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(54) **MOBILE TERMINAL AND METHOD FOR CONTROLLING THE SAME**

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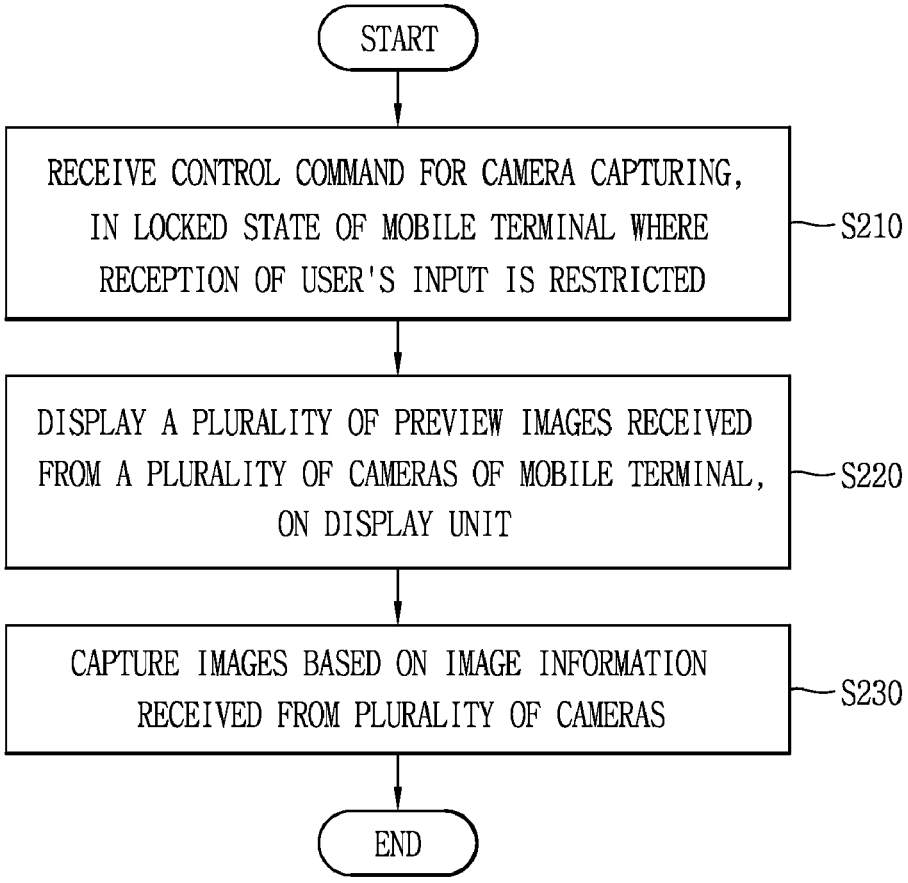
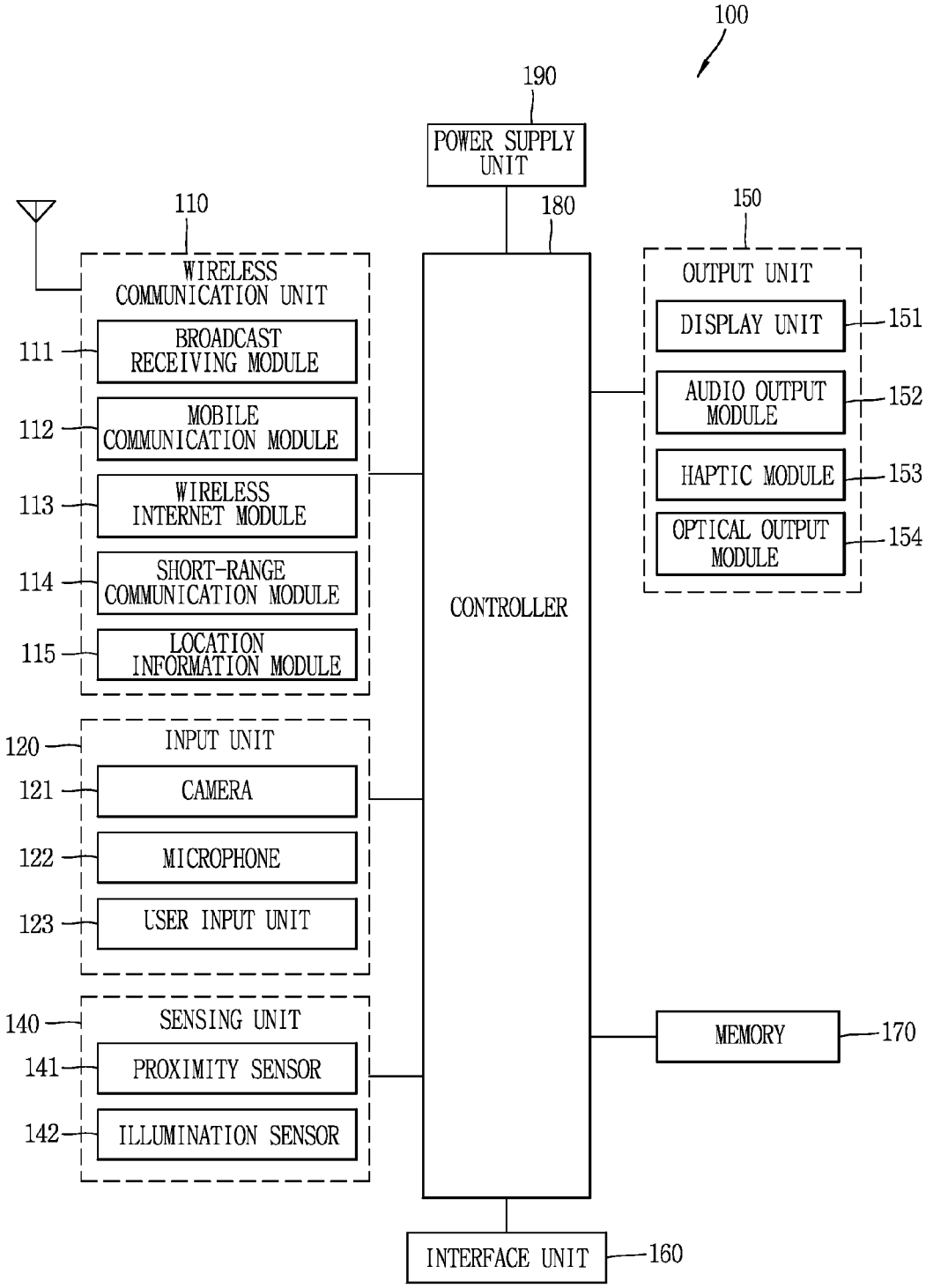
(57) **ABSTRACT**

