXXX XXXX XXXXX
LOGIN XXXXX | XXXX | XXX | XX
SEVENTH AS OOO ...
OOO PANEL ATTENDING THE
OOO PROSECUTION
OO ELECTRONICS UPDATING
HIGHKICK 3 LEAKING SPOILER
ACTIVE MODE
90°
(413)
m.shff.com
SHFF
REAL TIME SHARP RISE ONLY YOU 321
SECRET MODE

FIG. 4G

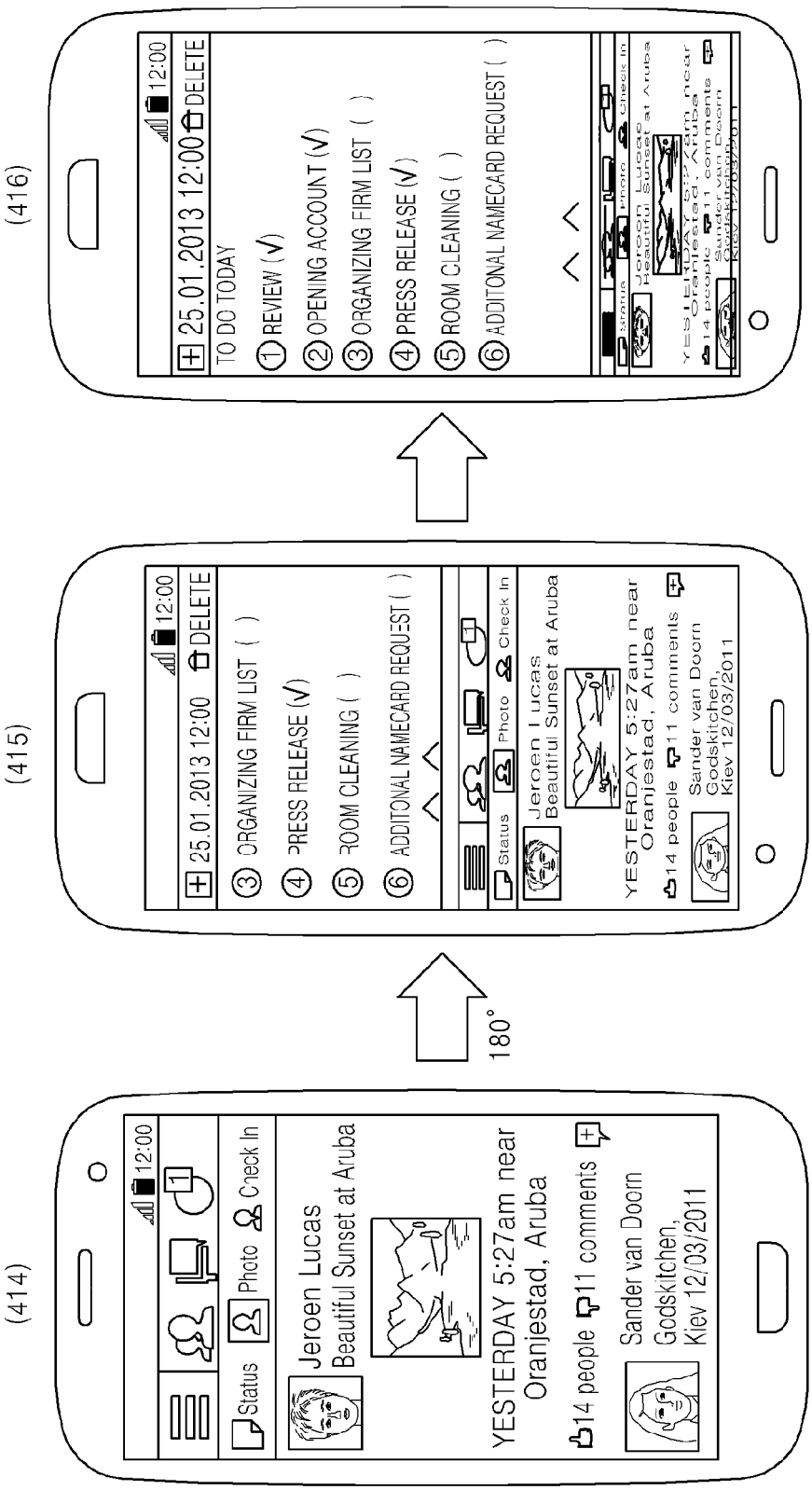

(414)
(415)
(416)
180°
12:00
DELETE
25.01.2013 12:00
TO DO TODAY
① REVIEW (√)
② OPENING ACCOUNT (√)
③ ORGANIZING FIRM LIST ( )
④ PRESS RELEASE (√)
⑤ ROOM CLEANING ( )
⑥ ADDITONAL NAMECARD REQUEST ( )
Status
Photo
Check In
Jeroen Lucas
Beautiful Sunset at Aruba
YESTERDAY 5:27am near Oranjestad, Aruba
14 people
11 comments
Sander van Doorn
Godskitchen,
Kiev 12/03/2011

FIG. 4H

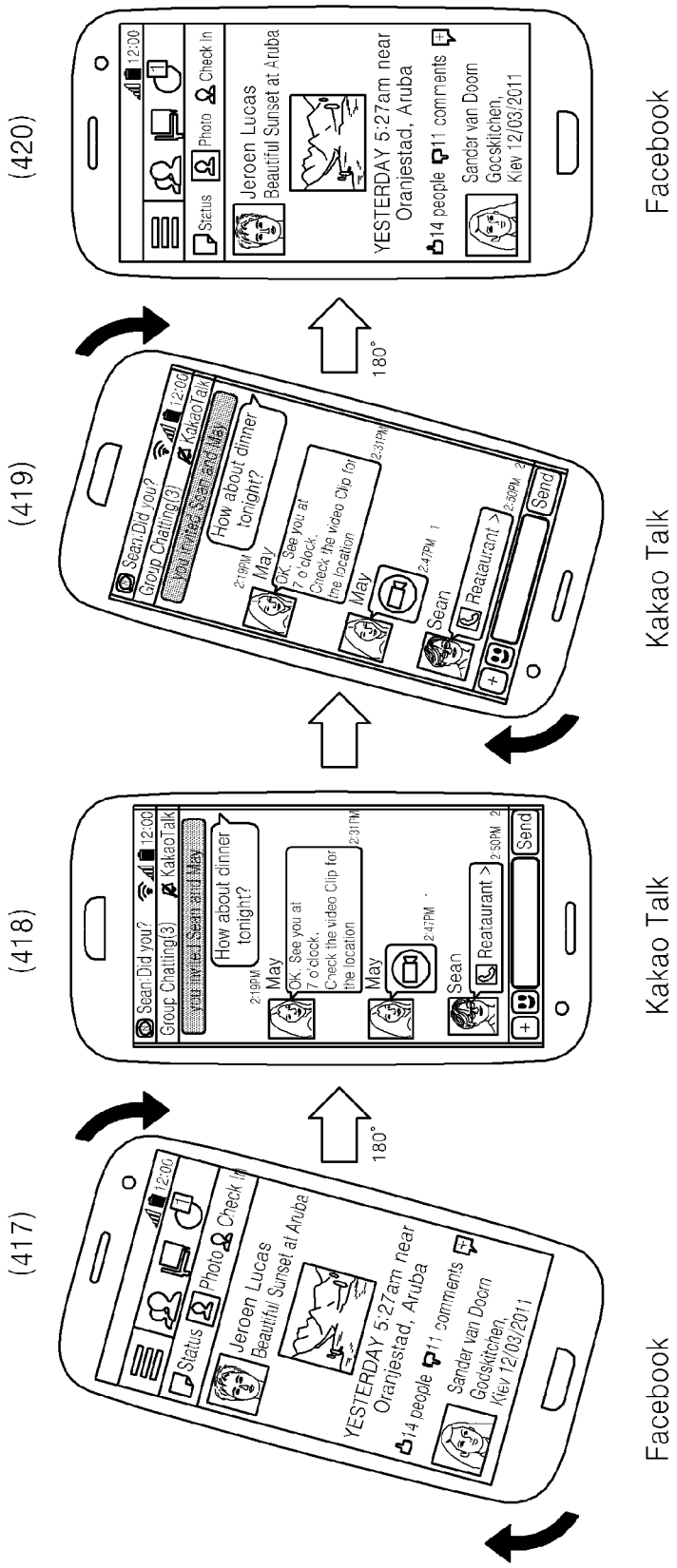

(417)
(418)
(419)
(420)
Facebook
Kakao Talk
Kakao Talk
Facebook
180°
180°
Status
Photo
Check In
Jeroen Lucas
Beautiful Sunset at Aruba
YESTERDAY 5:27am near
Oranjestad, Aruba
14 people
11 comments
Sander van Doorn
Godskitchen,
Kiev 12/03/2011
Sean:Did you?
Group Chatting(3)
KakaoTalk
How about dinner tonight?
OK. See you at 7 o'clock.
Check the video Clip for the location
May
Sean
Reataurant >
Send

FIG. 4I

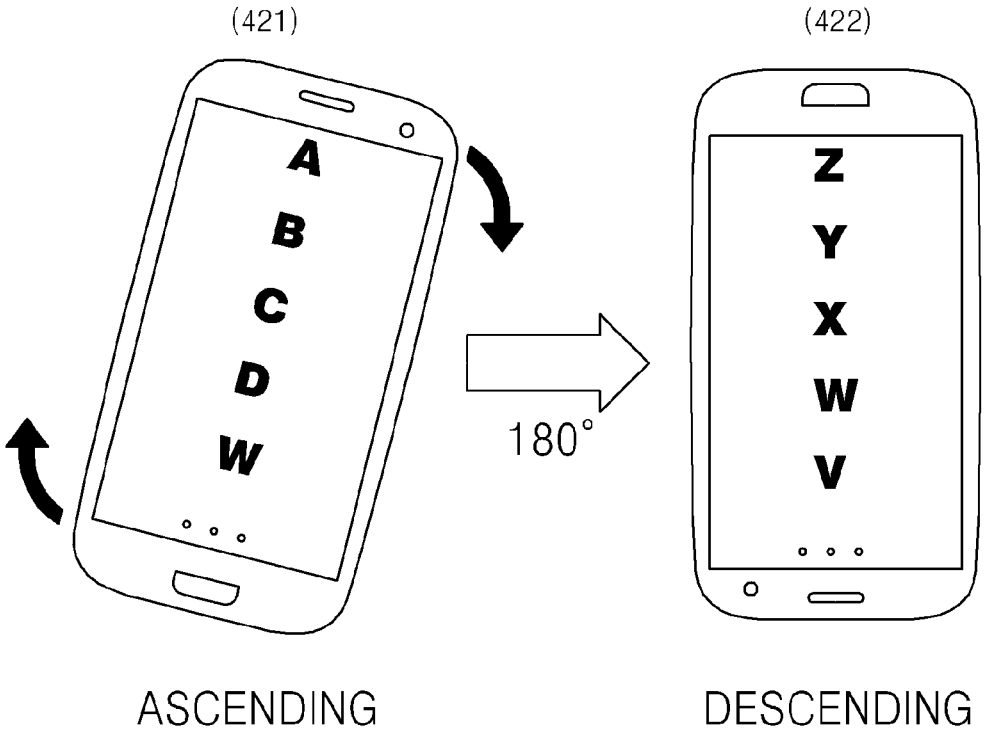


FIG. 4J

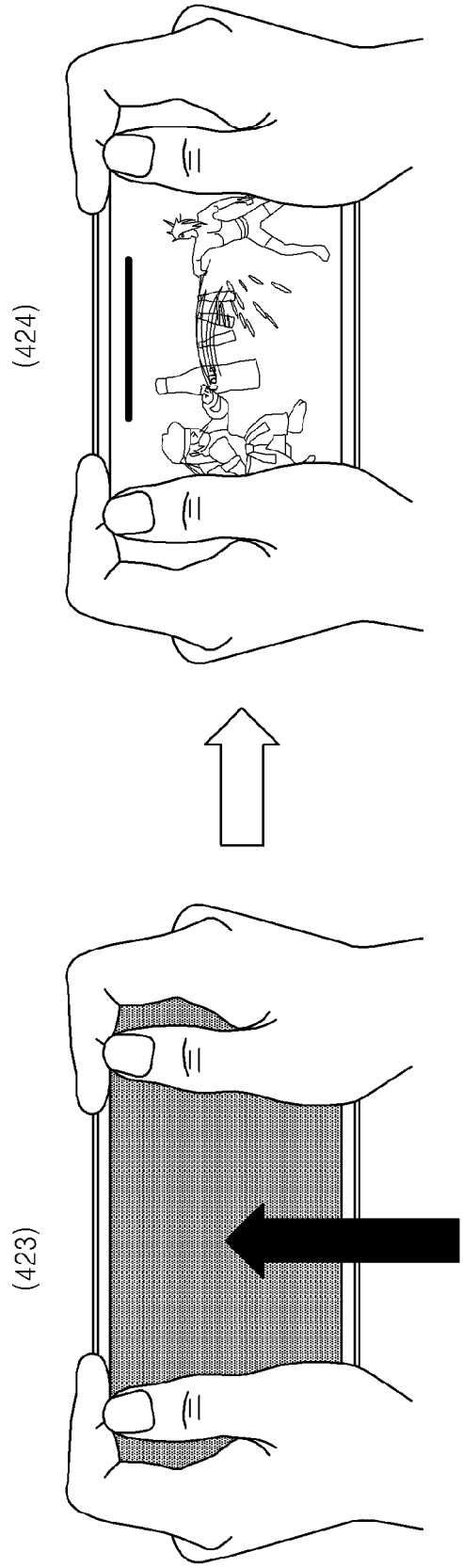


FIG. 5

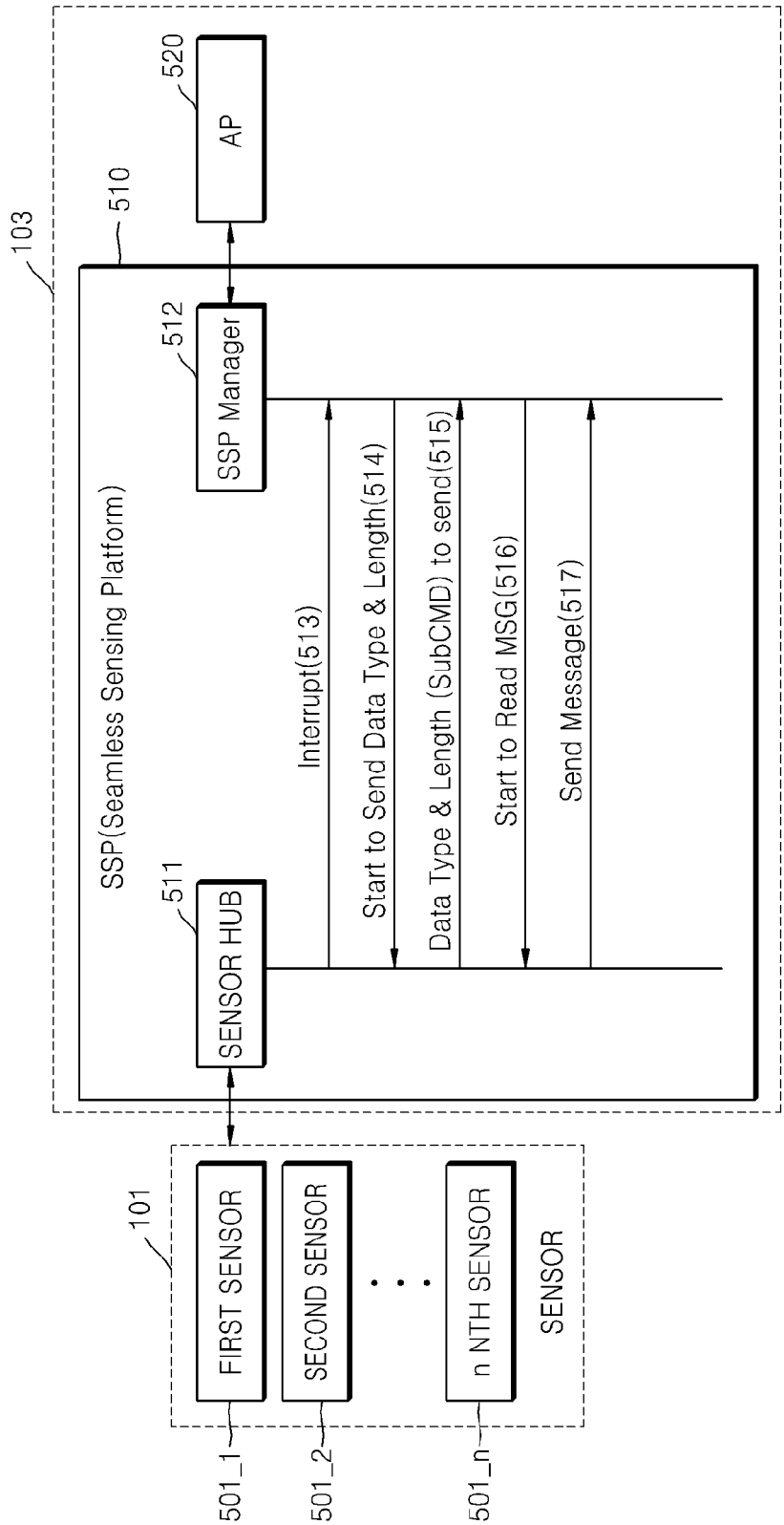

103
510
520
AP
SSP(Seamless Sensing Platform)
512
SSP Manager
511
SENSOR HUB
Interrupt(513)
Start to Send Data Type & Length(514)
Data Type & Length (SubCMD) to send(515)
Start to Read MSG(516)
Send Message(517)
101
FIRST SENSOR
SECOND SENSOR
n NTH SENSOR
SENSOR
501_1
501_2
501_n

FIG. 6A

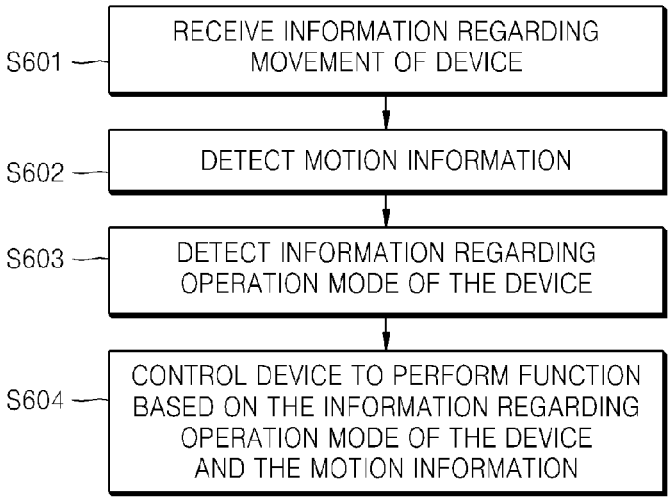


FIG. 6B

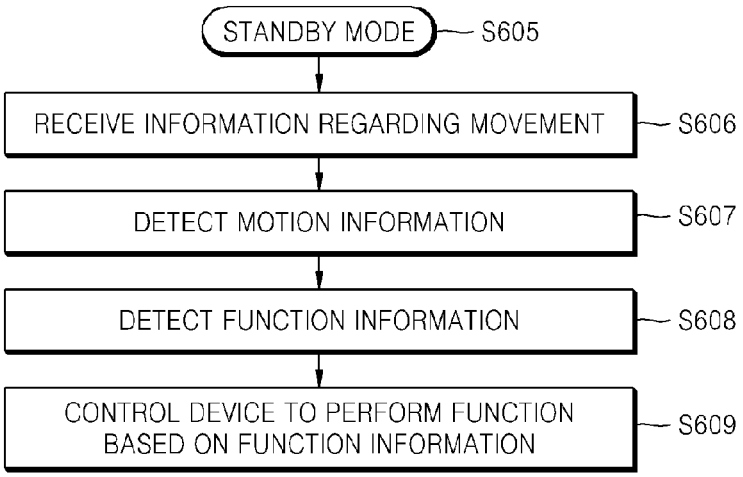


FIG. 7

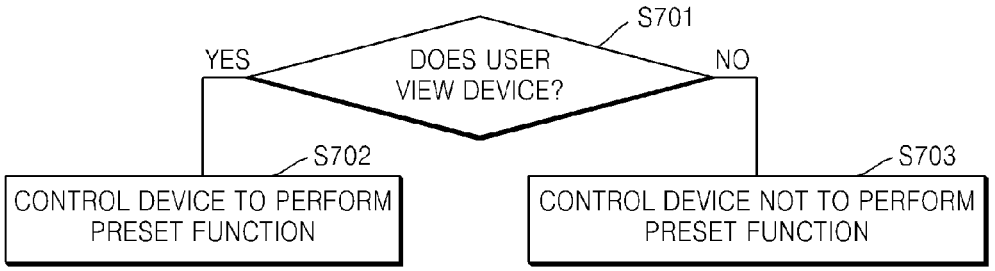


FIG. 8

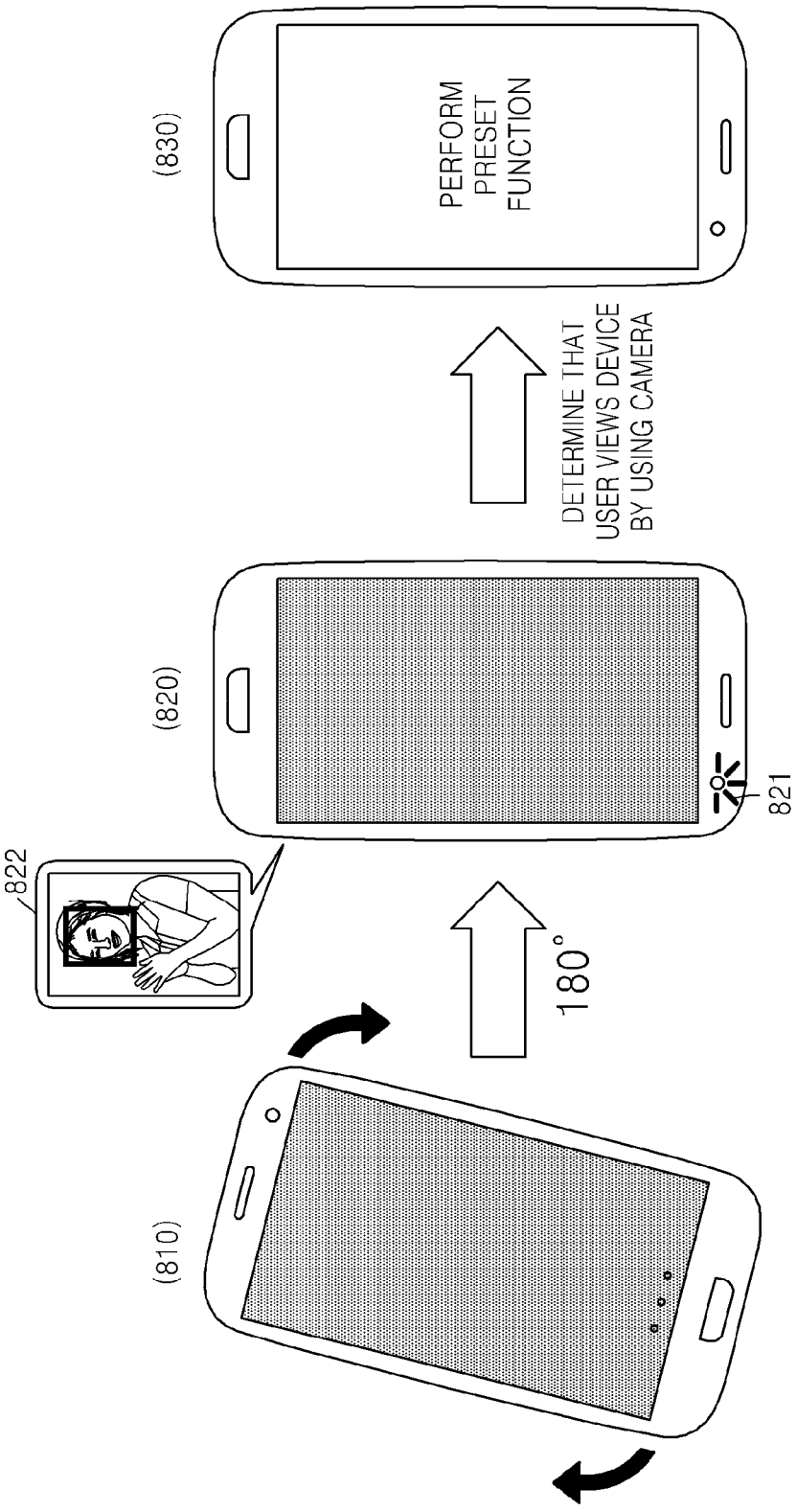
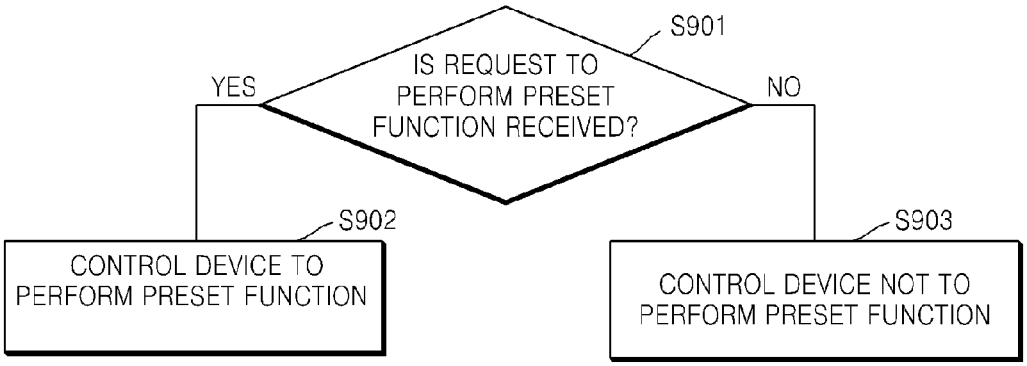