Disclosed are a mobile terminal capable of executing image capturing, and a method of controlling the same. The mobile terminal includes a terminal body; a plurality of cameras disposed on different regions of the terminal body in a spaced manner, and having different capturing directions; a display unit configured to display video information; and a controller configured to execute a different control in response to a different input applied in a locked state where reception of a user's input is limited, wherein the controller displays a lock screen indicating a locked state, based on a first input received in the locked state, and wherein the controller displays a plurality of preview images received from the plurality of cameras, on the display unit, based on a second input received in the locked state.




100
190
POWER SUPPLY UNIT
110
180
150
WIRELESS COMMUNICATION UNIT
111
BROADCAST RECEIVING MODULE
112
MOBILE COMMUNICATION MODULE
113
WIRELESS INTERNET MODULE
114
SHORT-RANGE COMMUNICATION MODULE
115
LOCATION INFORMATION MODULE
CONTROLLER
OUTPUT UNIT
DISPLAY UNIT
151
AUDIO OUTPUT MODULE
152
HAPTIC MODULE
153
OPTICAL OUTPUT MODULE
154
120
INPUT UNIT
121
CAMERA
122
MICROPHONE
123
USER INPUT UNIT
140
SENSING UNIT
141
PROXIMITY SENSOR
142
ILLUMINATION SENSOR
MEMORY
170
INTERFACE UNIT
160

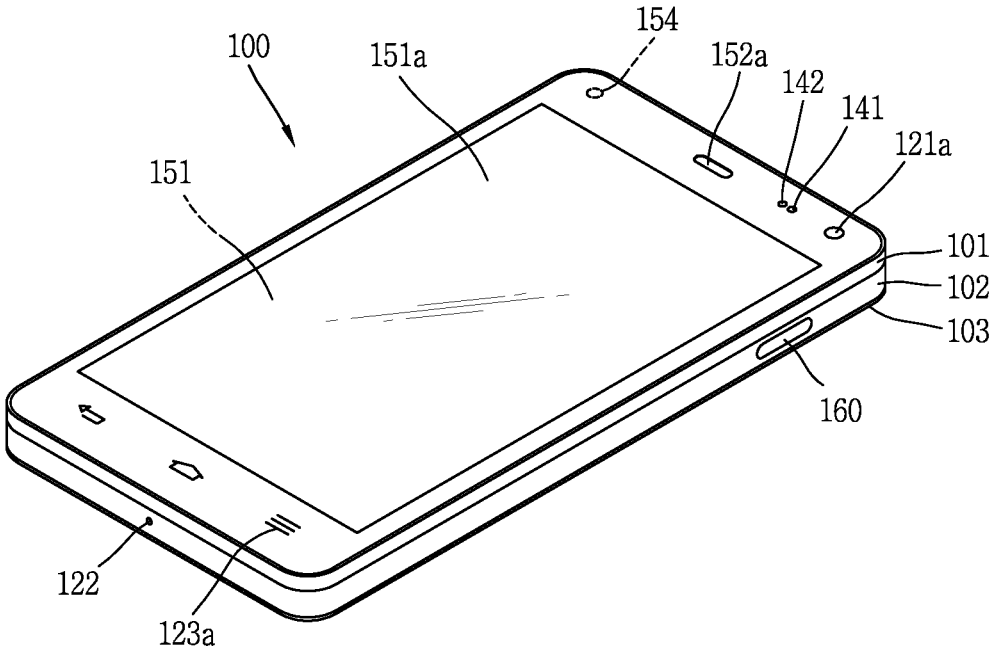

100
151a
154
152a
142
141
121a
151
101
102
103
160
122
123a

FIG. 1C

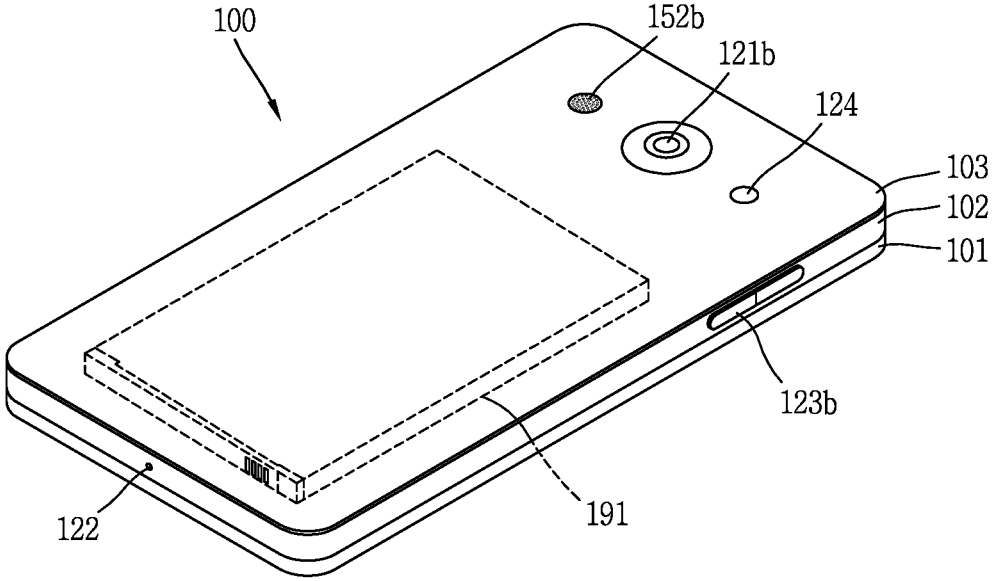

100
152b
121b
124
103
102
101
123b
122
191

FIG. 2

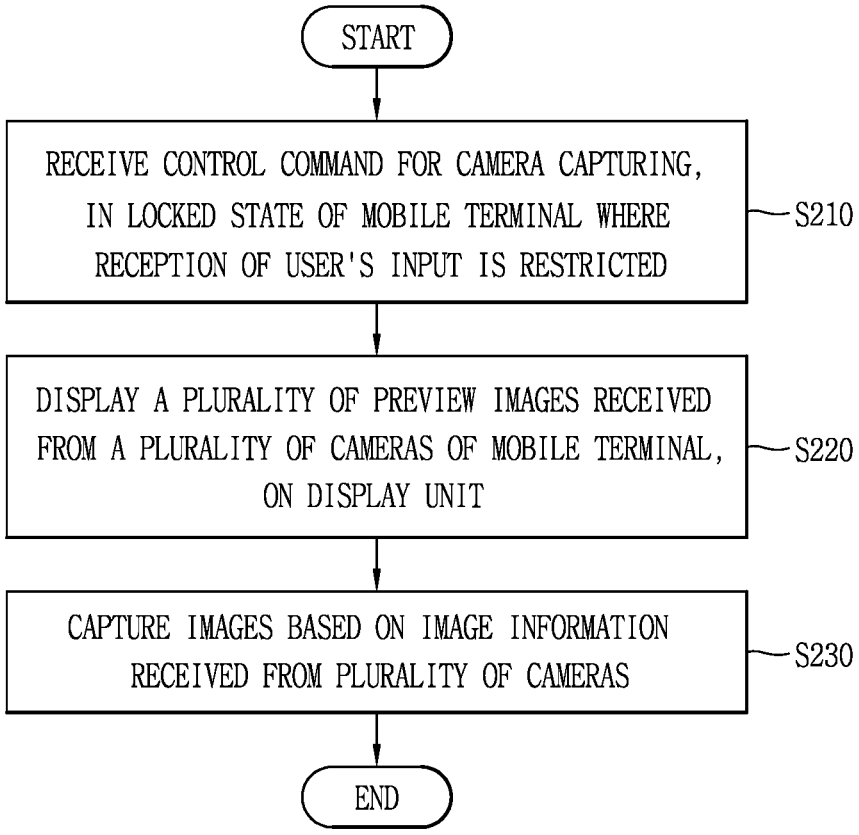

START
RECEIVE CONTROL COMMAND FOR CAMERA CAPTURING, IN LOCKED STATE OF MOBILE TERMINAL WHERE RECEPTION OF USER'S INPUT IS RESTRICTED
S210
DISPLAY A PLURALITY OF PREVIEW IMAGES RECEIVED FROM A PLURALITY OF CAMERAS OF MOBILE TERMINAL, ON DISPLAY UNIT
S220
CAPTURE IMAGES BASED ON IMAGE INFORMATION RECEIVED FROM PLURALITY OF CAMERAS
S230
END