(830)
PERFORM PRESET FUNCTION
DETERMINE THAT USER VIEWS DEVICE BY USING CAMERA
(820)
821
822
180°
(810)

FIG. 9


S901
IS REQUEST TO PERFORM PRESET FUNCTION RECEIVED?
YES
NO
S902
CONTROL DEVICE TO PERFORM PRESET FUNCTION
S903
CONTROL DEVICE NOT TO PERFORM PRESET FUNCTION

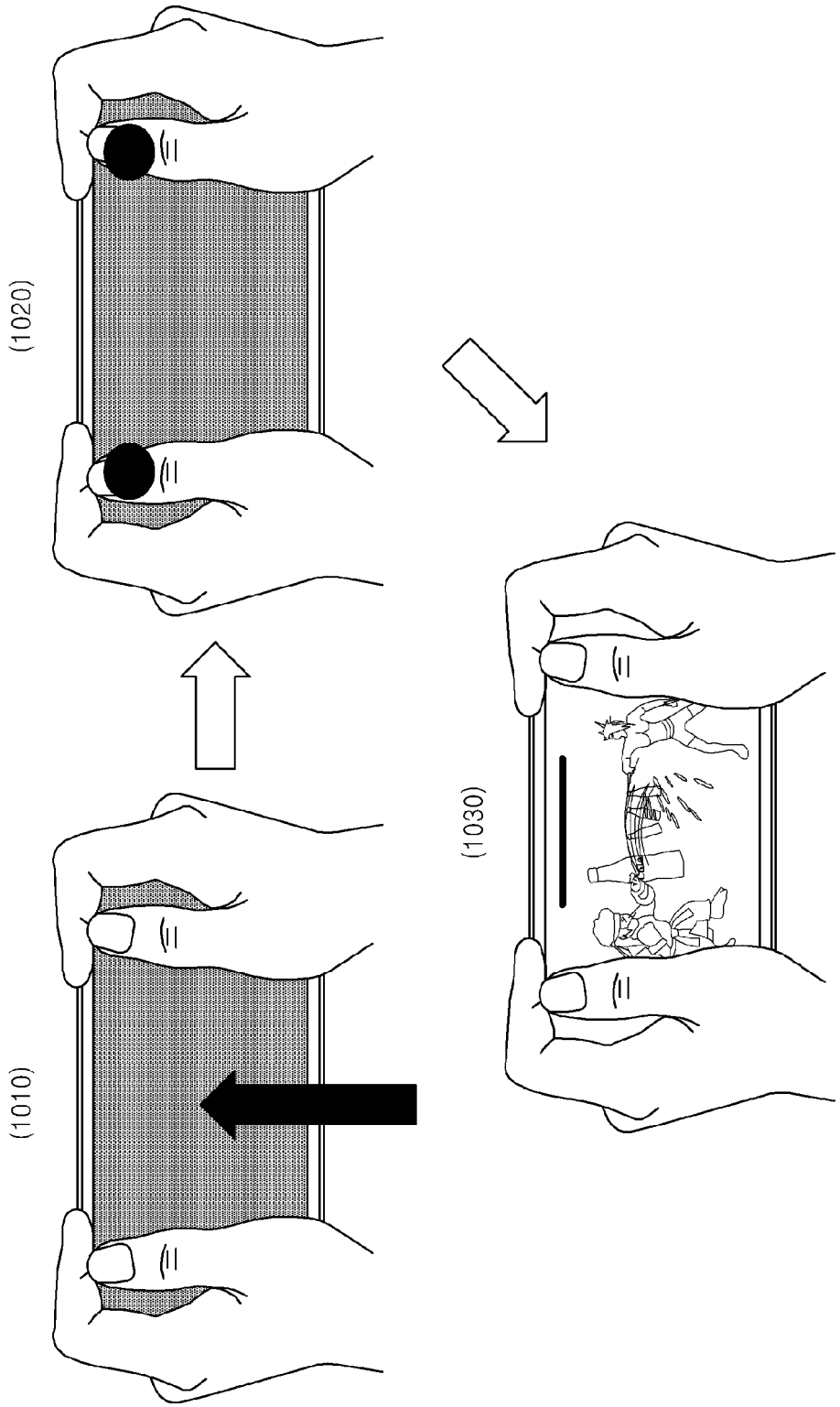


FIG. 10

FIG. 11

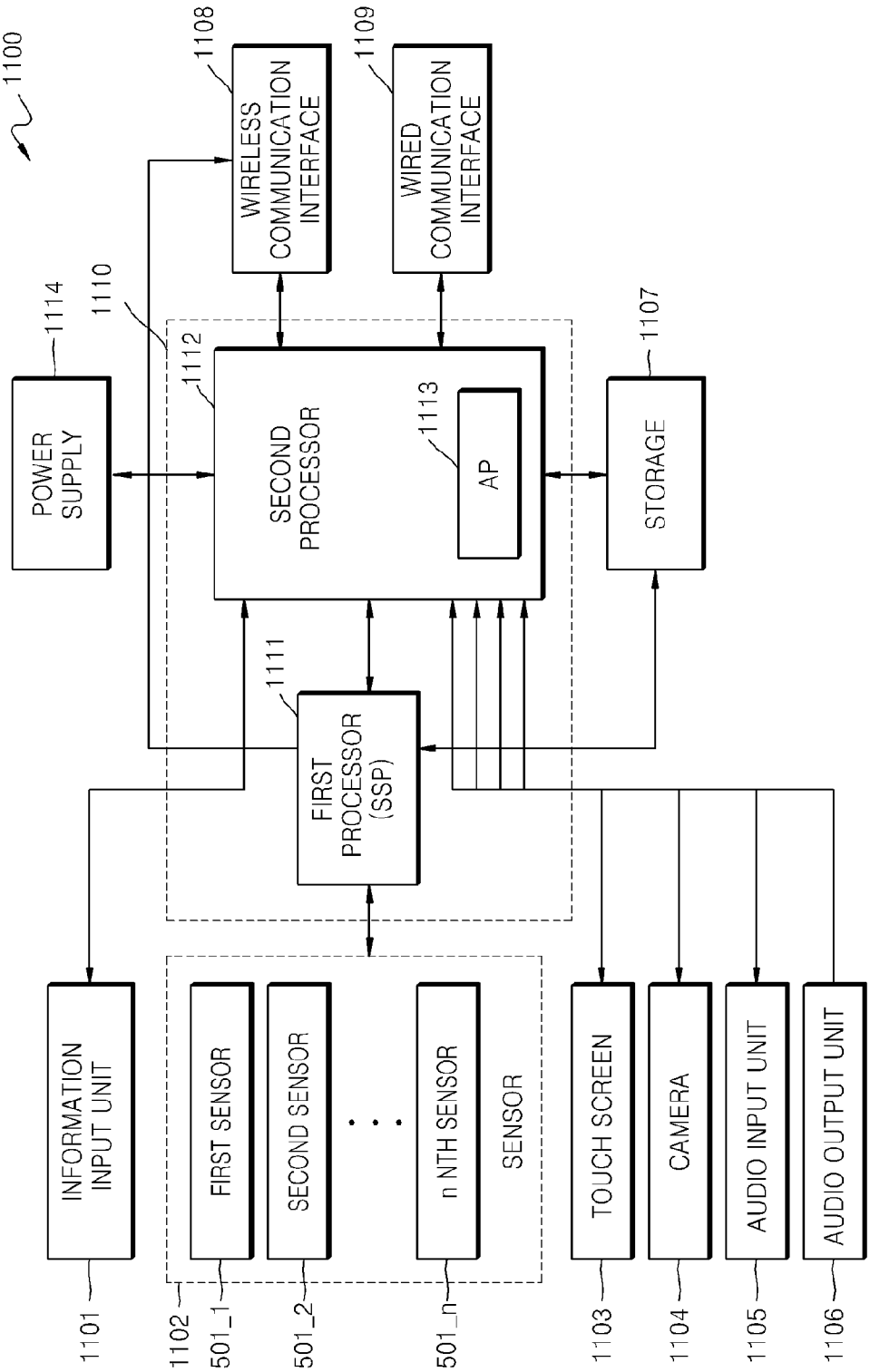

1100
1108
WIRELESS COMMUNICATION INTERFACE
1109
WIRED COMMUNICATION INTERFACE
1114
POWER SUPPLY
1110
1112
SECOND PROCESSOR
1113
AP
1107
STORAGE
1111
FIRST PROCESSOR (SSP)
INFORMATION INPUT UNIT
FIRST SENSOR
SECOND SENSOR
n NTH SENSOR
SENSOR
TOUCH SCREEN
CAMERA
AUDIO INPUT UNIT
AUDIO OUTPUT UNIT
1101
1102
501_1
501_2
501_n
1103
1104
1105
1106

FIG. 12

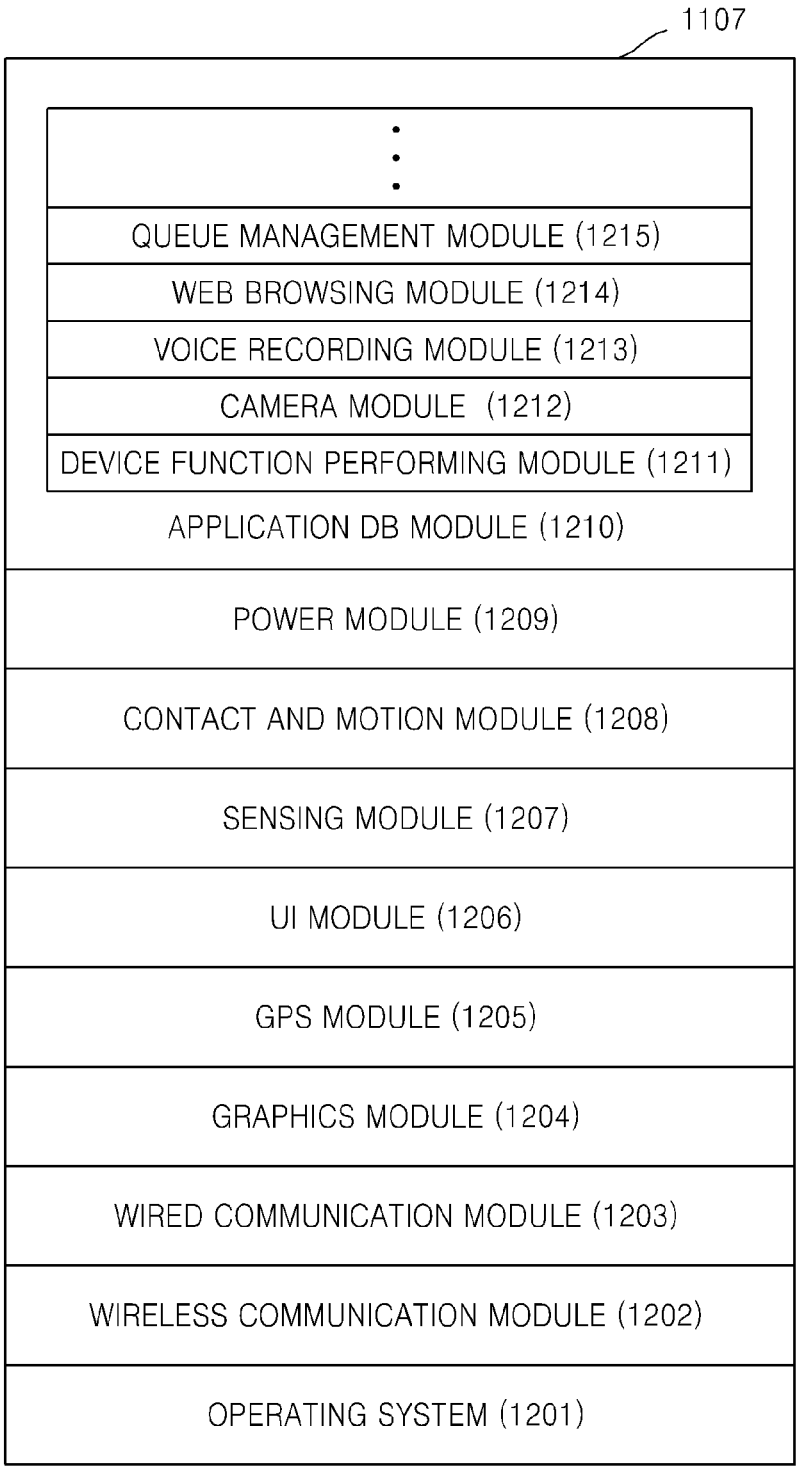

1107
QUEUE MANAGEMENT MODULE (1215)
WEB BROWSING MODULE (1214)
VOICE RECORDING MODULE (1213)
CAMERA MODULE (1212)
DEVICE FUNCTION PERFORMING MODULE (1211)
APPLICATION DB MODULE (1210)
POWER MODULE (1209)
CONTACT AND MOTION MODULE (1208)
SENSING MODULE (1207)
UI MODULE (1206)
GPS MODULE (1205)
GRAPHICS MODULE (1204)
WIRED COMMUNICATION MODULE (1203)
WIRELESS COMMUNICATION MODULE (1202)
OPERATING SYSTEM (1201)

FIG. 13A

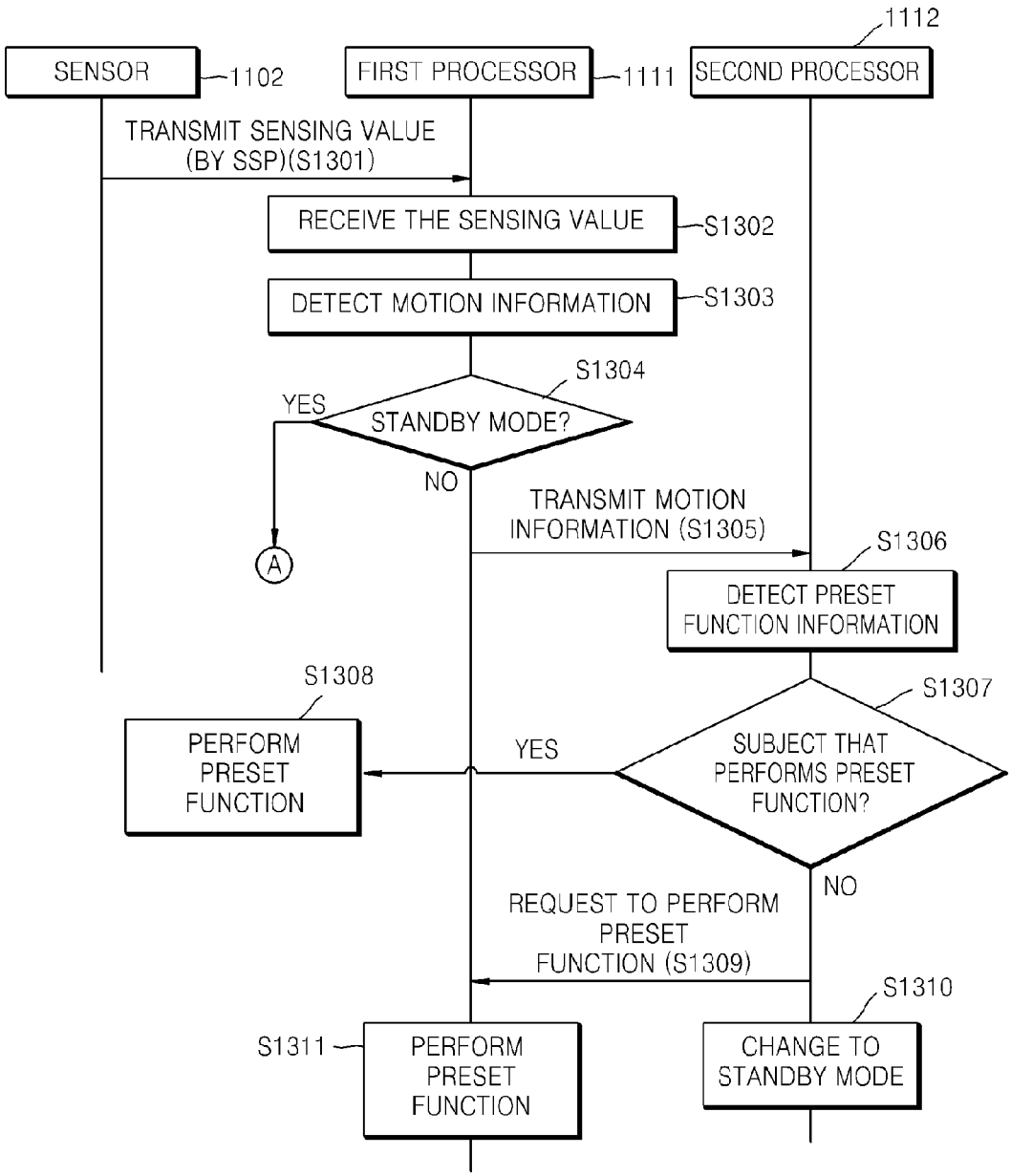

SENSOR
1102
FIRST PROCESSOR
1111
SECOND PROCESSOR
1112
TRANSMIT SENSING VALUE (BY SSP)(S1301)
RECEIVE THE SENSING VALUE
S1302
DETECT MOTION INFORMATION
S1303
S1304
YES
STANDBY MODE?
NO
A
TRANSMIT MOTION INFORMATION (S1305)
S1306
DETECT PRESET FUNCTION INFORMATION
S1307
SUBJECT THAT PERFORMS PRESET FUNCTION?
YES
S1308
PERFORM PRESET FUNCTION
NO
REQUEST TO PERFORM PRESET FUNCTION (S1309)
S1310
CHANGE TO STANDBY MODE
S1311
PERFORM PRESET FUNCTION

FIG. 13B

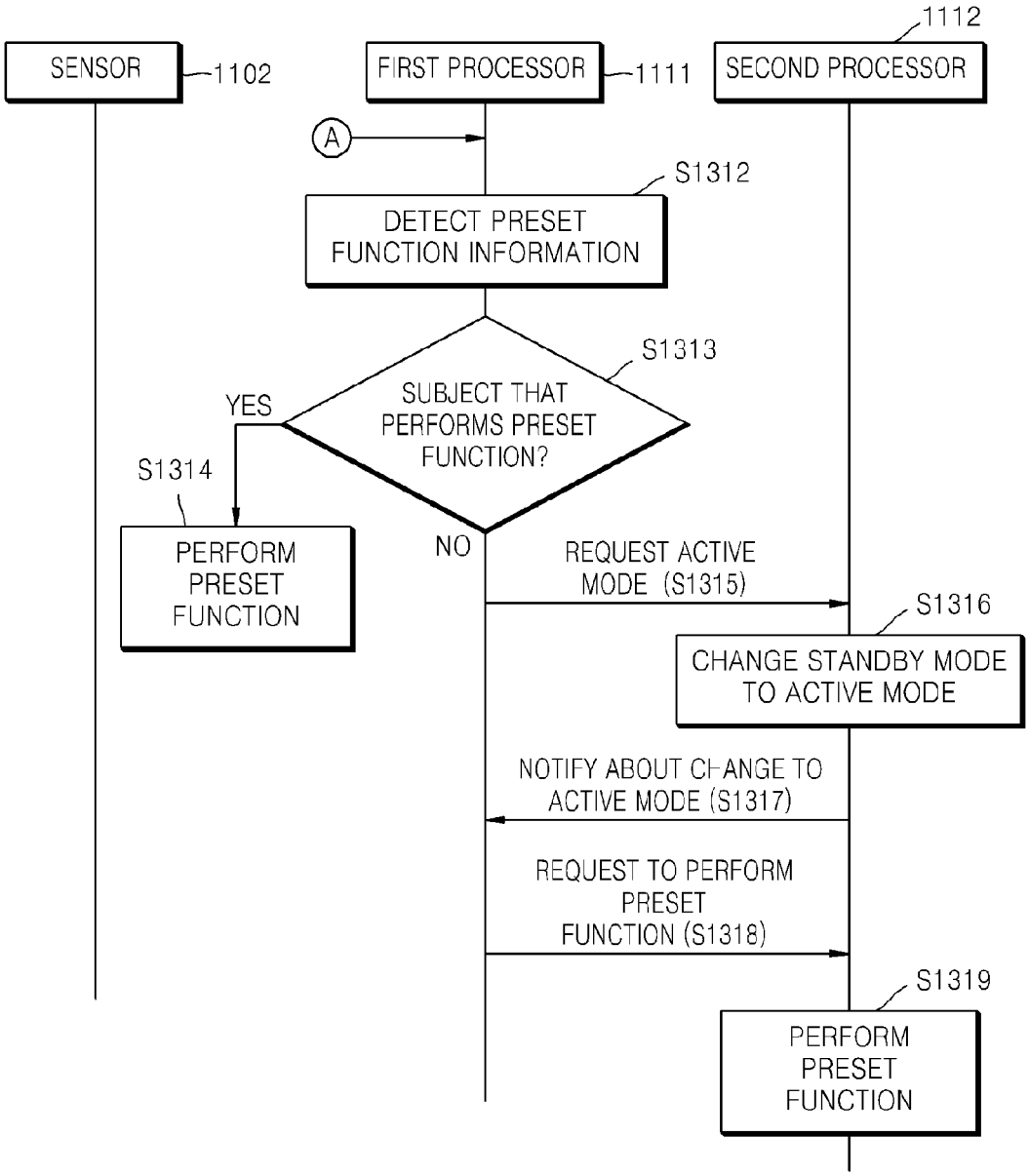

SENSOR
1102
FIRST PROCESSOR
1111
SECOND PROCESSOR
1112
A
S1312
DETECT PRESET FUNCTION INFORMATION
S1313
SUBJECT THAT PERFORMS PRESET FUNCTION?
YES
NO
S1314
PERFORM PRESET FUNCTION
REQUEST ACTIVE MODE (S1315)
S1316
CHANGE STANDBY MODE TO ACTIVE MODE
NOTIFY ABOUT CHANGE TO ACTIVE MODE (S1317)
REQUEST TO PERFORM PRESET FUNCTION (S1318)
S1319
PERFORM PRESET FUNCTION