FIG. 3A

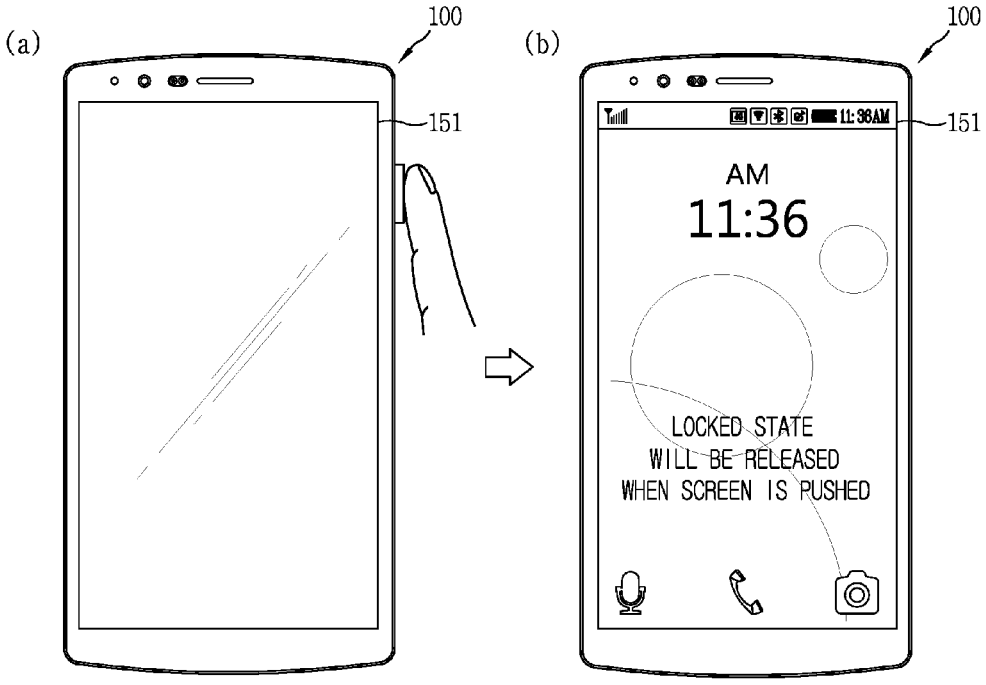

(a)
100
151
(b)
100
151
11:36AM
AM
11:36
LOCKED STATE
WILL BE RELEASED
WHEN SCREEN IS PUSHED

FIG. 3B

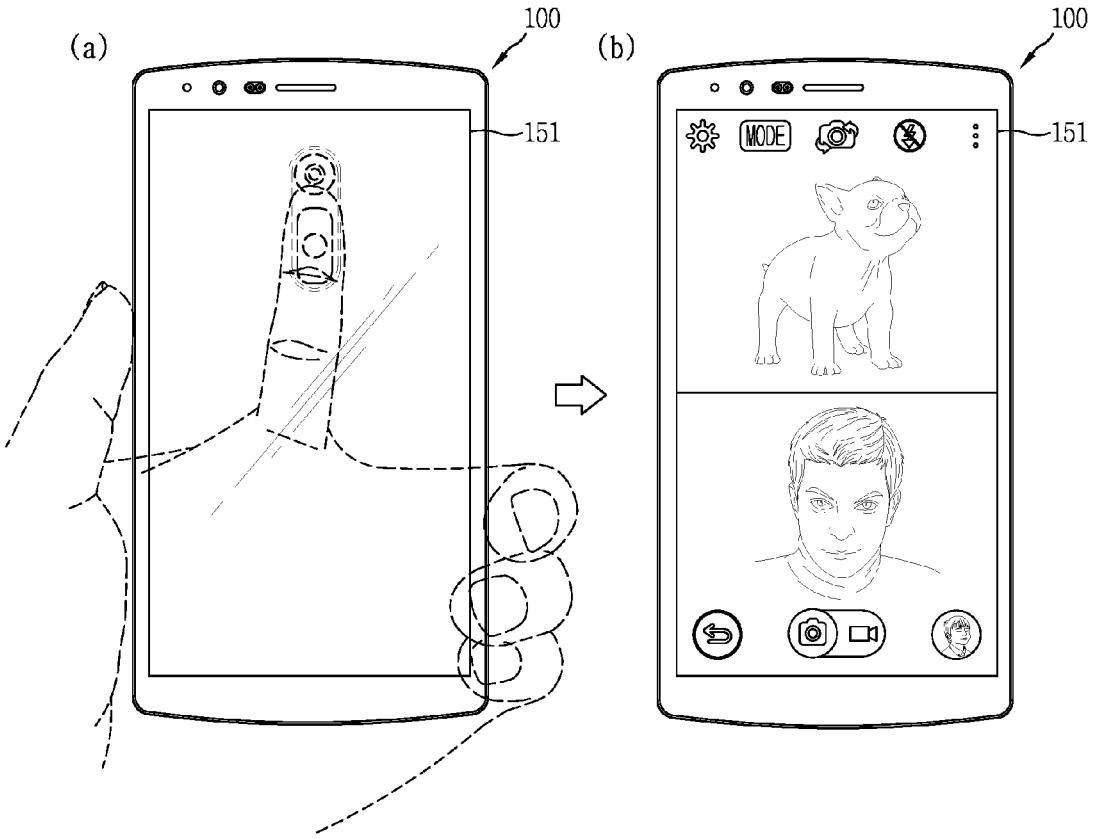