FIG. 14

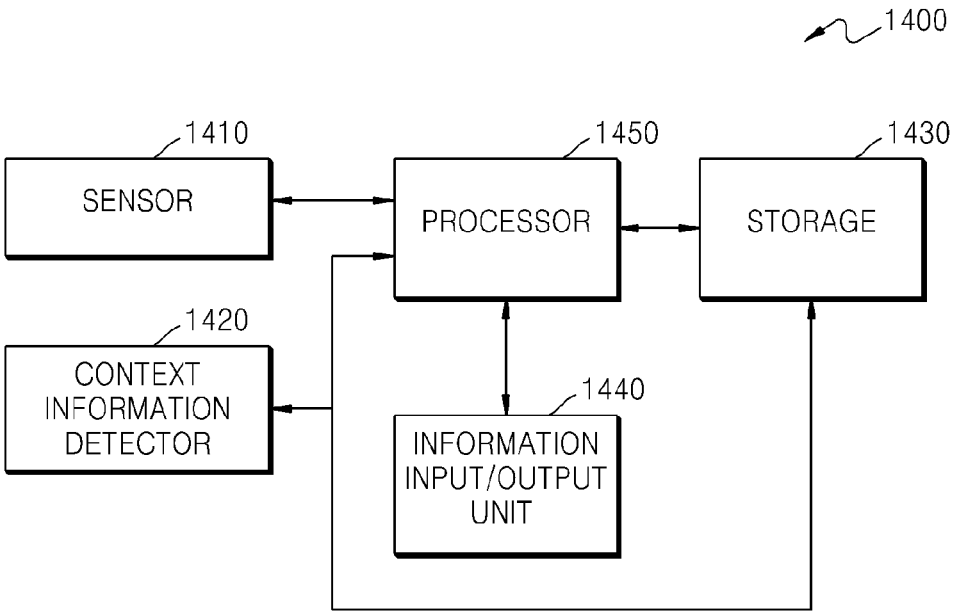

1400
1410
SENSOR
1450
PROCESSOR
1430
STORAGE
1420
CONTEXT INFORMATION DETECTOR
1440
INFORMATION INPUT/OUTPUT UNIT

FIG. 15

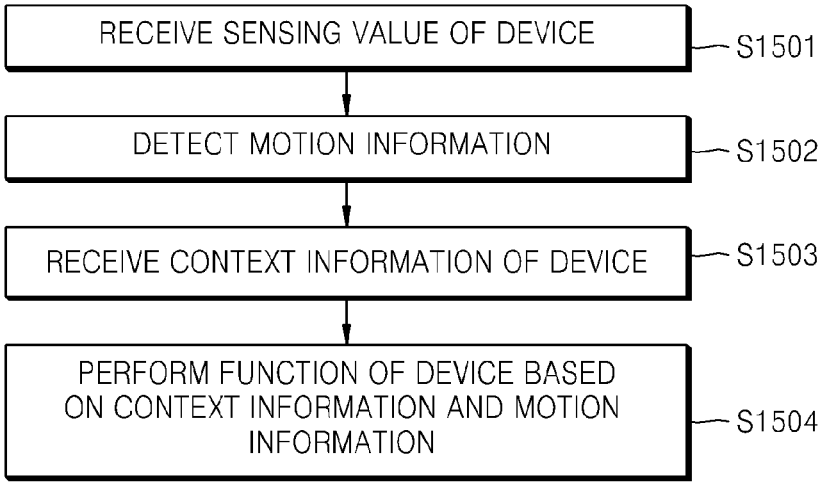

RECEIVE SENSING VALUE OF DEVICE
S1501
DETECT MOTION INFORMATION
S1502
RECEIVE CONTEXT INFORMATION OF DEVICE
S1503
PERFORM FUNCTION OF DEVICE BASED ON CONTEXT INFORMATION AND MOTION INFORMATION
S1504

FIG. 16A

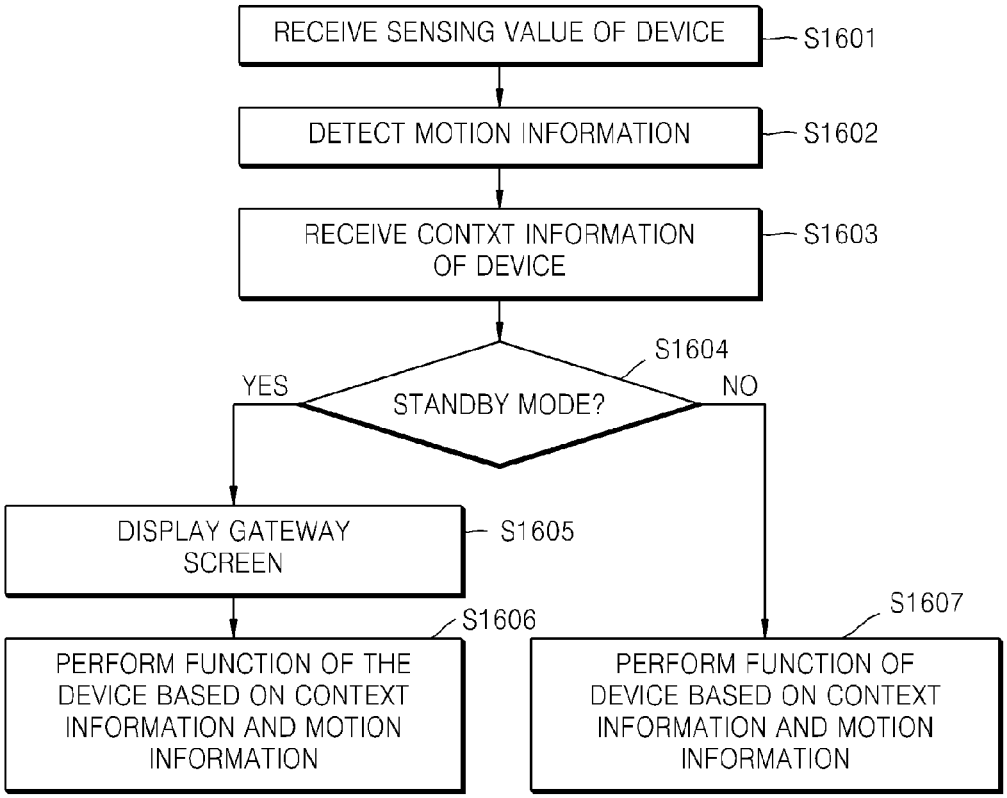

RECEIVE SENSING VALUE OF DEVICE
S1601
DETECT MOTION INFORMATION
S1602
RECEIVE CONTXT INFORMATION OF DEVICE
S1603
S1604
STANDBY MODE?
YES
NO
DISPLAY GATEWAY SCREEN
S1605
S1606
PERFORM FUNCTION OF THE DEVICE BASED ON CONTEXT INFORMATION AND MOTION INFORMATION
S1607
PERFORM FUNCTION OF DEVICE BASED ON CONTEXT INFORMATION AND MOTION INFORMATION

FIG. 16B

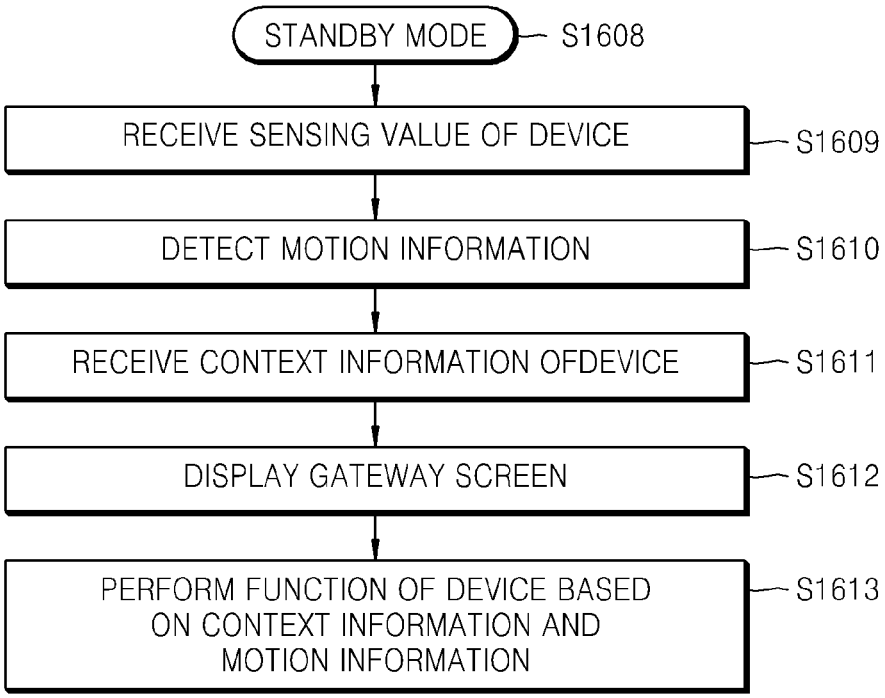

STANDBY MODE
S1608
RECEIVE SENSING VALUE OF DEVICE
S1609
DETECT MOTION INFORMATION
S1610
RECEIVE CONTEXT INFORMATION OFDEVICE
S1611
DISPLAY GATEWAY SCREEN
S1612
PERFORM FUNCTION OF DEVICE BASED ON CONTEXT INFORMATION AND MOTION INFORMATION
S1613

FIG. 17

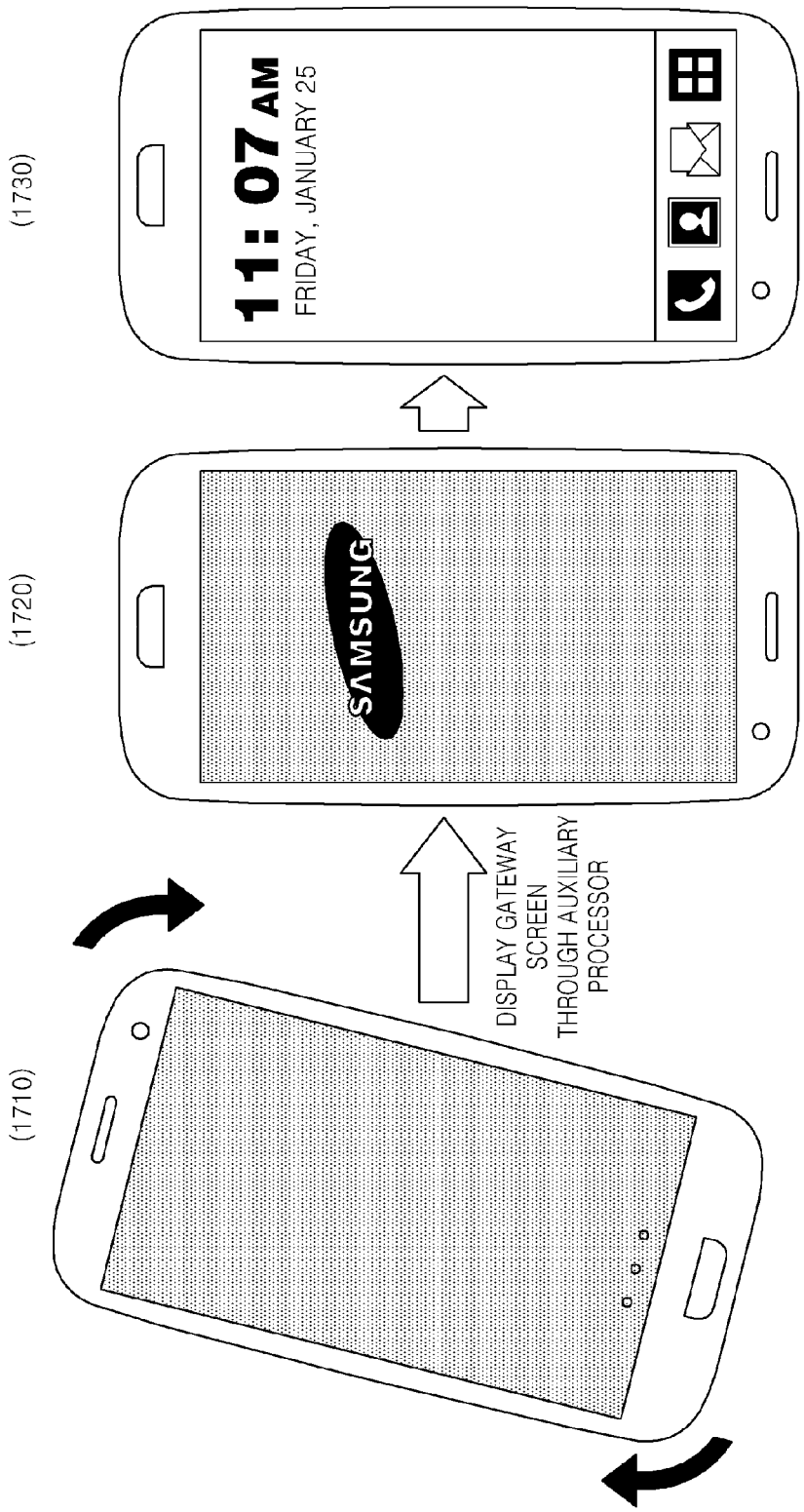

(1730)
11: 07 AM
FRIDAY, JANUARY 25
(1720)
SAMSUNG
DISPLAY GATEWAY SCREEN THROUGH AUXILIARY PROCESSOR
(1710)

FIG. 18A

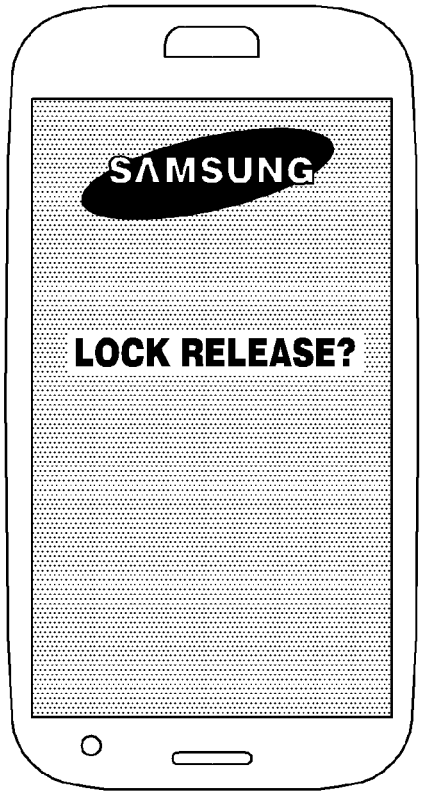


FIG. 18B

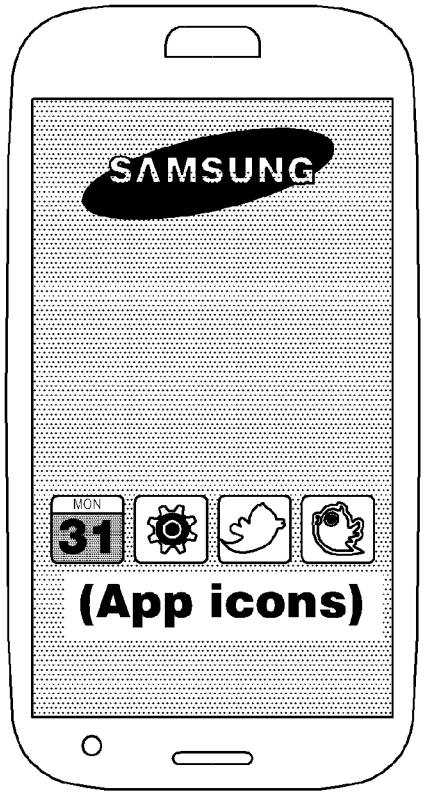


FIG. 18C

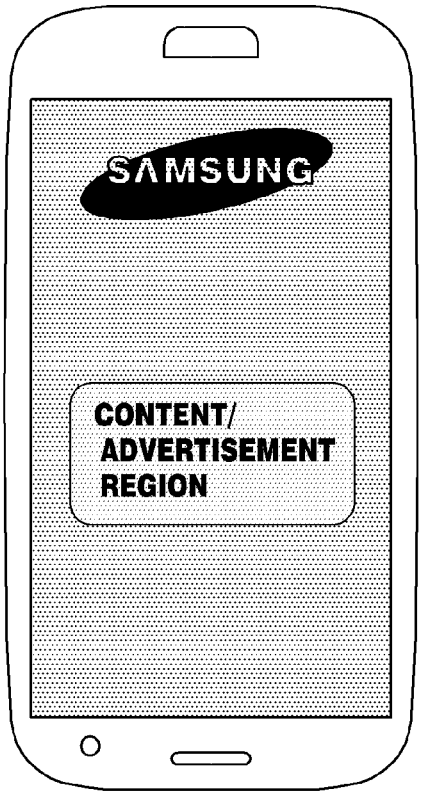


FIG. 18D

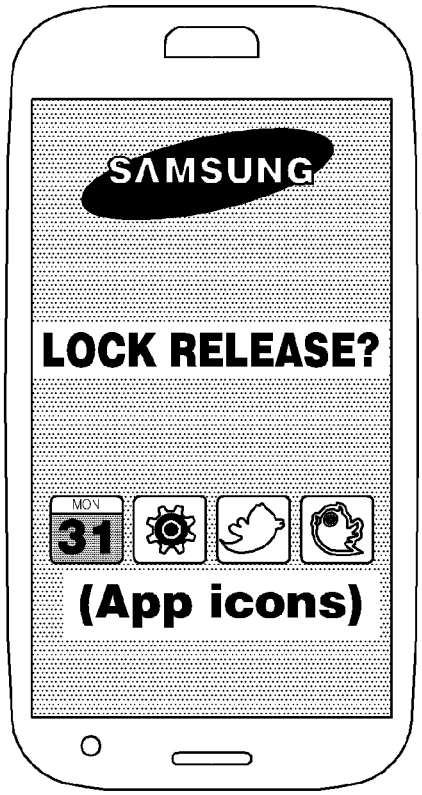


FIG. 18E

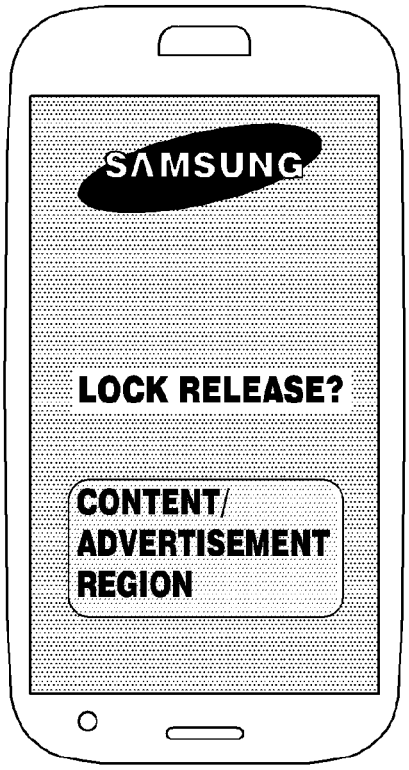


FIG. 18F

FIG. 19A

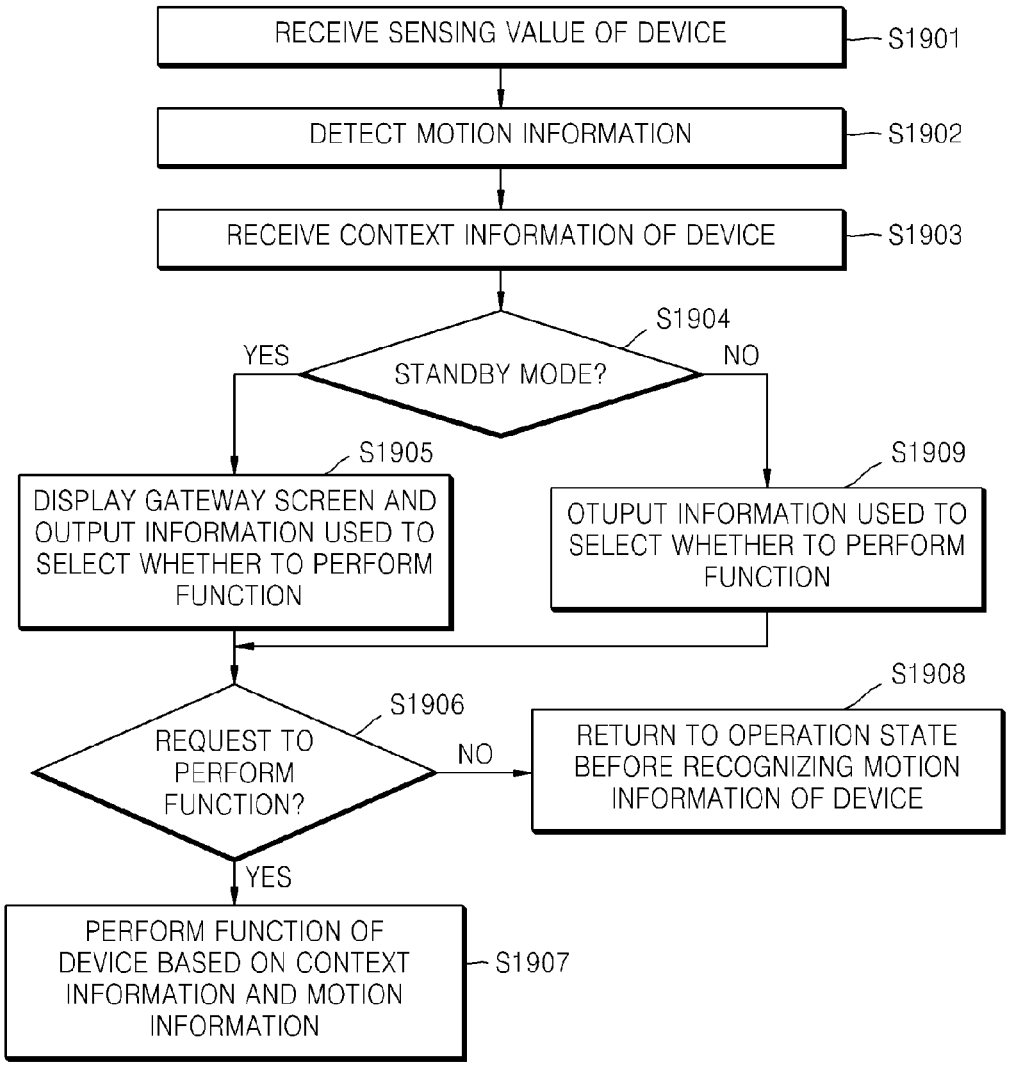

RECEIVE SENSING VALUE OF DEVICE
S1901
DETECT MOTION INFORMATION
S1902
RECEIVE CONTEXT INFORMATION OF DEVICE
S1903
S1904
STANDBY MODE?
YES
NO
S1905
DISPLAY GATEWAY SCREEN AND OUTPUT INFORMATION USED TO SELECT WHETHER TO PERFORM FUNCTION
S1909
OTUPUT INFORMATION USED TO SELECT WHETHER TO PERFORM FUNCTION
S1906
REQUEST TO PERFORM FUNCTION?
NO
S1908
RETURN TO OPERATION STATE BEFORE RECOGNIZING MOTION INFORMATION OF DEVICE
YES
PERFORM FUNCTION OF DEVICE BASED ON CONTEXT INFORMATION AND MOTION INFORMATION
S1907

FIG. 19B

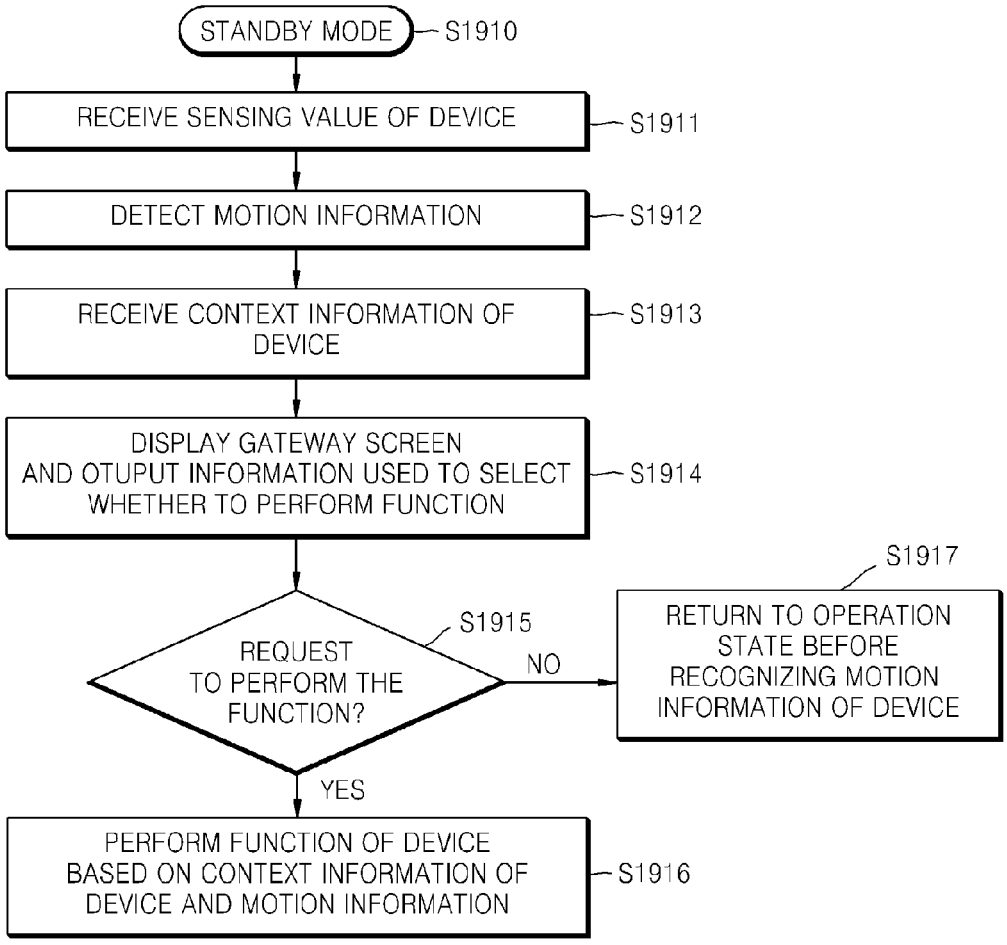

STANDBY MODE
S1910
RECEIVE SENSING VALUE OF DEVICE
S1911
DETECT MOTION INFORMATION
S1912
RECEIVE CONTEXT INFORMATION OF DEVICE
S1913
DISPLAY GATEWAY SCREEN AND OTUPUT INFORMATION USED TO SELECT WHETHER TO PERFORM FUNCTION
S1914
S1915
REQUEST TO PERFORM THE FUNCTION?
NO
S1917
RETURN TO OPERATION STATE BEFORE RECOGNIZING MOTION INFORMATION OF DEVICE
YES
PERFORM FUNCTION OF DEVICE BASED ON CONTEXT INFORMATION OF DEVICE AND MOTION INFORMATION
S1916

FIG. 20

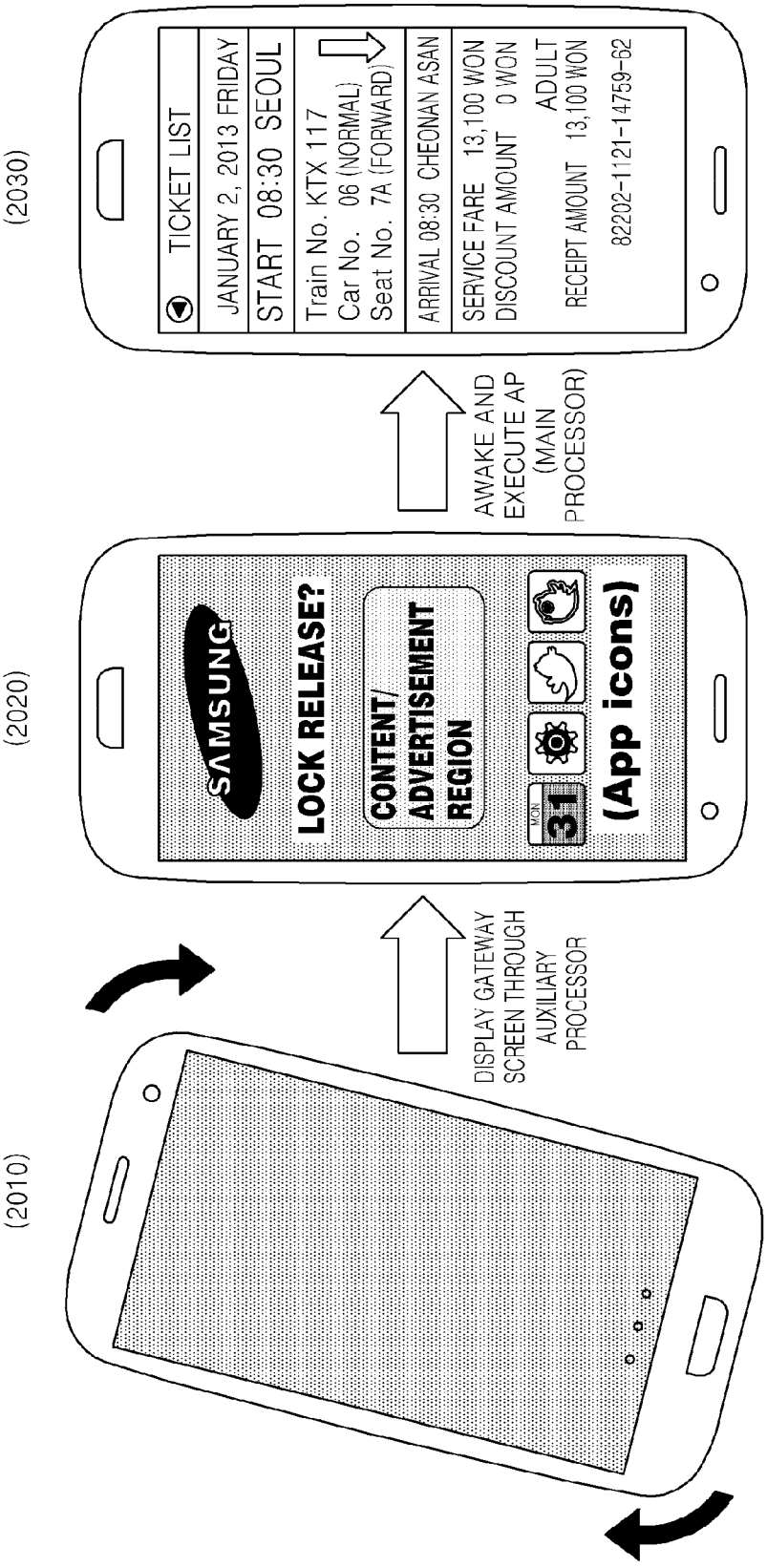
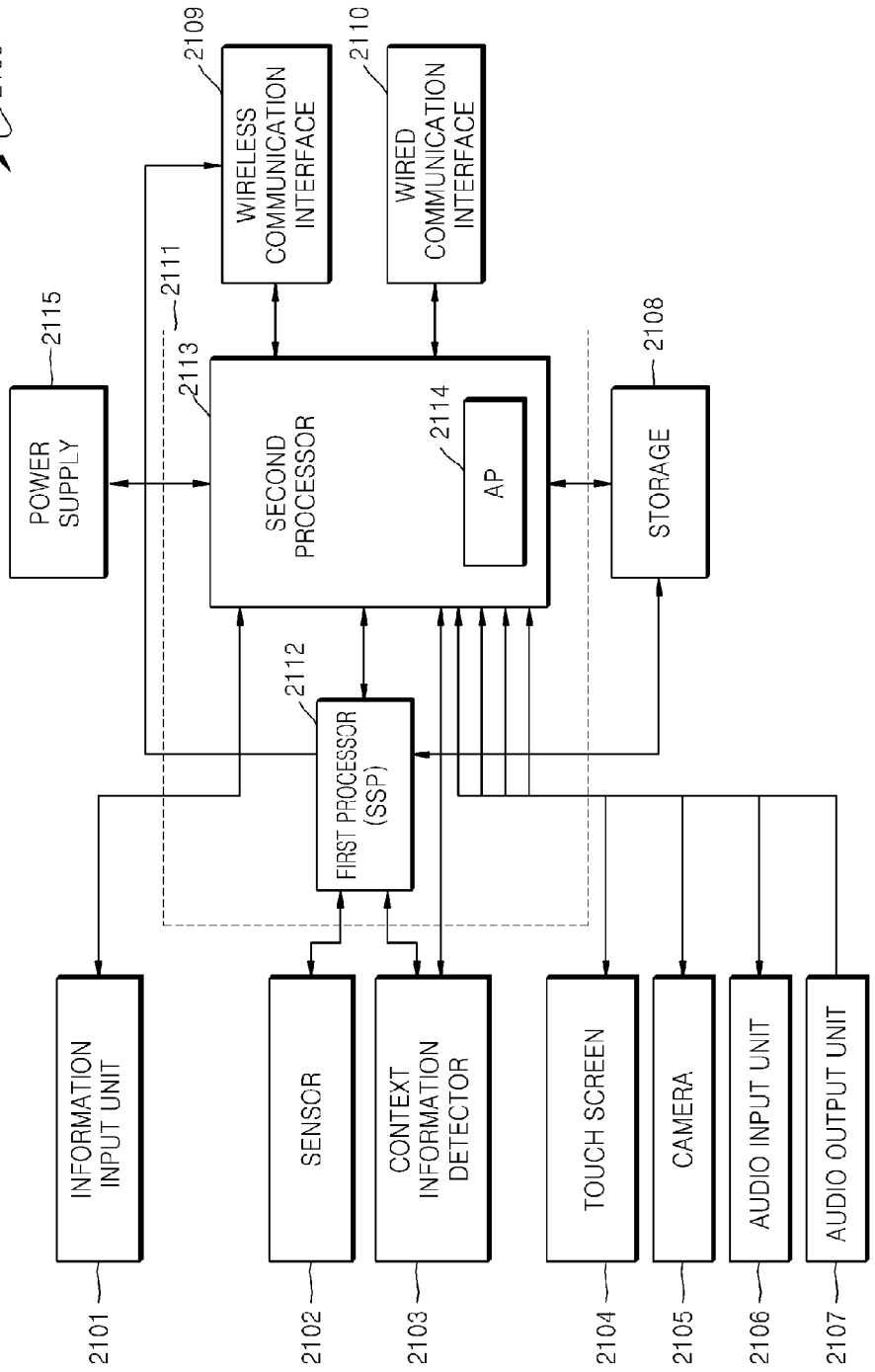

(2010)
DISPLAY GATEWAY SCREEN THROUGH AUXILIARY PROCESSOR
(2020)
SAMSUNG
LOCK RELEASE?
CONTENT/ ADVERTISEMENT REGION
(App icons)
AWAKE AND EXECUTE AP (MAIN PROCESSOR)
(2030)
TICKET LIST
JANUARY 2, 2013 FRIDAY
START 08:30 SEOUL
Train No. KTX 117
Car No. 06 (NORMAL)
Seat No. 7A (FORWARD)
ARRIVAL 08:30 CHEONAN ASAN
SERVICE FARE 13,100 WON
DISCOUNT AMOUNT 0 WON
ADULT
RECEIPT AMOUNT 13,100 WON
82202-1121-14759-62

FIG. 21


2100
2109
WIRELESS COMMUNICATION INTERFACE
2110
WIRED COMMUNICATION INTERFACE
2111
2115
POWER SUPPLY
2113
SECOND PROCESSOR
2114
AP
2108
STORAGE
2112
FIRST PROCESSOR (SSP)
INFORMATION INPUT UNIT
SENSOR
CONTEXT INFORMATION DETECTOR
TOUCH SCREEN
CAMERA
AUDIO INPUT UNIT
AUDIO OUTPUT UNIT
2101
2102
2103
2104
2105
2106
2107

METHOD OF PERFORMING FUNCTION OF DEVICE AND DEVICE FOR PERFORMING THE METHOD

RELATED APPLICATIONS

This application claims priority from Korean Patent Application No. 10-2013-0010102, filed on Jan. 29, 2013, and Korean Patent Application No. 10-2013-0084384, filed on Jul. 17, 2013, in the Korean Intellectual Property Office, the disclosures of which are incorporated herein in their entireties by reference.

BACKGROUND

1. Field

Apparatuses and methods consistent with exemplary embodiments relate to performing a function of a device, and more particularly to, a method of performing a function of a device based on a movement of the device and a device for performing the method.

2. Description of the Related Art

According to the functions of mobile devices such as smart phones have become more intelligent, mobile devices based applications, services, and contents are increasing and the functions of mobile devices are diversifying.

Accordingly, the accessibility to applications, services, and contents or the accessibility to functions that devices may perform may reduce. In particular, in a standby mode of a device, the accessibility to applications, services, and contents or the accessibility to functions that devices may perform may deteriorate.

SUMMARY

One or more exemplary embodiments provide a method of performing a function of a device based on motion information of the device in a standby mode of a device, a device for performing the method, and a non-transitory computer readable medium storing computer codes for performing the same.

One or more exemplary embodiments also provide a method of performing a function of a device based on motion information of the device and context information thereof in a standby mode of a device, a device for performing the method, and a non-transitory computer readable medium storing computer codes for performing the same.

One or more exemplary embodiments also provide a method of performing a function of a device based on an operation mode of a device and motion information thereof, a device for performing the method, and a non-transitory computer readable medium storing computer codes for performing the same.

One or more exemplary embodiments also provide a method of performing a function of a device based on an operating mode of a device, motion information thereof, and context information thereof, a device for performing the method, and a non-transitory computer readable medium storing computer codes for performing the same.

According to an aspect of an exemplary embodiment, there is provided a device including a sensor configured to detect movement of the device in a standby mode of the device; a storage configured to store motion information based on information related to the movement and at least one piece of function information corresponding to the motion information; and a processor configured to control the device to perform a function corresponding to the motion information in the standby mode based on the information related to the movement, the motion information, and the at least one piece of function information.

The standby mode of the device may include at least one of an idle state of an application processor included in the device, an inactive state of a function related to a touch screen included in the device, and a screen lock set state of the device.

The function related to the touch screen may include at least one of a touch sensing function of the touch screen and a display function of the touch screen.

The standby mode of the device may include an inactive state of other elements included in the device other than the movement sensor, the storage, and the processor, a state in which power is not consumed by the other elements, or a state in which power is consumed by the movement sensor, the storage, and the processor.

The processor may control the device such that a gateway screen is displayed before the function is performed.

The gateway screen may include notification information notifying that the function is performed, and selection information for selecting an execution mode of the function.

When there are a plurality of functions corresponding to the motion information of the device, the gateway screen may include selection information to select an execution mode of each of the plurality of functions.

The device may further include a context information sensor for detecting at least one piece of context information related to the device, wherein the storage stores mapping information between the at least one piece of context information of the device, the motion information, and the at least one piece of function information, and the function performed by the processor is determined based on the at least one piece of context information detected by the context information sensor, information related to the movement of the device, and the mapping information.

The at least one piece of context information may include at least one piece of current time information, position information of the device, schedule information stored in the device, and log information related to the device.

According to an aspect of another exemplary embodiment, there is provided a method of performing a function of a device, the method including: detecting movement of the device in a standby mode of the device; detecting motion information based on information related to the movement; detecting at least one piece of function information corresponding to the detected motion information; and performing a function based on the detected at least one function information.

According to an aspect of another exemplary embodiment, there is provided a non-transitory computer readable recording medium storing one or more programs including commands for executing the method of performing the function of the device.

BRIEF DESCRIPTION OF THE DRAWINGS

The and/or other aspects will become apparent and more readily appreciated from the following description of exemplary embodiments, taken in conjunction with the accompanying drawings in which:

FIG. **1** is a block diagram of a device, according to an exemplary embodiment;

FIG. **2** shows a table for explaining mapping information regarding an operation mode of a device, motion information thereof, and function information thereof, according to an exemplary embodiment;

FIGS. **3**A and **3**B illustrate motion information of a device, according to an exemplary embodiment;

FIGS. **4**A through **4**J illustrate functions of a device performed based on motion information of the device and an operation mode of the device, according to exemplary embodiments;

FIG. **5** is a block diagram for explaining an operation between a sensor and a processor based on a seamless sensing platform (SSP), according to an exemplary embodiment;

FIG. **6**A is a flowchart of a method of performing a function of a device, according to an exemplary embodiment;

FIG. **6**B is a flowchart of a method of performing a function of a device, according to another exemplary embodiment;

FIG. **7** is a flowchart of a process that may be performed in operation S**604** of FIG. **6**A or operation S**609** of FIG. **6**B, according to an exemplary embodiment;

FIG. **8** shows screens for explaining a preset function performed by a device in operations S**701** and S**702** of FIG. **7**, according to an exemplary embodiment;

FIG. **9** is a flowchart of a process that may be performed in operation S**604** of FIG. **6**A or operation S**609** of FIG. **6**B, according to another exemplary embodiment;

FIG. **10** shows screens for explaining a preset function performed by a device in operations S**901** and S**902** of FIG. **9**, according to another exemplary embodiment;

FIG. **11** is a block diagram of a device, according to another exemplary embodiment;

FIG. **12** shows an example of programs and/or command sets that are stored in a storage of FIG. **11**;

FIGS. **13**A and **13**B are flowcharts of a method of performing a function of a device, according to other exemplary embodiments;

FIG. **14** is a block diagram of a device, according to another exemplary embodiment;

FIG. **15** is a flowchart of a method of performing a function of a device, according to another exemplary embodiment;

FIGS. **16**A and **16**B are flowcharts of a method of performing a function of a device, according to other exemplary embodiments;

FIG. **17** shows screens for explaining functions of a device performed by using the method of FIG. **16**A, according to an exemplary embodiment;

FIGS. **18**A through **18**F show gateway screens, according to exemplary embodiments;

FIGS. **19**A and **19**B are flowcharts of a method of performing a function of a device, according to other exemplary embodiments;

FIG. **20** shows screens for explaining functions of a device performed by using the method of FIGS. **19**A and **19**B, according to an exemplary embodiment; and

FIG. **21** is a block diagram of a device, according to another exemplary embodiment.

DETAILED DESCRIPTION

Reference will now be made in detail to embodiments, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout. In this regard, the exemplary embodiments may have different forms and should not be construed as being limited to the descriptions set forth herein.

Terms such as "first" and "second" are used herein merely to describe a variety of constituent elements, but the constituent elements are not limited by these terms. These terms are used only for distinguishing one constituent element from another constituent element.

Most of the terms used herein are general terms that are widely used in the technical art to which the inventive concept pertains. However, some of the terms used herein may reflect intentions of technicians in this art, precedents, or the occurrence of new technologies. Also, some of the terms used herein may be arbitrarily chosen by the present applicant. In this case, these terms are defined in detail below. Accordingly, the specific terms used herein should be understood based on the unique meanings thereof and the whole context of the exemplary embodiments.

As used herein, the singular forms "a", "an" and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms "comprises" or "comprising," when used in this specification, specify the presence of stated features, integers, steps, operations, elements, components, and/or groups thereof, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof. As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items. Expressions such as "at least one of," when preceding a list of elements, modify the entire list of elements and do not modify the individual elements of the list.

Throughout the specification, input information is touch based input information of a user. The touch based input information may include user gesture based input information. The touch based input information may include input information based on, for example, a tap (or a touch), a long tap (or a long touch), a touch and hold, a touch and drag, a double tap, dragging, panning, a flick, a drag and drop, a sweep, and the like, but is not limited thereto.

The input information is not limited to the touch based input information. For example, the input information may be movement based input information or vision based input information.

The movement based input information may be based on a user gesture (for example, a device shaking, a device rotation, a device pickup, etc.) based on a movement of a device. For example, the user gesture based on the device motion when a device is turned upside down in a direction of gravity, which will be described later, may be set as input information based on a movement of the device indicating a request to perform a preset function.

The vision based input information may be based on information recognized by analyzing an input image captured by a camera without contacting the device. For example, as will be described later, information obtained by recognizing a user's face included in the input image captured by the camera or information obtained by recognizing user's eyes may be set as the vision based input information indicating an activation request to a preset function of the device.

FIG. **1** is a block diagram of a device **100**, according to an exemplary embodiment. The device **100** of FIG. **1** performs a preset function based on motion information regarding a movement of the device **100** and operation mode of the device **110**.

Referring to FIG. **1**, the device **100** includes a sensor **101**, a storage **102**, a processor **103**, and an information input/output unit **104** but is not limited thereto. That is, the device **100** may include more or less constituent elements than those shown in FIG. **1**.

For example, the device **100** may further include an element for detecting at least one piece of context information regarding the device **100**. This will be described later with respect to FIG. **14**. The device **100** may be configured to detect the at least one piece of context information regarding the device **100** by transmitting and receiving data between the element for detecting at least one piece of context information regarding the device **100**, the processor **103**, and the storage **102**. The at least one piece of context information regarding the device **100** will be described in more detail with reference to FIG. **14**. Information regarding the operation mode of the device **100** may be included in the at least one piece of context information regarding the device **100**.

The sensor **101** may include a plurality of sensors of various types to sense movement of the device **100**.

The information input/output unit **104** may include a display that may display a screen. The display may be configured as a touch screen and receive user touch based input information.

The operation mode of the device **100** may include a standby mode and an activation mode, but is not limited thereto.

The standby mode of the device **100** may include at least one of a black screen state of the device **100**, an idle state of an application processor included in the device **100**, a deactivation state of a function related to a touch screen of the information input/output unit **104**, and a screen lock set state of the device **100**. It is noted that the term "black screen state" is used throughout the present description to indicate a state of the screen in which no information is displayed the screen is thus blank and this is typically experienced by the user as a screen that is substantially black or grey in color: a "black screen state" is therefore not intended to limit the screen color to black alone.

The deactivation state of a function related to a touch screen may include a touch sensing function deactivation state of the touch screen and a display function deactivation state of the touch screen but is not limited thereto. The touch sensing function deactivation state of the touch screen may indicate an off state of a touch sensing function of the device **100**. The display function deactivation state of the touch screen may indicate a black screen state of the device **100**.

The standby mode of the device **100** may include a deactivation state of an element of the device **100** other than the sensor **101**, the storage **102**, and the processor **103**. The standby mode of the device **100** may include a deactivation state of a function of the device **100** other than a function based on an interface between the sensor **101** and the storage **102** among functions of the processor **103**, a function related to the sensor **101**, and a function related to the storage **102**.

The standby mode of the device **100** may include a low power state in which only the sensor **101**, the storage **102**, and the processor **103** operate. That is, the standby mode of the device **100** may include the low power state in which power is consumed by the sensor **101**, the storage **102**, and the processor **103**. The low power state may be, for example, in the range of power consumption of several of mW and several μW but is not limited thereto.

The standby mode of the device **100** may include a low power state in which no power is consumed by an element of the device **100** other than the sensor **101**, the storage **102**, and the processor **103**. The standby mode of the device **100** may include a state in which power consumption is less than that in an activation mode of the device **100**.

The processor **103** may include an auxiliary processor which may perform a function based on an interface between the processor **103** and the sensor **101** and a function based on an interface between the processor **103** and the storage **102**. In this case, the above-described low power state may refer to a state in which power is consumed by the sensor **101**, the storage **102**, and the processor **103**. The auxiliary processor may use a micro controller unit that operates at a low clock rate.

The standby mode of the device **100** may include an activation state of the application processor included in the device **100**. That is, when the screen lock set state of the device **100** is operated in the activation state of the application processor and is set as the standby mode of the device **100**, the standby mode of the device **100** may include the activation state of the application processor.

The application processor may be included in the processor **103**. This may mean that the processor **103** may include the application processor and the above-described auxiliary processor. When the processor **103** includes the application processor and the auxiliary processor, the above-described standby mode of the device **100** may include an activation state of the auxiliary processor included in the processor **103** and a deactivation state of the application processor but is not limited thereto.

The device **100** may be, for example, a smart phone, a smart TV, a personal computer (PC), a desktop PC, a notebook, a smart board, a tablet PC, a mobile device, a handheld device or a handheld PC, a media player, an e-book terminal, a personal digital assistant (PDA), a digital camera having a function of sensing a movement of the device, and a digital consumer electronics (CE) device having a function of sensing a movement of the device, but is not limited thereto.

For example, the device **100** may be equipment that a user may put on. The equipment may be, for example, equipment used as a watch, glasses, a binding accessory (for example, a waist belt, a hair band, etc.), diverse types of wearable accessories (for example, a ring, a bracelet, an ankle bracelet, a hair pin, a necklace, etc.), earphones, a helmet, various types of body guards (for example, knee guards and elbow guards), shoes, gloves, clothes, a hat, a prosthesis leg for an impaired person, a prosthesis hand for an impaired person, etc. The equipment that the user may wear may have a communication function and a data processing function. The equipment that the user may wear is not limited to the equipment described above.

The sensor **101** detects movement of the device **100**. The movement of the device **100** may include, for example, a rotation based movement such as an upside-down movement of the device **100**, a rotation direction based movement (for example, a clockwise direction movement, a counter clockwise direction movement, a +z axial direction movement, and a −z axial direction movement, a perpendicular direction based movement such as that the device **100** is placed in a horizontal direction and then is lifting in a vertical direction, and a movement distance of the device **100** according to the perpendicular direction based movement, but is not limited thereto. For example, the movement of the device **100** may include a shaking based movement of the device **100** as described above.

The sensor **101** includes at least one sensor for detecting the movement of the device **100**. That is, the sensor **101** may include at least one of a gyro sensor for sensing a rotation based movement of the device **100** and an accelerometer sensor for sensing a perpendicular direction based movement of the device **100** and a moving distance of the device **100**, but is not limited thereto.

For example, the sensor **101** may further include at least one of a magnetic field sensor for sensing a rotation direction of the device **100**, an orientation sensor for sensing an inclination direction of the device **100**, a global position system (GPS) sensor for sensing a location of the device **100**, a gravity sensor for sensing a gravity direction of the device **100**, and a rotation number sensor for sensing a rotation number of the device **100**. Sensors that may be further included in the sensor **101** are not also limited to those described above.

The gyro sensor may include three gyro sensors for sensing a rotation angular speed around three axes (x, y, and z axes) of the device **100**. In this case, the sensor **101** may convert results of sensing an x axis rotation angle (roll (left and right rotation) angle) of the device **100**, a y axis rotation angle (pitch (gradient) angle), and a z axis rotation angle (yaw (horizontal rotation) angle) and the rotation direction into electrical signals and output the electrical signals.

An acceleration sensor may be configured to sense an acceleration variation with respect to the three axes (x, y, and z axes) of the device **100** or an acceleration variation with respect to the two axes (x and y axes). In this case, the sensor **101** may convert results of sensing a linear acceleration of the device **100** and an inclination angle of each axial direction into electrical signals and output the electrical signals. The electrical signals output by the sensor **101** are transmitted to the processor **103**.

The sensor **101** may be referred to as a movement sensor for detecting the movement of the device **100**. The electrical signals output by the sensor **101** may be referred to as a sensing value of the movement of the device **100** or information regarding the movement of the device **100**.

The storage **102** stores at least one program and data related to the at least one program. The at least one program stored in the storage **102** includes a program used to control a device so as to perform a function based on motion information of the device **100** based on the information regarding the movement of the device **100** and at least one piece of function information of the device **100** corresponding to the motion information. The data related to the at least one program may include mapping information of the above-described information regarding the movement of the device **100**, the above-described motion information of the device **100**, and the above-described function information of the device **100**.

FIG. **2** shows a table for explaining mapping information regarding operation mode information of the device **100**, motion information thereof, and function information thereof, according to an exemplary embodiment. The table of FIG. **2** does not include information indicating a mapping relationship between information regarding a movement of the device **100** and the motion information thereof. However, motion information of the device **100** such as a 90° rotation in a clockwise direction, a 180° rotation in the clockwise direction, and a 270° rotation in the clockwise direction may be determined based on the information regarding the movement of the device **100** that is output by the sensor **101**.

Data related to a program stored in the storage **102** may include table information shown in FIG. **2**. The data related to the program stored in the storage **102** does not include information related to an activation mode of the device **100** and may include the mapping information regarding the movement information of the device **100**, the motion information thereof, and the function information thereof related to a standby mode of the device **100**.

Referring to FIG. **2**, the operation mode of the device **100** may include the standby mode and the activation mode. The motion information of the device **100** may include information indicating a 90° rotation in a clockwise direction, information indication a 180° rotation in the clockwise direction, and information indicating a 270° rotation in the clockwise direction.

The above-described standby mode may be referred to as a sleep mode, a deactivation mode, or an idle state but is not limited thereto. An active mode may be referred to as a running mode but is not limited thereto.

FIGS. **3**A and **3**B show screens for explaining rotation based motion information of the device **100**, according to an exemplary embodiment. That is, FIG. **3**A is an example of a plurality of pieces of motion information with respect to the device **100** in a vertical position. The motion information includes horizontal span motion information of a 90° rotation in a clockwise direction, horizontal span motion information of a 270° rotation in the clockwise direction, and upside-down motion information of a 180° rotation in the clockwise direction.

The rotation based motion information of the device **100** is not limited to the 90°, 180°, and 270° rotations as shown in FIG. **3**A. For example, the rotation based motion information of the device **100** may be set based on information regarding a rotation movement below 90° in the clockwise direction. That is, the rotation based motion information of the device **100** may be set based on information regarding a rotation movement by 45° in the clockwise direction.

The rotation based motion information of the device **100** may include motion information based on information regarding a movement according to a rotation of the device **100** by 90° in a counterclockwise direction. The rotation based motion information of the device **100** may include motion information based on information regarding a movement according to a rotation of the device **100** by 90° in the clockwise direction and the motion information based on the information regarding the movement according to the rotation of the device **100** by 90° in the counterclockwise direction.

The rotation based motion information of the device **100** may include one of motion information based on information regarding an upside-down movement (180° rotation) in a +z axis direction and motion information based on information regarding the upside-down movement (180° rotation) in a −z axis direction with respect to the device **100** in the vertical position as shown in FIG. **3**B. The rotation based motion information of the device **100** may include motion information based on information regarding the upside-down movement (180° rotation) in the ±z axis direction with respect to the device **100** in the horizontal position.

A standby mode of the device **100** may be changed to an active mode according to motion information detected in the standby mode of the device **100**.

The information input/output unit **104** may be in a deactivation state in the standby mode of the device **100**. For example, when a touch screen is included in the information input/output unit **104**, and the standby mode of the device **100** is set as a black screen of the touch screen, a deactivation state of a function related to the touch screen, or a screen lock set state of the device **100**, the information input/output unit **104** may be in the deactivation state in the standby mode of the device **100**.

The active mode of FIG. **2** may include an active state of all the sensor **101**, the storage **102**, the processor **103**, and the information input/output unit **104** that are included in the device **100**. The active mode of FIG. **2** may include an active

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state of at least one other element that is not shown as well as the sensor **101**, the storage **102**, the processor **103**, and the information input/output unit **104** that are included in the device **100**.

The active mode of FIG. **2** may include a power consumption state in which power is consumed by the sensor **101**, the storage **102**, the processor **103**, and the information input/output unit **104** that are included in the device **100**. The active mode of FIG. **2** may include the power consumption state in which power is consumed by at least one other element that is not shown as well as the sensor **101**, the storage **102**, the processor **103**, and the information input/output unit **104** that are included in the device **100**.

The active mode of FIG. **2** may include an active state of an application processor included in the device **100**. The active state of the application processor may indicate a state in which power is consumed by the application processor.

The active mode of FIG. **2** may include a state in which power consumption of the device **100** is greater than that in the standby mode of FIG. **2**.

The active mode of FIG. **2** may include a state in which at least one of an application, a service, and content that may be set in the device **100** or may be downloaded by the device **100** from the outside is executed or an execution of at least one of the application, the service, and the content may be requested.

The state in which at least one of the application, the service, and the content is executed may include a multitasking state. The state in which an execution of at least one of the application, the service, and the content may be requested may include a state in which the information input/output unit **104** displays or may display a screen including an icon, a screenshot, or a user interface that may be used to set an execution mode of the application, the service, and the content.

A relationship between the operation mode information of the device **100**, the motion information of the device **100**, and the function information of the device **100** will now be described in more detail with reference to FIG. **2**.

That is, when the motion information of the device **100** corresponds to information regarding a movement indicating the 90° rotation in the clockwise direction, and the operation mode of the device **100** is the standby mode, a preset function that may be performed by the device **100** is a time check function.

FIGS. **4**A through **4**J show screens **401** through **424** for explaining preset functions of the device **100** performed based on motion information of the device **100** and an operation mode of the device **100**, according to exemplary embodiments.

Referring to FIG. **4**A, when the device **100** is in a standby mode, the information input/output **104** displays the black screen **401**, and a sensing value (information regarding a movement) indicating a 90° rotation of the device **100** in a clockwise direction is received from the sensor **101**, the processor **103** detects the motion information of the device **100** from information stored in the storage **102** according to the received sensing value. In this regard, the detected motion information indicates the 90° rotation in the clockwise direction.

The processor **103** detects function information from the storage **102** by using the motion information of the device **100** detected in the standby mode of the device **100**. The detecting of the function information or the motion information from the storage **102** may be referred to as reading of information or searching of information but is not limited thereto.

Referring to FIG. **2**, when the motion information of the device **100** indicates the 90° rotation of the device **100** in the clockwise direction, and the operation mode of device **100** is in the standby mode, the function information detected from the storage **102** is time check function information. The processor **103** controls a function of the device **100** to perform a time check function according to the detected function information. Accordingly, the black screen **401** of the information input/output unit **104** is changed to a screen **402** including time information.

The screen **402** provided by performing the time check function may be referred to as a first screen. The first screen may be a screen firstly provided on the black screen **401** but is not limited thereto. For example, the first screen may be the screen firstly provided on the black screen **401** as well as a screen that may provide various types of information such that a user may stay more than a preset time. Various types of information may include, for example, information related to a gateway that will be described later but is not limited thereto.

When the first screen is provided, an application processor included in the device **100** may be in a deactivation state but may be in an active state. It may be determined whether the application processor included in the device is in a deactivation state according to information provided on the first screen. For example, when the information provided on the first screen is provided in the deactivation state of the application processor included in the device **100**, the application processor may be in the deactivation state. When the information provided on the first screen is provided in the active state of the application processor included in the device **100**, the application processor may be in the active state.

When the screen **402** including the above-described time function is displayed, the application processor included in the device **100** may be in the deactivation state. The application processor may be included in the processor **103** and set in the deactivation state or the active state as described above. However, the application processor may be installed outside the processor **103**.

When the device **100** is the standby mode and the motion information of the device **100** indicates a 180° rotation in the clockwise direction in FIG. **2**, a quick node function, as shown in FIG. **4**B, may be a preset function that may be performed by the device **100**.

Referring to FIG. **4**B, when the device **100** is in the standby mode, the information input/output unit **104** displays a black screen **403**, a sensing value indicating the 180° rotation of the device **100** in the clockwise direction is received from the sensor **101**, the processor **103** recognizes the motion information of the device **100** as the 180° rotation in the clockwise direction. The recognizing of the motion information by the processor **103** according to the sensing value may be based on an operation of detecting the motion information from the storage **102** by using the received sensing value. Thus, the recognizing of the motion information by the processor **103** may be referred to as detecting of the motion information but is not limited thereto.

The processor **103** may detect an operation mode of the device **100** after detecting the motion information of the device **100**. The processor **103** may detect information regarding the preset function corresponding to the detected motion information of the device **100** and the detected operation mode of the device **100** from the storage **103**.

When the device **100** is in the standby mode and the motion information of the device **100** is detected as the 180° rotation in the clockwise direction in FIG. **2**, the information

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regarding the preset function read from the storage **103** is quick node function information. Accordingly, the processor **103** may perform the quick note function, and a screen displayed on the information input/output unit **104** may be changed from the black screen **403** to a note screen **404** as shown in FIG. **4**B.

A recording icon and a camera icon that are included in the note screen **404** of FIG. **4**B may be used for the quick note function. That is, when a user command to select the recording icon is input in the note screen **404**, content that is recording may be displayed on the note screen **404**. For example, if a user voice signal "I am going to school at 8 a.m." is input, the processor **103** converts the input user voice signal into text information and displays the converted text information on the note screen **404**. Accordingly, the user may see a message "I am going to school at 8 a.m." on the note screen.

To this end, the processor **103** may perform a function of converting an audio signal received through the information input/output unit **104** into text information that may be displayed. In this regard, a font of the text information that may be displayed may be previously set. The displayed text information may be stored in the storage **102** according to a user storage request.

Therefore, desired content may be written on the note screen **404** by using a stylus pen or by using a recording function. Accordingly, the user may quickly write ideas that instantly occur, and may use the quick note function of the device **100** without the stylus pen.

When the stylus pen is installed in the device **100**, the quick note function of the device **100** may be used without removing the stylus pen. When the recording icon is selected, the processor **103** may display a screen for executing a recording application on the information input/output unit **104** while executing the recording application.

When a command to select the camera icon is input on the note screen **404**, a camera may be used to display a captured image on a quick note screen. To this end, the processor **103** may perform a function of overlapping the image captured by the camera on the quick note screen.

For example, the processor **103** may split and display a screen according to an execution of a camera application and the quick note screen. For example, a message related to the captured image may be input on the note screen **404** by displaying the image captured by the camera in the left side and the note screen in the right side. An area on which that captured image is displayed and an area on which the note screen **404** is displayed are not limited thereto. The captured image may be a still image or a moving image.

Sizes of the screen on which the captured image is displayed and the quick note screen may be previously set. Only an image captured according to a user command or both the captured image and the message input on the note screen **404** may be stored in the storage **102**. Accordingly, the user may capture and store an image that the user wants to capture quickly by using the quick note function or may store both the captured image and a message related to the captured image.

When the captured image is stored, the execution of the camera application may automatically end or may end according to a user request. Such an operation follows an environment set of the device **100**. The information input/output unit **104** may further include a microphone and a camera for the above-described recording function and capture function.

When a corresponding application is executed by using the recording icon and the camera icon that are included in the above-described note screen **404**, the note screen **404** may be defined as a gateway screen to execute the recording application or a camera application.

The gateway screen may include notification information notifying that a preset function will be executed. The gateway screen may include selection information used to select an execution mode regarding at least one function. The selection information may be defined like the above-described recording icon and camera icon. The gateway screen will be described in more detail with reference to FIGS. **17** and **18**A through **18**F later.

When the quick note function indicates a function of quickly performing a note application installed in the device **100**, the quick note function may be based on the note application installed in the device **100**.

The quick note function may simultaneously select the recording icon and the camera icon. In this case, the captured image and the text information of the audio signal corresponding to the captured image may be displayed on the note screen **404**. The simultaneously selecting of the recording icon and the camera icon may be performed by using a multi-touch on the recording icon and the camera icon. The simultaneously selecting of the recording icon and the camera icon may follow the environment set of the device **100** that the camera icon is automatically selected since the recording icon is selected. The simultaneously selecting of the recording icon and the camera icon may follow the environment set of the device **100** that the recording icon is automatically selected since the camera icon is selected.

When the device **100** is in the standby mode and the motion information based on the information regarding the movement of the device **100** indicates the 180° rotation in the clockwise direction, as shown in FIG. **4**C, a universal queue function may be a preset function that may be performed by the device **100**.

FIG. **4**C shows the universal queue function when the device **100** is in the standby mode, the information input/output unit **104** displays a black screen **405**, and the motion information based on the information regarding the movement of the device **100** indicates the 180° rotation in the clockwise direction.

That is, information regarding the preset function that is read by the processor **103** from the storage **102** is universal queue function information. The processor **103** controls the device **100** to convert the black screen **405** displayed on the information input/output unit **104** into an information screen **406** stored in a universal queue. The universal queue may be included in the storage **102**.

When the device **100** is in the standby mode and the motion information of the device **100** indicates the 180° rotation in the clockwise direction, a universal queue list display function is a preset function that may be performed by the device **100**.

When the information regarding the preset function is universal queue list display function information, since the processor **103** performs the universal queue list display function, as shown in FIG. **4**D, the black screen **407** displayed on the information input/output unit **104** is converted into a universal queue list screen **408**. A universal queue list may be stored in the storage **103**, and information based on the universal queue list may be provided from the storage **103** or a server (not shown). The screen **409** of FIG. **4**D is a screen for downloading information regarding a universal queue selected based on the universal queue list from the server (not shown).

When the device **100** is in the standby mode and the motion information of the device **100** indicates the 270°

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rotation in the clockwise direction in FIG. **2**, a byte information viewer function is a preset function that may be performed by the device **100**.

The byte information viewer function is a function of showing necessary information according to a screen or an environment set in the device **100**. For example, ticket information, security card information, payment barcode information, coupon information, etc. that are previously designated by the user are information that may be provided by using the byte information viewer function but are not limited thereto.

The user may quickly swipe and view information that remains in a clipboard, information that remains as a byte information viewer through a specific interaction, and information stored in a screen capture and a note while using a specific application by using the byte information viewer function.

FIG. **4**E shows a screen for executing the byte information viewer function. That is, when the device **100** is in the standby mode, the information input/output unit **104** displays a black screen **410**, and a sensing value indicating the 270° rotation of the device **100** in the clockwise direction is received from the sensor **101**, the processor **103** recognizes the motion information of the device **100** based on the operation mode of the device **100**, a screen state of an information input/out unit **104**, and the sensing value.

When the motion information is recognized, the processor **103** detects the information regarding the preset function from the storage **102** by using the operation mode of the device **100** and the motion information of the device **100**. Referring to FIG. **2**, the information regarding the preset function detected from the storage **102** is byte information viewer function information. The processor **103** performs the byte information viewer function, and the black screen **410** of the information input/output unit **104** is converted into a previously set information screen **411**.

Referring to FIG. **2**, when the device **100** is in an active mode, the motion information of the device **100** indicates the 90° rotation in the clockwise direction, and a function currently performed by the device **100** is a web browsing function, as shown in FIG. **4**F, a browser secret mode execution function is a preset function that may be performed by the device **100**.

Referring to FIG. **4**F, when the device **100** in the active mode executes the web browsing function **412**, and the motion information indicating the 90° rotation of the device **100** in the clockwise direction is detected based on the sensing value received from the sensor **101**, the processor **103** detects the information regarding the preset function from the storage **102** by using the motion information of the device **100**, the operation mode of the device **100**, and the function executed by the device **100**. The information regarding the preset function is browser secret mode execution function information. Accordingly, the processor **103** executes a browser secret mode, also known as an "incognito" or "private" browsing mode. Once the browser secret mode is executed, log information that occurs after the execution of the browser secret mode, is not recorded on the device **100**. The log information may include information such as a user's searching history information, a user's internet surfing history information, and log-in information, etc.

During the execution of the browser secret mode, when a sensing value indicating a 90° rotation of the device **100** in a counterclockwise direction is received from the sensor **101** (that is, the sensing value is received as a reference value), the processor **103** may cancel the execution of the browser secret mode of web browsing. A browser secret mode execution function and a browser secret mode cancellation function may be performed by the processor **103** by reading the motion information from the storage **102** by using the sensing value, and reading the information regarding the preset function from the storage **102** by using the read motion information and the sensing value.

Referring to FIG. **2**, when the device **100** is in the active mode, the motion information of the device **100** indicates the 180° rotation in the clockwise direction, and an application is currently executed by the device **100**, as shown in FIG. **4**G, a function of switching the application to another application is a preset function that may be performed by the device **100**.

Referring to FIG. **4**G, while the device **100** executes a specific social network service (SNS) **414**, when a sensing value indicating the 180° rotation of the device **100** in the clockwise direction is received from the sensor **101**, the processor **103** detects the motion information of the device **100** from the storage **102** by using the sensing value. The processor **103** detects the information regarding the preset function from the storage **102** by using the detected motion information of the device **100** and the operation mode of the device **100**. In FIG. **4**G, the detected motion information of the device **100** is the function of switching the application to another application.

Thus, the processor **103** performs the function of switching the application to another application **415**, **416**. The above-described other application may include one of a previously set application, an application that was just previously executed, and another application that is multitasking but is not limited thereto. If a plurality of applications are performed at the same time, the other application may include an application that has been recently executed.

When applications are switched, although the processor **103** may directly switch screens, an animation effect may be provided as shown by the screens **415** and **416** of FIG. **4**G. If the screens **415** and **416** of FIG. **4**G display a heavy stone in a low side of the device **100** as an accordion effect, and the sensing value indicating the 180° rotation of the device **100** in the clockwise direction is received from the sensor **101**, the processor **103** displays a screen of slowly compressing an original application screen while slowly lowering the heavy stone down.

The animation effect is not limited to the above-described accordion effect. For example, the animation effect may include various animation effects such as an animation effect of making a blurry image clear, an animation effect of moving an image from top to bottom of a screen, an animation effect of rotating an image at the same angle as the rotation angle of the device **100**, etc. Various animation effects may be set by the user in advance. The animation effect may be simulated in a demonstration form in advance before set by the user.

Referring to FIG. **4**H, while the device **100** executes a specific application (for example, Facebook) **417**, when it is sensed that the device **100** rotated by 180° in the clockwise direction, the application (for example, Facebook) is switched to a previously designated application (for example, KaKao Talk) **418**. During an execution of the designated application (for example, KaKao Talk), when the device **100** rotates by 180° in the clockwise direction again **419**, the executed application (for example, Kakao Talk) is switched to a previously executed application (for example, Facebook) **420**. As described above, the motion information of the device **100** stored in the storage **102**, information regarding the operation mode of the device **100**, and the

information regarding the preset function that may be performed by the device **100** may be set in such a way that an application executed by the device **100** may be switched to another application. The device **100** may be set to rotate by 180° in the counterclockwise direction on the screen **419**.

When the operation mode of the device **100** indicates an execution of a service or content, information regarding a preset function of the device **100** according to a preset motion information may be set to switch the service or the content to another service, other content, or another application.

When the operation mode of the device **100** indicates a service or an application, and a plurality of accounts are set in a currently executed service or application, information regarding a preset function of the device **100** according to preset motion information may be set to perform a function of changing a currently used account to another account.

Referring to FIG. **2**, when the device **100** is in the active mode and displays a specific list, and the motion information of the device **100** indicates the 180° rotation in the clockwise direction, a list sorting change function may be a preset function that may be performed by the device **100** as shown in FIG. **4**I. That is, when the motion information of the device **100** indicates the 180° rotation in the clockwise direction, the processor **103** may change the screen **421** of a list sorted in ascending order of FIG. **4**I to the screen **422** of a list sorted in descending order.

Referring to FIG. **2**, when the device **100** is in the active mode, and the motion information of the device **100** indicates the 270° rotation in the clockwise direction, a preset function may be set to perform a voice recording function irrespective of a function that is executed by the device **100**. For example, when the device **100** displays a home screen, if a sensing value indicating the 270° rotation of the device **100** in the clockwise direction is received, the device **100** may perform the voice recording function according to information regarding a preset function.

The information regarding the preset function of the device **100** according to the operation mode of the device **100** and the motion information of the device **100** are not limited to as defined in FIG. **2**. For example, the motion information of the device **100** may be defined only information regarding an upside-down (180° rotation of the device **100**) motion in the clockwise direction. The motion information of the device **100** may be defined only motion information **423** indicating horizontal holding of the device **100** and vertical lifting of the device **100** as shown in FIG. **4**J. Information regarding the preset function corresponding to the motion information **423** may match information regarding one of functions defined in FIG. **2**. However, the function information capable of matching the motion information **423** is not limited to FIG. **2**.

The motion information of the device **100** is not limited as described above. For example, the motion information of the device **100** may include motion information indicating vertical holding of the device **100** and vertical lifting of the device **100**, motion information indicating vertical holding of the device **100** and moving of the device **100** by a preset distance in a left and/or right direction, and motion information indicating horizontal holding of the device **100** and moving of the device **100** by a preset distance in the left and/or right direction. The preset distance may be defined as a distance greater than a minimum distance that may be recognized that the device **100** moves in a left or right direction by using the sensor **101**. The minimum distance may be determined according to a sensor included in the sensor **101**.

FIG. **4**J shows a case where the processor **103** executes a previously set application when the device **100** is in the standby mode, and a sensing value indicating horizontal holding of the device **100** and vertical lifting of the device **100** is received from the sensor **101**. The sensing value indicating horizontal holding of the device **100** and vertical lifting of the device **100** may be set as, for example, an x axis variation smaller than 30°, a y axis variation greater than 90°, and an acceleration variation greater than T, wherein T is an integer, but is not limited thereto. That is, the sensing value may be determined according to the sensor included in the sensor **101**.

The at least one program stored in the storage **102** may include an application execution program, a service execution program, a content storage program, a content reproduction program, etc.

The processor **103** may execute the at least one program stored in the storage **102** as described above, and may recognize the motion information of the device **100** by using a value sensed by the sensor **101** and information stored in the storage **102**.

The processor **103** may detect the operation mode of the device **100**. When information regarding the operation mode of the device **100** is stored in a flag register of the processor **103** or in a preset area of the storage **102**, the processor **103** may determine the operation mode of the device **100** by reading the information regarding the operation mode of the device **100** from the flag register or from the above-described preset area of the storage **102**. The determining of the operation mode of the device **100** may be referred to as detecting of the operation mode of the device **100**. The processor **103** may include a random access memory (RAM) including the above-described flag register.

The processor **103** may be one or more processors for controlling a general operation of the device **100**. The processor **103** may control operations of the sensor **101**, the storage **102**, and the information input/output unit **104**. The processor **103** may be a controller, a microprocessor, a digital signal processor, etc.

The processor **103** may include a low power processor **510** that control the sensor **101** by using a seamless sensing platform (SSP) as shown in FIG. **5** and an application processor (AP) **520**. The low power processor **510** may be defined as an auxiliary processor. The application processor **520** may be defined as a main processor. FIG. **5** is a block diagram for explaining an operation between the sensor **101** and the processor **103** based on the SSP, according to an exemplary embodiment.

The low power processor **510** of FIG. **5** may be a low power micro control unit (MCU) operating in a standby mode of the device **100** described in FIG. **1** above. The low power processor **510** may include a sensor hub **511** and a SSP manager **512**. The sensor **101** may include first through nth sensors **501_1**~**501_***n* which may be attached to the sensor hub **511**. The SSP manager **512** may be included in a framework of the application processor **520**.

The sensor hub **511** may receive values sensed from the first through nth sensors **501_1**~**501_***n*. The first through nth sensors **501_1**~**501_***n* may transmit the sensed values based on communication such as Bluetooth low energy communication to the sensor hub **511**. Communication between the first through nth sensors **501_1**~**501_***n* and the sensor hub **511** is not limited to the Bluetooth low energy communication.

When the operation mode of the device **100** is in the standby mode, the application processor **520** may be set in the standby mode. When the application processor **520** is set

in the standby mode, if the operation mode of the application processor **520** is changed to an active mode, the sensor hub **511** may perform data communication with the SSP manager **512** by using a data communication protocol based on the SSP. The case where the standby mode of the application processor **520** is changed to the active mode may be determined according to information regarding a preset function that needs to be executed by the device **100** described in the above-described embodiments.

The operation between the sensor hub **511** and the SSP manager **512** is as follows. That is, the sensor hub **511** transmits an interrupt signal indicating that there is data that is to be transmitted to the SSP manager **512** (**513**). The SSP manager **512** transmits a signal requesting a data type and a length that are to be transmitted by the sensor hub **511** to the sensor hub **511** (**514**). The sensor hub **511** transmits information regarding the data type and the length that are to be transmitted to the SSP manager **512** (**515**). The information transmitted from the sensor hub **511** to the SSP manager **512** is not limited to the data type and the length.

The SSP manager **512** transmits a start to read message MSG to the sensor hub **511** (**516**). When the sensor hub **511** receives the start to read message MSG (**516**), the sensor hub **511** makes the sensed values as a previously agreed packet and transmits the packet to the SSP manager **512** (**517**). The sensed values transmitted from the sensor hub **511** to the SSP manager **512** may be referred to as an electrical signal.

The SSP manager **512** detects motion information from information stored in the storage **102** by using the sensed values received from the sensor hub **511** in the standby mode of the device **100** as described with reference to FIG. **1** above. The SSP manager **512** may detect information regarding a preset function of the device **100** based on the detected motion information and may control the function of the device **100** based on the detected preset function information.

The SSP manager **512** detects the motion information from the information stored in the storage **102** by using the sensed values received from the sensor hub **511** as described in FIG. **1**, and checks the operation mode of the device **100** as describe in FIG. **1**. The SSP manager **512** may detect the information regarding the preset function from the storage **102** by using the checked operation mode and the detected motion information and may control the function of the device **100** based on the detected preset function information.

The information input/output unit **104** may be in a black screen in the standby mode of the device **100** as described above, a state in which no power is consumed, a deactivation state of a function related to the touch screen, and a deactivation state of a display function related to the touch screen but is not limited thereto.

FIG. **6**A is a flowchart of a method of performing a function of a device, according to an exemplary embodiment. FIG. **6**A shows a case where a preset function is performed according to motion information of the device **100** and an operation mode of the device **100**. The flowchart of FIG. **6**A may be performed by the processor **103** of the device **100**.

In operation S**601**, the processor **103** receives information regarding a movement of the device **100**. The information regarding the movement of the device **100** may be received from sensors included in the sensor **101** of FIG. **1** based on the SSP as described with reference to FIG. **5**.

The processor **103** detects the preset motion information based on the information regarding the movement of the device **100** (operation S**602**). When the motion information of the device **100** is detected, the processor **103** detects information regarding the operation mode of the device **100** (operation S**603**). The detecting of the information regarding the operation mode of the device **100** may be referred to as checking of the operation mode of the device **100**.

When the device **100** is in the active mode, the information regarding the operation mode of the device **100** may include information regarding a current state of the device **100**. For example, when an application is executed by the device **100**, the information regarding the operation mode of the device **100** may include information regarding the application that is currently being executed by the device **100** but is not limited thereto. The detecting of the operation mode of the device **100** in operation S**603** may be performed as described with respect to the processor **103** of FIG. **1**.

In operation S**604**, the processor **103** performs the preset function based on the information regarding the operation mode of the device **100** and the motion information of the device **100**. The preset function may be detected from the storage **102** as described with reference to FIGS. **2** and **4**A through **4**J.

FIG. **6**B is a flowchart of a method of performing a function of a device, according to another exemplary embodiment. FIG. **6**B shows a case where the device **100** is in the standby mode. The flowchart of FIG. **6**B may be performed by the processor **103** of the device **100**.

Referring to FIG. **6**B, when the operation mode of the device **100** is the standby mode, the processor **103** may receive information regarding a movement of the device **100** from the sensor unit **101**. In this regard, the processor **103** may be a low power processor **510** of FIG. **5**. Thus, the processor **103** may receive the information regarding the movement of the device **100** from the sensor **101** by using a SSP based data communication protocol.

In operation S**605**, in the standby mode of the device **100**, the processor **103** receives the information regarding the movement of the device **100** from the sensor **101** in operation S**606**. The processor **103** detects motion information from the storage **102** by using the received information regarding the movement (operation S**607**). When the motion information is detected, the processor **103** detects at least one piece of function information corresponding to the detected motion information in operation S**608**.

The detecting of the motion information and the at least one piece of function information according to storage structures of the motion information and the at least one piece of function information that are stored in the storage **102** may be referred to as detecting of the at least one piece of function information. For example, when the processor **103** detects the at least one piece of function information from the storage **102** by using the information regarding the movement received from the sensor unit **101**, the detecting of the motion information and the at least one piece of function information may be referred to as the detecting of the at least one piece of function information.

The processor **103** controls the device **100** to perform a function based on the at least one piece of function information received from the storage **102** in operation S**609**. The flowchart of FIG. **6**B may be performed as described with reference to FIGS. **4**A through **4**E and **4**J. In operation S**609**, the processor **103** may display a gateway screen as shown in FIGS. **17** and **18**A through **18**F that will be described later before the function is performed.

FIG. **7** is a flowchart of a process that may be performed in operation S**604** of FIG. **6**A or operation S**609** of FIG. **6**B, according to an exemplary embodiment.

FIG. **7** relates to the process of performing a preset function of the device **100** according to a result of determining whether a user looks at the device **100**.

That is, in operation S**701**, the processor **103** determines whether the user looks at the device **100** before performing the preset function. Whether the user looks at the device **100** may be determined according to whether a user' face is included in an image obtained by using a camera included in the device **100**. Alternatively, whether the user looks at the device **100** may be determined according to whether the user's face included in the obtained image is oriented toward the device **100** but is not limited thereto.

The processor **103** may determine whether the user's face is included in the obtained image by using a face region extraction technology. The processor **103** may determine whether the user's face included in the obtained image is oriented toward the device **100** by using a feature value detection method. The feature value detection method detects feature values such as a distance between the eyes, a noise width, a height and shape of a cheekbone, a proportion of a forehead (an area based on a breadth and a height of forehead) on a face, etc. The processor **103** may estimate an orientation direction of the user's face included in the obtained image by using the detected feature value and determine whether the user looks at the device **100**.

Instead of the above-described user's face recognition method, it may be determined whether the user looks at the device **100** by detecting the user's eyes from the obtained image and estimating the eyes' movements.

As a result of the determining in operation S**701**, if it is determined that the user looks at the device **100**, the processor **103** controls the device **100** to perform a function based on information regarding the preset function (operation S**702**).

As a result of the determining in operation S**702**, if it determined that the user does not look at the device **100**, the processor **103** controls the device **100** not to perform the function based on the information regarding the preset function (operation S**703**).

To determine whether the user looks at the device **100** by using the face region extraction, the feature value detection, or the eyes movement estimation as described above, the storage **102** may store at least one related application program and provide the processor **103** with the related application program according to a request of the processor **103**. The processor **103** may execute the related application program provided by the storage **102** and determine whether the user looks at the device **100** as described above.

FIG. **8** shows screens activating a preset function performed by the device **100** in operations S**701** and S**702** of FIG. **7**, according to an exemplary embodiment. That is, when the device **100** is in the standby mode and a screen **810** is in a black screen state as shown in FIG. **8**, when it is determined that the device **100** has rotated by 180° in a clockwise direction by using a sensing value, the processor **103** activates a function of a front camera **821**. The processor **103** temporarily changes an operation mode of the device **100** to the active mode so as to execute an application related to the front camera **821** as shown by a screen **820**. In this regard, the processor **103** may output a black screen via the information input/output unit **104** or the screen on which a camera mode is executed via the information input/output unit **104**.

The processor **103** may determine whether a user looks at the device **100** according to the above-described face recognition or eyes estimation regarding an image **822** obtained by using the front camera **821**. If it is determined that the user looks at the device **100**, the processor **103** performs the preset function according to an operation mode of the device **100** and motion information of the device **100** (screen **830**).

FIG. **9** is a flowchart of a process that may be performed in operation S**604** of FIG. **6**A or operation S**609** of FIG. **6**B, according to another exemplary embodiment. FIG. **9** relates to the process of performing a preset function in the device **100** when previously set user gesture based information corresponding to a request to perform the preset function is received.

That is, in operation S**901**, the processor **103** determines whether the user gesture based information corresponding to the request to perform the preset function is received before performing the preset function. The user gesture based information may be previously defined as a 2-touch (for example, 2-touch based on thumbs of both hands) in a position of horizontally holding the device **100** with both hands as shown in FIG. **10**. However, the user gesture based information may be previously defined as 1-touch (for example, 1-touch using a thumb of a hand holding the device **10**) in a position of horizontally holding the device **100** with one hand.

The position of the device **100** is not limited to the above-described horizontally held position. For example, the position of the device **100** may include a vertically held position. The horizontally held position as shown in FIG. **10** may indicate that a bezel side of the device **100** that has height information included in size information of the device **100** may be approximately perpendicular to the ground. The vertically held position may indicate that a bezel side of the device **100** that has width information included in the size information of the device **100** may be approximately perpendicular to the ground,

The above-described 2-touch and 1-touch may be recognized by using information regarding a previously stored and predicted touch region. The information regarding the previously stored and predicted touch region may be set considering an error range. The information regarding the previously stored and predicted touch region may be previously set according to the size information of the device **100** and size information of user's hands. The size information of the user's hands may be changed according to body size of the user. The size information of the user's hands may be determined by using images of scanned user's hands. The size information of the device **100** may use information included in previously stored specification information of the device **100**.

The above-described information regarding the previously stored and predicted touch region may be set through a process of registering a touch region carried out by the user. For example, the user may create the same situation by using the device **100** and register a region touched in the created situation as the predicted touch region. When the predicted touch region is registered, the user may set an available error range.

The above-described user gesture based information may be stored to map information regarding the operation mode of the device **100** and the motion information of the device **100** that are stored in the storage **102**.

The above-described user gesture based information stored in the storage **102** may include at least coordinate information of a touch surface. The above-described coordinate information of the touch surface may include a size of the device **100**, coordinate information of a touch surface on which a 2-touch based on both thumbs is predicted to occur when the user holds the device **100** with both hands, coordinate information of a touch surface on which a

1-touch based on a right thumb is predicted to occur when the user holds the device **100** with the right hand, and coordinate information of a touch surface on which a 1-touch based on a left thumb is predicted to occur when the user holds the device **100** with the left hand, but is not limited thereto. The coordinate information of the touch surface may include coordinate information indicating a two-dimensional (2D) screen region. In operation S**901**, if the processor **103** determines that a request to perform a preset function based on the above-described user gesture is received, the processor **103** performs the above-described preset function in operation S**902**.

In operation S**903**, if the processor **103** determines that the request to perform the preset function based on the above-described user gesture is not received, the processor **103** does not perform the above-described preset function in operation S**903**.

FIG. **10** shows screens for explaining a preset function performed by the device **100** in operations S**901** and S**902** of FIG. **9**, according to another exemplary embodiment. When the operation mode of the device **100** is in the standby mode in the case of a screen **1010** of FIG. **10**, and the screen **1010** is in a black screen, the processor **103** recognizes motion information of the device **100** by using a sensing value indicating a movement of the device **100** that moves in a vertical direction more than a preset distance.

After recognizing the motion information of the device **100**, the processor **103** recognizes that a multi-touch with thumbs of both hands holding the device **100** has occurred (operation S**1020**), the processor **103** performs the preset function determined according to the operation mode of the device **100** and the motion information of the device **100** (operation S**1030**). FIG. **10** shows a case where the preset function continuously executes applications that have been executed just before the device **100** is enters the standby mode.

FIG. **11** is a block diagram of a device **1100**, according to another exemplary embodiment. Referring to FIG. **11**, the device **1100** includes an information input unit **1101**, a sensor **1102**, a touch screen **1103**, a camera **1104**, an audio input unit **1105**, an audio output unit **1106**, a storage **1107**, a wireless communication interface **1108**, a wired communication interface **1109**, a processor **1110**, and a power supply **1114**. However, elements of the device **1100** are not limited to those shown in FIG. **11**. That is, the device **1100** may include more or fewer constituent elements than those shown in FIG. **11**. Also, the device **1100** may not include, for example, the wired communication interface **1109**.

The device **1100** of FIG. **11** may perform a preset function according to a movement thereof when the device is in a standby mode based on a first processor **1111** irrespective of an operation of a second processor **1112**. The first processor **1111** may be the above-described low power processor, and the second processor **1112** may be the above-described application processor but are not limited thereto. The relationship between the first processor **1111** and the second processor **1112** will be described in more detail below when the corresponding elements are described.

The standby mode of the device **1100** may include a low power consumption state described with reference to FIG. **1** that is a power consumption state of the sensor **1102**, the first processor **1111**, and the storage **1107**. The standby mode of the device **1100** may include a state in which power is not consumed by an element of the device **1100** other than the sensor **1102**, the first processor **1111**, and the storage **1107**. The standby mode of the device **1100** may include a deactivation state of an application processor (AP) **1113** of the second processor **1112**. The standby mode of the device **1100** may include a black screen state of the touch screen **1103**. The standby mode of the device **1100** may include at least one of a deactivation state of a function related to the touch screen **1103** and a deactivation state of a touch sensing function of the touch screen **1103**. The standby mode of the device **1100** is not limited thereto.

The information input unit **1101** may be in a state in which power is not consumed in the standby mode of the device **1100**. The information input unit **1101** may be in a deactivation state in the standby mode of the device **1100**. The information input unit **1101** may input data used to control an operation of the device **1100**. For example, the information input unit **1101** may input a power on/off command of the device **1100**. The information input unit **1101** may include a key pad, a dome switch, a job wheel, a jog switch, a hardware button, a hot key, a touch panel, etc. but is not limited thereto.

The sensor **1102** may be in an active state in the standby mode and an active mode of the device **1100**. The sensor **1102** may be the same as described with reference to the sensor **101** of FIG. **1** and output a signal of sensing a movement of the device **1100**. The sensor **1102** may be referred to as a movement sensor for detecting the movement of the device **1100**.

The sensor **1102** generates a signal for sensing a location of the device **1100**, whether there is any user contact, an orientation of the device **1100**, an acceleration or deceleration of the device **1100**, etc. The sensor **1102** may include a proximity sensor and a motion sensor. The proximity sensor is a sensor for detecting whether an object approaches a previously set detection surface or whether the object is present nearby by using a force of an electromagnetic field or an infrared ray without any actual physical touch. Examples of the proximity sensor include a transparent photoelectric sensor, a direct reflective photoelectric sensor, a mirror reflective photoelectric sensor, a high frequency oscillation photoelectric sensor, a capacitive photoelectric sensor, a magnetic photoelectric sensor, an infrared photoelectric sensor, etc.

The sensor **1102** may output a signal for sensing a sensor based user gesture. The sensor **1102** may include the first through nth sensors **501_1~501_*n*** like the sensor **101** of FIG. **5**. The sensor **1102** may operate in both the standby mode of the device **1100** and the active mode of the device **1100**.

The touch screen **1103** may be in a black screen state as described above in the standby mode of the device **1100**. The touch screen **1103** may be in a state in which no power is consumed in the standby mode of the device **1100**. The touch screen **1103** may be in a deactivation state of the function related to the touch screen **1103** and/or a deactivation state of the touch sensing function of the touch screen **1103** in the standby mode of the device **1100**. The touch screen **1103** may output a screen or information indicating a screen lock set state in the standby mode of the device **1100**. The touch screen **1103** may be in the deactivation state in the standby mode of the device **1100**.

The touch screen **1103** may be a resistive (decompression) or capacitive touch screen but is not limited thereto. The touch screen **1103** may receive user input information that depends on the above-described user touch based gesture. The user input information that depends on the user touch based gesture may be defined as various combinations of a touch frequency, a touch pattern, a touch area, and a touch intensity.

The touch screen **1103** may include various sensors for sensing a touch or proximity touch thereon. Sensors included in the touch screen **1103** may generate a signal by sensing the touch based user gestures or patterns. A proximity sensor for the touch screen **1103** may be the same as the proximity sensor included in the sensor **1102**.

An example of the sensor for sensing the touch of the touch screen **1103** may include a tactile sensor. The tactile sensor may sense various types of information such as roughness of a touch surface, hardness of a touch object, a temperature at a touch point, etc.

The touch of the touch screen **1103** may mean touching a touch panel by using a pointer. A proximity touch of the touch screen **1103** occurs when the pointer does not actually touch the touch panel but approaches the touch panel within a preset distance. Examples of the pointer may include a stylus pen, or a user's finger, etc., but are not limited thereto.

The touch screen **1103** displays information output by the device **1100**. For example, the touch screen **1103** may display a screen responding to user gestures or touch patterns sensed through sensors included in the touch screen **1103**. The touch screen **1103** may display a screen responding to control data or user input information input through the user input unit **1101**. The touch screen **1103** may display a screen responding to a signal sensed through the sensor **1102**. The touch screen **1103** may display at least one of the above-described screens as shown in FIGS. **4**A through **4**J.

The touch screen **1103** may be referred to as an input and output apparatus. A screen displayed on the touch screen **1103** includes a user interface (UI) screen or a graphical user interface (GUI) screen.

The touch screen **1103** may include a liquid crystal display (LCD), a thin film transistor liquid crystal display (TFT-LCD), an organic light-emitting diode (OLED), a flexible display, a 3D display, or an active matrix OLED (AMOLED), but is not limited thereto. The touch screen **1103** may be referred to as a display. The device **1100** may include two or more touch screens **1103**. When the device **1100** includes two or more touch screens **1103**, the touch screen **1103** may be configured as a dual touch mode. The dual touch mode may refer to a front touch mode of the device **1100** and a back touch mode of the device **1100** but is not limited thereto.

The camera **1104** processes an image frame such as a still image or a moving image obtained by an image sensor (or a photo sensor) in a video call mode or a photographing mode. The image frame processed by the camera **1104** may be displayed on the touch screen **1103**. The image frame processed by the camera **1104** may be stored in the storage **1107** or transmitted to the outside through the wireless communication interface **1108** or the wired communication interface **1109**.

The camera **1104** may be in a state in which no power is consumed in the standby mode of the device **1100**. The camera **1104** may be in a deactivation state in the standby mode of the device **1100**. The camera **1104** may include two or more cameras according to the configuration of the device **1100**. That is, the device **1100** may include a front camera and a rear camera of the device **1100**. The front camera may operate so as to recognize a user's face or obtain an image for estimating movements of user's eyes as shown in FIG. **8** in the standby mode of the device **1100**. The estimating of the movements of user's eyes may be referred to as tracking of the movements of user's eyes. The camera **1104** may be used as an input apparatus for recognizing a user space gesture.

The audio input unit **1105** may be a state in which no power is consumed in the standby mode of the device **1100**. The audio input unit **1105** may be a deactivation state in the standby mode of the device **1100**. The audio input unit **1105** may receive an input of an external acoustic signal in a call mode, a recording mode, or a voice recognition mode, convert the acoustic signal to electrical voice data, and transmit the electrical voice data to the processor **1110**. The audio input unit **1105** may be, for example, a microphone. The audio input unit **1105** may include a function based on diverse noise removal algorithms for removing noise generated during a process for receiving the external acoustic signal.

The audio input unit **1105** may be activated if the recording icon of FIG. **4**B is selected. The external acoustic signal input through the audio input unit **1105** may be stored in the storage **1107** through the processor **1110**. The external acoustic signal input through the audio input unit **1105** may be transmitted to the outside via the processor **1110** and the wireless communication interface **1108**. The external acoustic signal input through the audio input unit **1105** may be transmitted to the outside via the processor **1110** and the wired communication interface **1109**.

The audio output unit **1106** may be a state in which no power is consumed in the standby mode of the device **1100**. The audio output unit **1106** may be a deactivation state in the standby mode of the device **1100**. The audio output unit **1106** outputs the acoustic signal or an audio signal that is received from the outside or read from the storage **1107** in the call mode or an audio reproduction mode. The audio output unit **1106** may be a speaker. If an audio signal is included in content when the content is reproduced, the audio output unit **1106** outputs the audio signal included in the reproduced content. The audio input unit **1105** and the audio output unit **1106** may be integrally formed within a head set.

The storage **1107** may operate in the standby mode and the active mode of the device **1100**. The storage **1107** may be in an activation state in the standby mode and the active mode of the device **1100**. The storage **1107** may store at least one program and/or a command set and resource that are configured to be executed in the processor **1110** that will be described later.

The at least one program may include at least one program for executing a method of performing a function of the device **1100** according to an exemplary embodiment. The at least one program may include an operating system program of the device **1100**, an application program related to diverse functions (or services) performed by the device **1100**, and a program for driving hardware components included in the device **1100**, and an application program for controlling at least one external device of the device **1100** but is not limited thereto.

The external device may include an accessory of the device **1100**. The accessory is referred to as a device of which function is controlled by the device **1100** since an application program related to the accessory is performed by the device **1100** but is not limited thereto.

The storage **1107** may store at least one program capable of determining whether a value sensed by the sensor **1102** corresponds to preset motion information of the device **1100** and data related to the at least one program.

The first processor **1111** may load the at least one program stored in the storage **1107**, execute the loaded program, and determine whether the sensing value corresponds to the preset motion information of the device **1100**. That is, when the program is executed, if the first processor **1111** receives the sensing value from the sensor **1102**, the first processor

1111 may detect the preset motion information corresponding to a sensing value received from the storage 1107 by using the received sensing value.

The at least one program used to determine whether the sensing value corresponds to the preset motion information of the device 1100 may be previously stored in the first processor 1111. The first processor 1111 may include a memory such as random access memory (RAM) to store the at least one program.

The resource stored in the storage 1107 may include mapping information between the sensing value, the preset motion information of the device 1100, and preset function information of the device 1100 as described with reference to FIG. 2 above. The resource stored in the storage 1107 may include information regarding the device 1100, information necessary for operating the application program set in the device 1100, and information necessary for executing a program for driving the hardware components but is not limited thereto.

The information regarding the device 1100 may include user information of the device 1100 but is not limited thereto. The storage 1107 may store the information as described with reference to FIGS. 7 and 9 above.

The storage 1107 may include at least one type of storage medium, such as a flash memory type, a hard disk type, a multimedia card micro type, a card type memory (for example, SD, XD memory, etc.), read only memory (ROM), electronically erasable programmable ROM (EEPROM), programmable ROM (PROM) magnetic memory, and an optical disk but is not limited thereto.

The at least one program and/or the command set that are stored in the storage 1107 may be classified as a plurality of modules according to functions.

FIG. 12 shows an example of programs and/or command sets that are stored in the storage 1107. Referring to FIG. 12, the storage 1107 includes an operating system 1201, a wireless communication module 1202, a wired communication module 1203, a graphics module 1204, a global positioning system (GPS) module 1205, a UI module 1206, a sensing module 1207, a contact and motion module 1208, a power module 1209, and an application database (DB) module 1210 but is not limited thereto.

The application DB module 1210 may include a device function performing module 1211, a camera module 1212, a voice recording module 1213, a web browsing module 1214, and a queue management module 1215 but is not limited thereto. For example, the application DB module 1210 may further include diverse application modules such as an e-mail module, a social networking service (SNS) module, a video conference module, an image management module, a browsing module, a calendar module, a widget module, a search module, and a word processing module.

The operating system 1201 may control and manage a general function of the device 1100. The operating system 1201 may include a software component for enabling communication between hardware and software components included in the device 1100.

The wireless communication module 1202 may enable communication with at least one external device through the wireless communication interface 1108. The wireless communication module 1202 may include a software component for processing data received from and transmitted to the at least one external device through the wireless communication interface 1208. The wireless communication module 1202 may enable wireless communication with a server (not shown) or a relay (not shown) through the wireless communication interface 1108. However, a wireless communication object is not limited to those described above.

The wired communication module 1203 may enable communication with the wired communication interface 1109 configured as an element such as a universal serial bus (USB) port and at least one external device (not shown). The wired communication module 1203 may include a software component for processing data received from and transmitted to the at least one external device through the wired communication interface 1109.

The graphics module 1204 may include a software component for brightness adjustment and rendering of graphics displayed on the touch screen 1103 and a software component for providing a virtual keyboard (or a soft keyboard) for inputting text in the application module 1210.

The GPS module 1205 may include a software component for determining a location of the device 1100 and providing the determined location to an application that provides a location based service. The UI module 1206 may include a software component for providing a UI necessary for an application that provides touch screen 1103 based UI information.

The sensing module 1207 may include a software component for determining a sensing value received from the sensor 1102 and providing the sensing value to a specific application included in the application DB module 1210 based on a result of determining. For example, if the sensing value received from the sensor 1102 is information regarding a movement of the device 1100, the sensing module 1207 transmits the received sensing value to the device function performing module 1211.

The device function performing module 1211 detects motion information of the device 1100 corresponding to the received sensing value from the storage 1107. When the motion information of the device 1100 corresponding to the received sensing value is detected, the device function performing module 1211 may check an operation mode of the device 1100 by using information stored in the storage 1107 or information stored in a flag register that is not shown and is included in the first processor 1111. A time when the operation mode of the device 1100 is checked is not limited to that described above. For example, the operation mode of the device 1100 may be checked before the sensing value is received.

The device function performing module 1211 may detect information regarding the checked operation mode and preset function information mapping the detected motion information and perform a function corresponding to the detected preset function information.

The device function performing module 1211 may operate according to the operation mode of the device 1100 without checking the operation mode of the device 1100.

That is, the device function performing module 1211 may operate in a standby mode of the device 1100 as described with reference to FIG. 6B above. In more detail, the device function performing module 1211 may received the sensing value in the standby mode of the device 1100. The receiving of the sensing value in the standby mode of the device 1100 may be performed as described with reference to FIG. 5 above.

When the sensing value is received in the standby mode of the device 1100, the device function performing module 1211 detects the motion information of the device 1100 from the storage 1107 by using the received sensing value. The device function performing module 1211 may detect the preset function information mapping the detected motion information by using the detected motion information of the

device **1100** and perform the function corresponding to the detected preset function information.

The device function performing module **1211** may detect the motion information and the preset function information of the device **1100** from the storage **1107** according to the received sensing value in an active mode of the device **1100** and perform the function corresponding to the detected preset function information.

The contact and motion module **1208** may include a software component for detecting a touch contact based on the touch screen **1103** and providing a result of tracking a movement of the device **1100** based on the touch contact to a specific application included in the application DB module **1210**. For example, the contact and motion module **1208** transmits information regarding the detected touch contact to the device function performing module **1211** if the touch contact based on the touch screen **1103** is detected as described with reference to FIG. **10** above.

The power module **1209** includes a software component for linking with the operating system **1201**, controlling a power supply that supplies power to hardware components included in the device **1100**, and controlling a sleep mode with respect to power supplied to the touch screen **1103**.

The storage **1107** may not store the modules included in the application DB module **1210** among the program and/or command set of FIG. **12** and may store only location information such as a uniform resource locator (URL) of an application module and display information indicating the application module.

In this case, the processor **1110** may be connected to an external device including application DB through the wireless communication interface **1108** or the wired communication interface **1109** by using the location information and use a corresponding program and/or a corresponding command set stored in the external device. In this regard, the external device includes a cloud server or a device including the application DB but is not limited thereto.

In addition, when a user selection signal based on information regarding the application module displayed on the touch screen **1103** is received, the processor **1110** may use information stored in the external device through the wireless communication interface **1108** or the wired communication interface **1109** by using the location information of the application module selected by a user.

The storage **1107** may store information stored in the storage **102** of FIG. **1**. The storage **1107** may further store user schedule information and log information of the device **1100**. The user schedule information and the log information of the device **1100** that are stored in the storage **1107** may be provided to the first processor **1111** as context information of the device **1100**. The first processor **1111** may request the context information of the device **1100** or the user schedule information and the log information of the device **1100** from the storage **1107**.

The wireless communication interface **1108** may be a state in which no power is consumed in the standby mode of the device **1100**. The wireless communication interface **1108** may be in a deactivation state in the standby mode of the device **1100**. The wireless communication interface **1108** may be controlled by the first processor **1111** and set in an active mode in the standby mode of the device **1100**.

The wireless communication interface **1108** may transmit and receive data to and from the external device over a wireless network including wireless Internet, wireless Intranet, a wireless phone network, a wireless local area network (LAN), a Wi-Fi network, a Wi-Fi direct (WFD) network, a 3G network, a 4G Long Term Evolution (LTE) network, a Bluetooth network, an infrared data association (IrDA) network, a RFID network, a ultra wideband (UWB) network, and a Zigbee network.

The wireless communication interface **1108** may include at least one of a broadcasting reception module, a mobile communication module, a wireless Internet module, a short distance communication module, and a location information module, but is not limited thereto.

The wired communication interface **1109** may be a state in which no power is consumed in the standby mode of the device **1100**. The wired communication interface **1109** may be in a deactivation state in the standby mode of the device **1100**. The wired communication interface **1109** may transmit and receive data to and from the external device over a wired network such as wired Internet. The wired communication interface **1109** may transmit and receive data to and from an external device (not shown) by using a plug and play interface such as a USB port (not shown).

The power supply **1114** supplies power to a hardware component included in the device **1100**. The power supply **1114** includes one or more power sources such as a battery and an alternating current (AC) power source. The device **1100** may not include the power supply **1114** but may include a connection unit (not shown) that may be connected to an external power supply (not shown). The power supply **1114** may supply power to the sensor **1102**, the first processor **1111**, and the storage **1107** in the standby mode of the device **1100**. The power supply **1114** may not supply power to an element other than the sensor **1102**, the first processor **1111**, and the storage **1107** in the standby mode of the device **1100**.

The processor **1110** may be one or more processors that control a general operation of the device **1100**. The processor **1110** may generally control the information input unit **1101**, the sensor **1102**, the touch screen **1103**, the camera **1104**, the audio input unit **1105**, the audio output unit **1106**, the storage **1107**, the wireless communication interface **1108**, the wired communication interface **1109**, and the power supply **1114** by using the operating system **1201** and the modules **1202** through **1215** included in the storage **1107**. Thus, the processor **1110** may be a controller, a microprocessor, or a digital signal processor.

The processor **1110** may also provide a UI based on the information input unit **1101**, the sensor **1102**, the touch screen **1103**, the camera **1104**, and the audio input unit **1105** by using the operating system **1201** and the UI module **1206**.

The processor **1110** may execute at least one program related to the method of performing the function of the device **1100** according to an exemplary embodiment and perform a method as shown in a flowchart of FIG. **6**A or FIG. **6**B or a flowchart of FIG. **13**A or **13**B that will be described later.

The processor **1110** may execute the program by reading the program from the storage **1107**. The processor **1110** may execute the program by downloading the program from an external device connected through the wireless communication interface **1108** or the wired communication interface **1109**. The external device may be an application providing server or an application market server. The external device may include a cloud server or a communicable device near the device **1100** but is not limited thereto. The processor **1110** may include an interface function unit between various hardware components included in the device **1100** and the processor **1110**.

The processor **1110** includes the first processor **1111** and the second processor **1112**. The first processor **1111** may correspond to the low power processor **510** of FIG. **5**, and

the second processor **1112** may correspond to the application processor **520** of FIG. **5** but are not limited thereto. The second processor **1112** of FIG. **11** may include the AP **1113** since an additional processor such as a communication processor (CP) may be included in the second processor **1112**. The CP is a processor for controlling a communication based operation.

A standby mode of the second processor **1112** may indicate that the device **1100** is in the standby mode. The standby mode of the second processor **1112** may indicate that the AP **1113** is in the standby mode.

The first processor **1111** may operate as described above in the standby mode of the device **1100**. When the AP **1113** of the second processor **1112** needs to be awakened so as to perform a function based on preset function information detected by the first processor **1111**, the first processor **1111** may transmit an active mode setting request signal to the AP **1113**. The first processor **1111** may be configured as a MCU as described above.

The first processor **1111** may be connected to the wireless communication interface **1108** and receive context information of the device **1100** such as location information of the device **1100** and time information thereof from the outside. To this end, the first processor **1111** may set the wireless communication interface **1108** that is set in the deactivation state to the active mode in the standby mode of the device **1100**. The setting of the active mode of the wireless communication interface **1108** may be temporarily performed.

FIGS. **13**A and **13**B are flowcharts of a method of performing a function of the device **1100**, according to other exemplary embodiments, based on relationships between the sensor **1102**, the first processor **1111**, and the second processor **1112** of FIG. **11**. The second processor **1112** of FIGS. **13**A and **13**B may be referred to as the AP **1113** of FIG. **11**.

In operation S**1301**, the sensor **1102** transmits a sensing value to the first processor **1111**. In operation S**1302**, the first processor **1111** receives the sensing value. Operations S**1301** and S**1302** of FIG. **13**A may be operations in which the first processor **1111** continuously receives the sensing value from the sensor **1102** in a standby mode of the device **1100**.

In operation S**1303**, the first processor **1111** detects motion information of the device **1100** by using the received sensing value.

When the motion information of the device **1100** is detected, the first processor **1111** checks whether the operation mode of the device **1100** is in the standby mode (operation S**1304**). The checking of the operation mode of the device **1100** in operation S**1304** may be performed by detecting information regarding the operation mode stored in a storage place such as a flag register (not shown) included in the first processor **1111** or information regarding the operation mode stored in a preset region of the storage **1107** as described with reference to FIGS. **1** and **2** above.

The information regarding the operation mode stored in the flag register and the information regarding the operation mode stored in the storage **1107** may indicate whether the device **1100** is in the standby mode or in an active mode by using, for example, a value "0" and "1". When the operation mode of the device **1100** is in the active mode, additional information indicating more detailed information regarding the operation mode of the device **1100** may be included.

The additional information may include, for example, information indicating that the device **1100** currently executes web browsing or Facebook activities. The additional information may be stored in the preset region of the storage **1107**. When the operation mode of the device **1100** is in the active mode, and additional information exists, the detecting of the more detailed information regarding the operation mode of the device **1100** by using the additional information may be performed by the second processor **1112**. The preset region of the storage **1107** is a region in which recorded data may be changed, and is accessible by both the first processor **1111** and the second processor **1112**.

If the operation mode of the device **1100** is not in the standby mode, the second processor **112** is in the active mode. If the second processor **1112** is in the active mode and the detected preset function information is executed by the second processor **1112**, the first processor **1111** transmits the detected motion information to the second processor **1112** in operation S**1305**.

The second processor **1112** detects the preset function information from the storage **1107** by using the received motion information in operation S**1306**.

The second processor **1112** may detect the more detailed information regarding the operation mode of the device **1100** by using the additional information regarding the operation mode of the device **1100** stored in the storage **1107** as described above before the preset function information is detected. The additional information may be stored in a temporal storage place included in the second processor **1112**. In a case that the additional information is stored in the temporal storage place included in the second processor **1112**, when the second processor **1112** receives the motion information from the first processor **1111**, the second processor **1112** may detect the more detailed information regarding the operation mode of the device **1100** by using the additional information stored in the temporal storage place. The temporal storage place included in the second processor **1112** may be configured as storage medium such as RAM.

The second processor **1112** determines whether a subject that performs a preset function based on the detected preset function information is the second processor **1112** in operation S**1307**. The determining may be performed by using metadata for each function but is not limited thereto. For example, when a power level (or a power consumption level) necessary for performing a preset function included in metadata of a preset function is higher than a preset reference value, the second processor **1112** may determine that the subject that performs the preset function is the second processor **1112**. Information regarding the preset reference value may be determined according to a level of power consumed by the device **1100** when the first processor **1111** only operates. The metadata for each function may be stored in the storage **1107**.

The second processor **1112** may determine the subject that performs the preset function by using information regarding the subject that performs the preset function stored in the storage **1107**. That is, the second processor **1112** may determined the subject that performs the preset function by using information (information indicating the first processor **1111** and information indicating the second processor **1112**) regarding the subject mapping the preset function information stored in the storage **1107**.

When it is determined that the subject that performs the preset function is the second processor **1112**, the second processor **1112** performs the preset function in operation S**1308**.

When it is determined that the subject that performs the preset function is not the second processor **1112** but the first processor **1111**, the second processor **1112** requests the first processor **1111** to perform the preset function in operation S**1309** and is changed to the standby mode in operation S**1310**. Accordingly, the first processor **1111** performs the

preset function in operation S1311. If the second processor 1112 is changed from the active mode to the standby mode, a power consumption state of the device 1100 may be changed to the above-described low power consumption state such as the standby mode of the device 1100. That is, the power consumption state of the device 1100 may be based on the sensor 1102, the first processor 1111, and the storage 1107.

If it is determined that the operation mode of the device 1100 is in the standby mode in operation S1304, the method proceeds to operation S1312.

The first processor 1111 detects the preset function information from the storage 1107 by using the detected motion information in operation S1312. When the preset function information is detected, the first processor 1111 determines that the subject that performs the preset function is the first processor 1111 according to the detected preset function information in operation S1313. The determining of the subject that performs the preset function may be performed in the same manner as described in relation to operation S1307 above. That is, if the power level necessary for performing the preset function included in the metadata included in the preset function information is lower than the preset reference value, the subject that performs the preset function may be determined as the first processor 1111.

A method of determining the subject that performs the preset function is not limited to that described above. For example, the first processor 1111 may determine the subject that performs the preset function by using the information regarding the subject mapping the preset function information stored in the storage 1107 as described above.

When the subject that performs the preset function is determined as the first processor 1111, the first processor 1111 performs the preset function while maintaining the operation mode of the device 110 in the standby mode in operation S1314.

When it is determined that the subject that performs the preset function is not the first processor 1111 in operation S1313, the first processor 1111 transmits an active mode setting request signal to the second processor 1112 in operation S1315. Accordingly, the second processor 1112 is changed from the standby mode to the active mode in operation S1316.

When the second processor 1112 is changed from the standby mode to the active mode, the second processor 1112 notifies the first processor 1111 about such a change to the active mode in operation S1317. Flag information indicating the operation mode of the device 1100 stored in the first processor 1111 or the storage 1107 is updated to indicate the active mode. The first processor 1111 transmits a preset function performing request signal to the second processor 1112 (operation S1318). The second processor 1112 performs the preset function in operation S1319.

FIG. 14 is a block diagram of a device 1400, according to another exemplary embodiment. FIG. 14 shows an example of performing a function of the device 1400 based on information regarding a movement of the device 1400 and context information regarding the device 1400. The function of the device 1400 may be performed as displayed on at least one of the screens of FIGS. 4A through 4J.

Referring to FIG. 14, the device 1400 includes a sensor 1410, a context information detector 1420, a storage 1430, an information input/output unit 1440, and a processor 1450 but is not limited thereto. That is, the device 1400 may include more or fewer constituent elements than those shown in FIG. 14 as described with reference to FIG. 1.

For example, when the context information regarding the device 1400 is configured to be detected by using the processor 1450, the context information detector 1420 may not be included in the device 1400. When the context information such as location information of the device 1400 and time information is received from an external device, the device 1400 may include a context information receiving unit instead of the context information detector 1420. The context information receiving unit may be configured as a communicable element like the wireless communication interface 1108 of FIG. 11 but is not limited thereto. The external device may include a GPS server, but is not limited thereto.

The sensor 1410 senses the movement of the device 1400 based on the above-described SSP of FIG. 5 and transmits a sensing value to the processor 1450 like the sensor 101 of FIG. 1. The transmitted sensing value may be referred to as the information regarding the movement of the device 1400. The sensor 1410 may operate in the standby mode and the active mode of the device 1400.

The context information detector 1420 is configured to detect current time information, current location information of the device 1400, and an operation mode of the device 1400 but is not limited thereto. That is, current context information of the device 1400 may be detected by further referring to schedule information stored in the storage 1430 and log information of the device 1400.

The context information detector 1420 may also operate based on a seamless context detecting platform. When the context information detector 1420 operates based on the seamless context detecting platform, the context information detector 1420 and the processor 1450 may be connected to transmit the context information in a similar way to data communication between the sensor hub 511 and the SSP manager 512 of FIG. 5.

In this case, the context information detector 1420 may be configured to be controlled by a low power processor when the context information such as time information is detected and by an application processor when the context information other than the time information is detected. To this end, the context information detector 1420 may include independent elements according to detectable context information. For example, the context information detector 1420 may independently include an element for detecting the time information and an element for detecting the location information.

When the context information detector 1420 includes the independent elements as described above, in the standby mode of the device 1400, some elements included in the context information detector 1420 may be in an active state, and the other elements included in the context information detector 1420 may be in a deactivation state. The active state of some elements included in the context information detector 1420 may indicate a power consumption state. The deactivation state of the other elements included in the context information detector 1420 may indicate a state in which no power is consumed.

The above-described some elements included in the context information detector 1420 are controlled by the low power processor, and may include, for example, an element for detecting the context information regarding the time information. The above-described other elements included in the context information detector 1420 are controlled by the application processor, and may include, for example, an element for detecting the location information. However, the elements included in the context information detector 1420 are not limited to those described above.

The context information that may be detected by the context information detector **1420** may be detected as described below but is not limited thereto.

That is, when the device **1400** recognizes preset motion information, the context information detector **1420** may detect whether the device **1400** is in the standby mode or the active mode. The context information detector **1420** may detect whether the device **1400** is indoors or outdoors. The detecting of whether the device **1400** is indoors or outdoors may be performed by using a triangulation method based on GPS receiving information or information received from a plurality of access points (APs).

When the device **1400** is indoors, the context information detector **1420** may detect indoor information (for example, information such as an office or a house) through communication with indoor APs. When the device **1400** is outdoors, the context information detector **1420** may detect place information (for example, information such as A train station or B theater) from the GPS receiving information or the information received from the APs.

The context information detector **1420** may detect GPS based time information or current time information by using a system clock signal included in the device **1400**.

The context information detector **1420** may detect related schedule information and/or related log information from schedule information and/or log information stored in the storage **1430** by using the detected time information and the location information of the device **1400**. The context information detector **1420** may infer the context information by using the detected schedule information and/or log information.

When the preset motion information of the device **1400** is recognized, the context information detector **1420** may detect context information indicating that a user of the device **1400** is walking or running and then stops walking or running, and at this time, the device **1400** is in the standby mode. To detect the context information, the context information detector **1420** may include a function of using information stored in the storage **1430** and/or information stored in the processor **1450** and a function of detecting a moving speed of the device **1400**. To perform the function of detecting the moving speed of the device **1400**, the context information detector **1420** may be configured to previously store reference speed information necessary for detecting the moving speed of the device **1400** or to use reference speed information stored in the storage **1430**.

When the preset motion information of the device **1400** is recognized, the context information detector **1420** may detect context information indicating that the user of the device **1400** holds the device **1400** in the B theater, the device **1400** is in the standby mode, and there is reservation information at a time close to a current time at the B theater by checking at least one of the schedule information, the time information, and the log information that are stored in the storage **1430** and/or the processor **1450**. To this end, the context information detector **1420** may include the function of detecting the moving speed of the device **1400** as described above, a function of reading necessary information from the storage **1430** and/or the processor **1450**, and a function of obtaining the location information of the device **1400** and the time information.

When the preset motion information of the device **1400** is recognized, the context information detector **1420** may detect context information indicating that the user of the device **1400** holds the device **1400** in the A train station, that the device **1400** is in the standby mode, and that a train ticket for departing from the A train station is reserved by checking at least one of the schedule information, the time information, and the log information that are stored in the storage **1430** and/or the processor **1450**. To this end, the context information detector **1420** may include the function of detecting the moving speed of the device **1400**, the function of reading necessary information from the storage **1430** and/or the processor **1450**, and the function of obtaining the location information of the device **1400** and the time information as described above.

When the preset motion information of the device **1400** is recognized, the context information detector **1420** may detect context information indicating that the user of the device **1400** holds the device **1400**, that the device **1400** is in the active mode, and that the device **1400** executes web browsing. To this end, the context information detector **1420** may include the function of detecting the moving speed of the device **1400** and the function of reading necessary information from the storage **1430** and/or the processor **1450**.

When the preset motion information of the device **1400** is recognized, the context information detector **1420** may detect context information indicating that the user of the device **1400** holds the device **1400** at exit 7 at Gangnam Subway Station, that the device **1400** is in the standby mode, and that the user has an appointment at a time close to a current time. To this end, the context information detector **1420** may include the function of obtaining the location information of the device **1400** and the time information, the function of reading necessary information (for example, the schedule information) from the storage **1430** and/or the processor **1450**.

The context information detector **1420** may be configured to detect only the time information and the location information as the context information. In this case, the processor **1450** may detect in more detail the current context information of the device **1400** by referring to information regarding the operation mode of the device **1400**, the schedule information, and the log information that are stored in the storage **1430** based on the received time information and location information.

The storage **1430** may be configured like the storage **102** of FIG. **1** and may store information and programs. The information input/output unit **1440** may be configured like the information input/output unit **104** of FIG. **1**.

When the processor **1450** operates as the low power processor (or an auxiliary processor) like the processor **103** of FIG. **1**, the standby mode of the device **1400** may include the power consumption state or the active state of the sensor **1410**, some or all elements included in the context information detector **1420**, the storage **1430**, and the processor **1450** that are included in the device **1400**.

When the processor **1450** operates as the low power processor, the standby mode of the device **1400** may include a state in which no power is consumed by elements included in the device **1400**, other than the sensor **1410**, some or all elements included in the context information detector **1420**, the storage **1430**, and the processor **1450** that are included in the device **1400**.

When the processor **1450** operates as the low power processor, the standby mode of the device **1400** may include at least one of a touch sensing function and a display function of a touch screen included in the information input/output unit **1440**, and a screen lock setting state of the device **1400**. The touch sensing function and the display function of the touch screen are as described with reference to the touch screen of FIG. **1**.

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The processor **1450** may include the low power processor and the application processor as described with reference to FIG. **1**. When the processor **1450** includes application processor, the standby mode of the device **1400** may include the active state of the low power processor included in the processor **1450** and a deactivation state of the application processor included in the processor **1450**. When the processor **1450** includes the application processor, the standby mode of the device **1400** may include a power consumption state of the low power processor included in the processor **1450**. The standby mode of the device **1400** may include a state in which no power is consumed by the application processor included in the processor **1450**.

When the processor **1450** includes the low power processor and the application processor, the processor **1450** may operate as shown in flowcharts of FIGS. **15**, **16**A, **16**B, **19**A, and **19**B. An operation of the processor **1450** will now be described based on the flowcharts of FIGS. **15**, **16**A, **16**B, **19**A, and **19**B.

FIG. **15** is a flowchart of a method of performing a function of the device **1400**, according to another exemplary embodiment. Referring to FIG. **15**, in operation S**1501**, the processor **1450** receives a sensing value from the sensor **1410**. The receiving of the sensing value from the sensor **1410** may be based on an SSP as described with reference to FIG. **5**.

The processor **1450** detects preset motion information from the storage **1430** based on the received sensing value in operation S**1502**. An error range of the received sensing value may be considered with respect to the preset motion information stored in the storage **1430**. For example, when the preset motion information indicates a 180° rotation, the received sensing value may be expressed as an electrical signal corresponding to $180°\pm\alpha$. In this case, α may be an integer greater than 0.

When preset motion information is detected, the processor **1450** receives context information from the context information detector **1420** in operation S**1503**. The receiving of the context information from the context information detector **1420** may be performed by transmitting a context information request signal from the processor **1450** to the context information detector **1420**.

The processor **1450** performs a function of the device **1400** based on the received context information and the preset motion information of the device **1400** in operation S**1504**.

When time information and location information are received from the context information detector **1420**, the processor **1450** may detect schedule information, log information, and an operation mode of the device **1400** that are stored in the storage **1430** by using the received time information and location information and may detect current context information of the device **1400** by using the detected schedule information, the log information and the operation mode of the device **1400**. In this case, operation S**1503** may refer to a context information detection operation, and the context information used in operation S**1504** is the current context information related to the device **1400**.

The method of FIG. **15** may be performed when the device **1400** is in the standby mode or an active mode. Thus, the function performed in operation S**1504** may differ according to the operation mode of the device **1400**.

FIG. **16**A is a flowchart of a method of performing a function of device **1400**, according to another exemplary embodiment. The flowchart of FIG. **16**A further includes a function of causing the display of a gateway screen (often abbreviated to "gateway") embedded in the device **1400** when the device **1400** is in a standby mode, in addition to the flowchart of FIG. **15**. When a preset function performed by the device **1400** includes a service, the gateway may be referred to as a service gateway.

The processor **1450** receives a sensing value from the sensor **1410** in operation S**1601**. The received sensing value may be referred to as information regarding a movement of the device **1400**. The processor **1450** detects preset motion information of the device **1400** by using the received sensing value in operation S**1602**. When context information is received from the context information detector **1420** in operation S**1603**, the processor **1450** checks the operation mode of the device **1400**. If the device **1400** is in the standby mode in operation S**1604**, the processor **1450** reads display information in respect of the gateway from the storage **1430** and controls to display a gateway screen on the information input/output unit **1440** in operation S**1605**. The processor **1450** detects preset function information based on the preset motion information and the context information and performs the preset function based on the detected preset function information in operation S**1606**.

If the device **1400** is not in the standby mode in operation S**1604**, the processor **1450** does not control to display the gateway screen on the information input/output unit **1440**, detects the preset function information based on the context information and the motion information of the device **1400**, and performs the preset function based on the detected preset function information in operation S**1607**.

FIG. **16**B is a flowchart of a method of performing a function of device **1400**, according to another exemplary embodiment, when the device **1400** is in a standby mode as shown in FIG. **6**B.

Referring to FIG. **16**B, when the device **1400** is in the standby mode in operation S**1608**, the processor **1450** receives a sensing value from the sensor **1410** in operation S**1609**. The received sensing value may be referred to as information regarding a movement of the device **1400**.

The processor **1450** detects preset motion information of the device **1400** by using the received sensing value in operation S**1610**. When context information is received from the context information detector **1420** in operation S**1611**, the processor **1450** displays a gateway screen embedded in the device **1400** by using the received context information and the detected motion information in operation S**1612**. The processor **1450** detects preset function information based on the preset motion information and the context information and performs a preset function based on the detected preset function information in operation S**1613**.

FIG. **17** shows screens **1710** through **1730** for explaining a gateway screen embedded in the device **1400** when preset motion information of the device **1400** is detected and an operation mode of the device **1400** is a standby mode.

That is, when the device **1400** is in the standby mode and a black screen state like the screen **1710**, if a movement of the device **1400** that rotates by 90° in a clockwise direction is detected, the device **1400** displays the gateway screen like the screen **1720**. The gateway screen may be displayed for a very short period of time. For example, the gateway screen may be displayed for about 5 seconds but is not limited thereto. A time taken to display the gateway screen may be set when an environment of the device **1400** is set.

As shown in FIG. **17**, the gateway screen may be displayed by an auxiliary processor when the processor **1450** includes the auxiliary processor (for example, a low power processor) and a main processor (for example, an application processor). Thus, when a preset function that needs to be performed is performed by the auxiliary processor, and the

main processor is in the standby mode, the device **1400** may perform the preset function by using the auxiliary processor while maintaining the standby mode of the main processor as shown in the screen **1730**.

The gateway screen may be provided in various forms as shown in FIGS. **18**A through **18**F.

That is, the gateway screen may include a language command inquiring a user about manufacturer identification information (for example, logo) of the device **1400** and a lock release as shown in FIG. **18**A.

The gateway screen may include manufacturer identification information of the device **1400** and information used to select a preset executable application as shown in FIG. **18**B. FIG. **18**B shows the information used to select the preset executable application as icons. However, the information used to select the preset executable application is not limited to the above-described icons. For example, the information used to select the preset executable application may be provided in a text form.

When four icons are provided as shown in FIG. **18**B, four applications correspond to information regarding preset functions that may be performed according to motion information of the device **1400** and context information. Thus, a user may select at least one of the four executable applications by using the four icons.

The gateway screen may include manufacturer identification information of the device **1400** and information used to allow a user to select whether to perform a preset function as shown in FIG. **18**C. FIG. **18**C shows a case where the information used to allow the user to select whether to perform the preset function is provided in an image form in a content/advertisement region.

Information displayed through the content/advertisement region may be a size-reduced image or a part of an image (for example, a thumbnail image or a key image or a representative image) indicating the preset function that may be performed but is not limited thereto. The user may select to perform the preset function based on a touch on the content/advertisement region. That is, the user may request to perform the preset function by touching the content/advertisement region. The information displayed through the content/advertisement region may correspond to preset function information determined according to motion information and context information of the device **1400** and may be previously stored in the storage **1430**.

The gateway screen of FIG. **18**D includes manufacturer identification information of the device **1400**, a lock (or a screen lock setting state) release message, and icons used to select at least one executable application. The gateway screen of FIG. **18**E includes manufacturer identification information of the device **1400**, a lock release message, and information based on a content/advertisement region that is information used to allow the user to select whether to perform a preset function. The gateway screen of FIG. **18**F includes manufacturer identification information of the device **1400**, a lock release message, the information (the content/advertisement region) that may be selected by the user as to whether to perform a preset function, and the information (icons) used to select at least one executable application.

The gateway screens are not limited to those shown in FIGS. **18**A through **18**F. For example, the gateway screens may not include a message "lock release" shown in FIGS. **18**A, **18**D, **18**E, and **18**F.

The gateway screens of FIGS. **18**A through **18**F may be used with respect to the device **100** of FIG. **1** or the device **1100** of FIG. **11**. In this case, the gateway screens of FIGS. **18**A through **18**F may be provided according to an operation mode of a device and motion information of the device without taking into consideration context information as described above.

FIG. **19**A is a flowchart of a method of performing a function of the device **1400**, according to another exemplary embodiment. The flowchart of FIG. **19**A further includes a function of selecting whether to perform a function through a gateway screen, in addition to the flowchart of FIG. **16**A. Thus, operations S**1901** through S**1904** of FIG. **19**A are respectively the same as operations S**1601** through S**1604**, and thus further descriptions thereof are omitted.

If the device **1400** is in a standby mode in operation S**1904**, the processor **1450** reads information regarding a gateway screen embedded in the storage **1403** and displays the gateway screen based on the information read from the storage **1403** in operation S**1905**. The displayed gateway screen may correspond to one of the screens of FIGS. **18**B through **18**F.

Thus, manufacturer identification information and information used to select whether to perform a function are output through the information input/output unit **1440**. In particular, when there are a plurality of preset functions that may be performed, a plurality of pieces of information that may be selected as to whether to perform preset functions may be displayed like one of the screens of FIGS. **18**B, **18**D, and **18**F. The information used to select whether to perform the function corresponds to preset function information determined based on preset motion information of the device **1400**, detected context information, and information regarding the operation mode of the device **1400**.

In operation S**1906**, if a request to perform a desired preset function that is to be performed is received, the processor **1450** performs the preset function that is requested to be performed in operation S**1907**. However, if the request is not received in operation S**1906**, the processor **1450** returns to an operation state before recognizing the motion information of the device **1400**.

When the device **1400** is in the standby mode, if the request is not received for a preset period of time, the processor **1450** determines that no request has been made. The processor **1450** may manage the preset period of time, and the storage **1403** may store and manage the preset period of time.

In operation S**1904**, if the device **1400** is not in the standby mode (if the device **1400** is an active mode), the processor **1450** may output the information used to select whether to perform the function in operation S**1909**. In this regard, the information may be output in a pop-up window but is not limited thereto. The information is used to select whether to perform the preset function determined according to the operation mode, the motion information, and context information of the device **1400**.

If the request to perform the function is received based on the information displayed on the device **1400**, the processor **1450** performs the function requested in operation S**1907**. If the request to perform the function is not received based on the information displayed on the device **1400**, the processor **1450** returns to the operation state before recognizing the motion information of the device **1400**.

When the device **1400** is in the active mode, the processor **1450** may determine that the request to perform the function is not received if another function menu is requested or selected when the information used to select whether to perform the function is displayed as described above or the request to perform the function is not received for the preset period of time as described above.

FIG. **19**B is a flowchart of a method of performing a function of the device **1400**, according to another exemplary embodiment when the device **1400** is in the standby mode. The flowchart of FIG. **19**B further includes a function of selecting whether to perform a function through a gateway screen in addition to the flowchart of FIG. **16**B. Thus, operations S**1910** through S**1913** of FIG. **19**B are respectively performed in a similar way to operations S**1608** through S**1611** of FIG. **16**B, and operations S**1914** through **1917** of FIG. **19**B are respectively performed in a similar way to operations S**1905** through S**1908** of FIG. **19**A.

FIG. **20** shows screens for requesting performing a preset function of the device **1400** by using a gateway screen **2020** including information (for example, icons) used to select at least one executable application and information (for example, a content/advertisement region) used to allow a user to select whether to perform a preset function as shown in FIG. **18**F.

That is, if the device **1400** is in a standby mode and a black screen state as shown in a screen **2010**, when upside down motion information of the device **1400** and context information of the device **1400** are detected, the gateway screen **2020** is displayed based on preset function information determined based on the motion information of the device **1400** and the context information of the device **1400**.

The screen **2030** including train ticket information is displayed when the content/advertisement region is selected on the gateway screen **2020**. In this regard, a part of an image of a train ticket displayed on the screen **2030**, an image of a reduced train ticket, or a text form may be displayed on the content/advertisement region.

Operation S**1504** of FIG. **15**, operations S**1606** and S**1607** of FIG. **16**A, operation S**1613** of FIG. **16**B, operation S**1907** of FIG. **19**A, and operation S**1917** of FIG. **19**B may be modified to include the methods of FIGS. **7** and **9**.

FIG. **21** is a block diagram of a device **2100**, according to another exemplary embodiment. The device **2100** of FIG. **21** further includes a context information detector **2103** similar to the context information detector **1420** of the device **1400** of FIG. **14**, in addition to the block diagram of FIG. **11**. Thus, a processor **2111** may operate like the processor **1450** of FIG. **14**.

The processor **2111** includes a first processor **2112** and a second processor **2113** as shown in FIG. **11**. The first processor **2112** may receive a sensing value from a sensor **2102** based on the SSP of FIG. **5**, and may receive context information from the context information sensor **2103** based on the seamless context detecting platform of FIG. **14**.

Configurations and operations of an information input/output unit **2101**, a touch screen **2104**, a camera **2105**, an audio input unit **2106**, an audio output unit **2107**, a wireless communication interface **2109**, a wired communication interface **2110**, and a power supply **2115** of FIG. **21** are respectively similar to those of the information input/output unit **1101**, the touch screen **1103**, the camera **1104**, the audio input unit **1105**, the audio output unit **1106**, the wireless communication interface **1108**, the wired communication interface **1109**, and the power supply **1144** of FIG. **11**.

The storage **2108** of FIG. **21** has a similar configuration to that of a combination of the storage **1430** of FIG. **14** and the storage **1107** of FIG. **11**, and stores information and at least one program that are stored in the storage **1430** and the storage **1107**.

A standby mode of the device **2100** may include a state as described with reference to FIGS. **1**, **11**, and **14**. That is, the standby mode of the device **2100** may include a power consumption state of the sensor **2102**, some elements of the context information sensor **2103**, the first processor **2112**, and the storage **2108**. The standby mode of the device **2100** may include a power consumption state of the sensor **2102**, the context information sensor **2103**, the first processor **2112**, and the storage **2108**. The standby mode of the device **2100** may include a state in which no power is consumed by elements included in the device **2100** other than the sensor **2102**, some elements of the context information sensor **2103**, the first processor **2112**, and the storage **2108**. The standby mode of the device **2100** may include a state in which no power is consumed by elements included in the device **2100** other than the sensor **2102**, the context information sensor **2103**, the first processor **2112**, and the storage **2108**.

The standby mode of the device **2100** may further include at least one of an inactive state of a function related to the touch screen **2104** and a screen lock set state of the device **2100** as described with reference to FIG. **11**.

The external device control methods according to exemplary embodiments may also be embodied as computer readable codes on a computer readable recording medium. The computer readable medium may be any recording apparatus capable of storing data that is read by a computer system, e.g., a read-only memory (ROM), a random access memory (RAM), a compact disc (CD)-ROM, a magnetic tape, a floppy disk, an optical data storage device, and so on. The computer readable medium may be distributed among computer systems that are interconnected through a network, and the exemplary embodiments may be stored and implemented as computer readable code in a distributed manner.

While exemplary embodiments have been particularly shown and described, it will be understood by those of ordinary skill in the art that various changes in form and details may be made herein without departing from the spirit and scope of the inventive concept as defined by the following claims.

What is claimed is:

1. An electronic device performing a function according to motion of the electronic device, the electronic device comprising:

a first sensor;

a second sensor;

a display;

a memory storing mapping information among information regarding a motion of the electronic device, information regarding an operation mode of the electronic device, and information regarding a function of the electronic device; and

a processor configured to:

obtain, through the first sensor, information regarding the motion of the electronic device being detected using the first sensor,

based on the obtained information regarding the motion of the electronic device, identify motion information corresponding to the information regarding the motion of the electronic device,

after identifying the motion information, determine the operation mode of the electronic device,

determine a function to be performed by the electronic device based on the determined operation mode of the electronic device, the identified motion information, and the mapping information,

determine whether a face image of a user of the electronic device is included in an image obtained through the second sensor,

based on determining that the face image of the user is included in the image obtained through the second sensor, control the electronic device to perform the determined function, and

based on determining that the face image of the user is not included in the image obtained through the second sensor, control the electronic device not to perform the determined function.

2. The electronic device of claim **1**, wherein the processor comprises an application processor, and the determined operation mode comprises a standby mode comprising an idle state of the application processor.

3. The electronic device of claim **1**, wherein the determined operation mode comprises an inactive state of the display.

4. The electronic device of claim **1**, wherein the determined operation mode comprises a screen lock state of the display.

5. The electronic device of claim **1**, wherein the processor is further configured to:

in response to the determined operation mode of the electronic device being a standby mode, control to display, on the display, a gateway screen including at least one item determined based on the determined operation mode and the identified motion information, receive information regarding an item selected through the gateway screen, and control the electronic device to perform a first function based on the selected item, and

in response to the determined operation mode of the electronic device not being the standby mode, control the electronic device to perform a second function determined based on the determined operation mode and the identified motion information.

6. The electronic device of claim **1**, further comprising a third sensor for detecting at least one piece of context information related to the electronic device,

wherein the processor determines the function based on the at least one piece of context information, the determined operation mode of the electronic device, and the identified motion information.

7. The electronic device of claim **6**, wherein the at least one piece of context information comprises at least one piece of current time information, position information of the electronic device, schedule information stored in the electronic device, and log information related to the electronic device.

8. A method of performing a function of an electronic device according to motion of the electronic device, the method comprising:

receiving, via a first sensor included in the electronic device, information regarding a motion of the electronic device being detected using the first sensor, wherein the electronic device includes a memory storing mapping information among the information regarding the motion of the electronic device, information regarding an operation mode of the electronic device, and information regarding a function of the electronic device;

in response to receiving the information regarding the motion of the electronic device, identifying motion information corresponding to the information regarding the motion of the electronic device;

after identifying the motion information, determining the operation mode of the electronic device;

determining a function to be performed by the electronic device based on the determined operation mode of the electronic device, the identified motion information, and the mapping information,

determining whether a face image of a user of the electronic device is included in an image obtained via a second sensor,

based on determining that the face image of the user of the electronic device is included in the image obtained via the second sensor, controlling the electronic device to perform the determined function; and

based on determining that the face image of the user of the electronic device is not included in the image obtained via the second sensor, controlling the electronic device not to perform the determined function, when the face image of the user is not included in the image obtained via the second sensor.

9. The method of claim **8**, wherein the determined operation mode comprises a standby mode comprising an idle state of an application processor of the electronic device.

10. The method of claim **8**, wherein the determined operation mode comprises an inactive state of a function related to a display of the electronic device.

11. The method of claim **8**, wherein the determined operation mode comprises a screen lock state of a display of the electronic device.

12. The method of claim **8**, further comprising:

in response to the determined operation mode of the electronic device being a standby mode, controlling to display, on a display of the electronic device, a gateway screen including at least one item determined based on the determined operation mode and the detected motion information, receiving information regarding an item selected via the gateway screen, and controlling the electronic device to perform a first function based on the selected item, and

in response to the determined operation mode of the electronic device not being the standby mode, controlling the electronic device to perform a second function determined based on the determined operation mode and the detected motion information.

13. The method of claim **8**, further comprising:

detecting at least one piece of context information related to the electronic device by using a third sensor included in the electronic device;

determining the function based on the at least one piece of context information, the determined operation mode of the electronic device, and the motion of the electronic device,

wherein the at least one piece of context information comprises at least one piece of current time information, position information of the electronic device, schedule information stored in the electronic device, and log information related to the electronic device.

14. A non-transitory computer readable recording medium having recorded thereon a program which is executable by a computer to perform the method of claim **8**.

15. The non-transitory computer readable recording medium of claim **14**, wherein the determined operation mode comprises a standby mode comprising an idle state of an application processor of the electronic device.

16. The non-transitory computer readable recording medium of claim **14**, the method further comprising:

detecting at least one piece of context information related to the electronic device by using a third sensor included in the electronic device;

determining the function based on the at least one piece of context information, the determined operation mode of the electronic device, and the motion of the electronic device,

wherein the at least one piece of context information comprises at least one piece of current time information, position information of the electronic device, schedule information stored in the electronic device, and log information related to the electronic device.

17. The non-transitory computer readable recording medium of claim **14**, the method further comprising:

in response to the determined operation mode of the electronic device being a standby mode, controlling to display, on a display of the electronic device, a gateway screen including at least one item determined based on the determined operation mode and the detected motion information, receiving information regarding an item selected via the gateway screen, and controlling the electronic device to perform a first function based on the selected item, and

in response to the determined operation mode of the electronic device not being the standby mode, controlling the electronic device to perform a second function determined based on the determined operation mode and the detected motion information.

18. The electronic device of claim **1**, wherein the processor is further configured to, based on the identified motion information indicating a movement of the electronic device, activate a function of the second sensor and temporarily change the operation mode of the electronic device to another mode for executing an application of the second sensor.

19. The method of claim **8**, further comprising, based on the identified motion information indicating a movement of the electronic device, activating a function of the second sensor and temporarily changing the operation mode of the electronic device to another mode for executing an application of the second sensor.

20. The non-transitory computer readable recording medium of claim **14**, the method further comprising, based on the identified motion information indicating a movement of the electronic device, activating a function of the second sensor and executing an application of the second sensor.

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