FIG. 4A

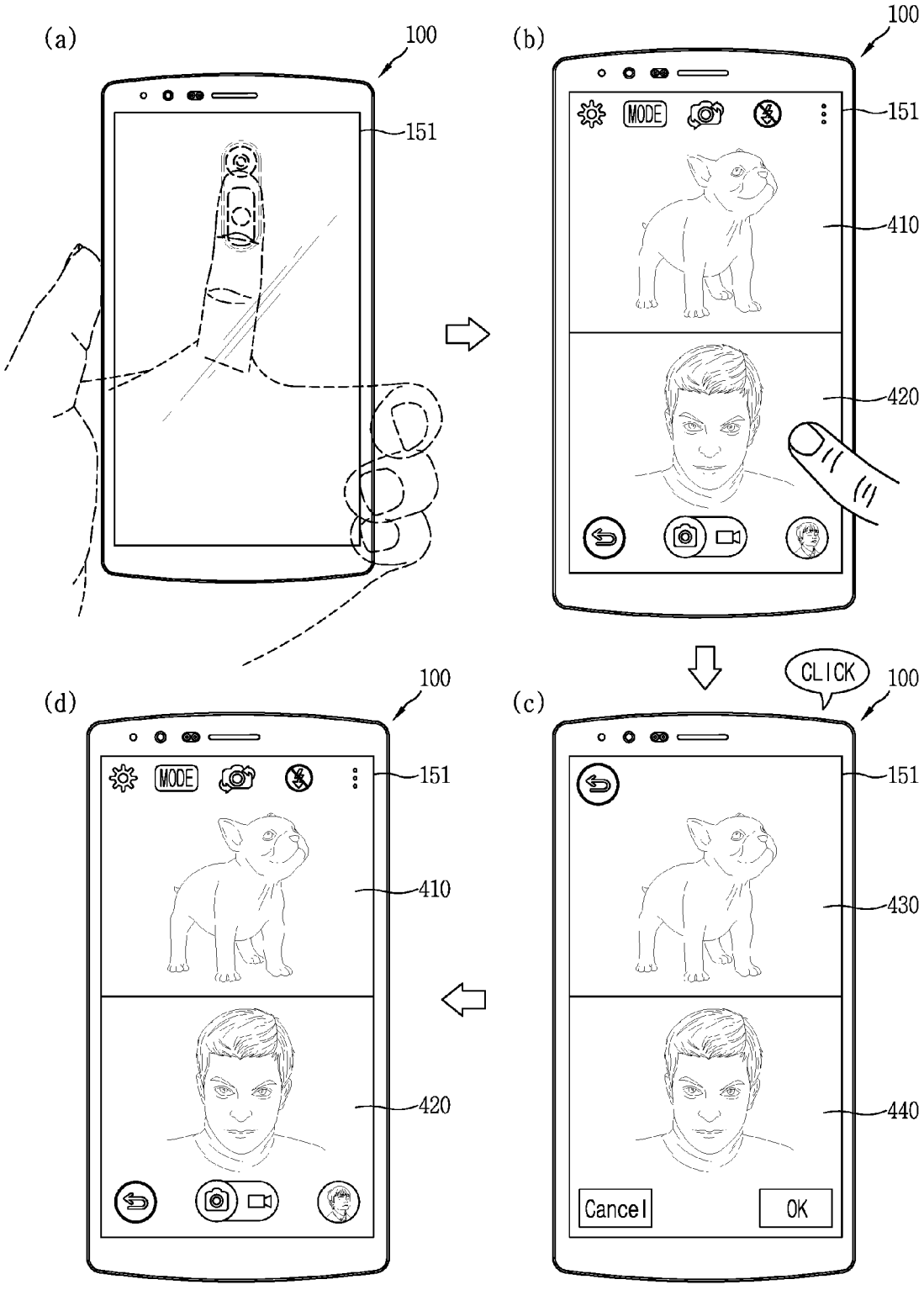

(a)
100
151
(b)
100
MODE
151
410
420
CLICK
(c)
100
151
430
440
Cancel
OK
(d)
100
MODE
151
410
420

FIG. 4B

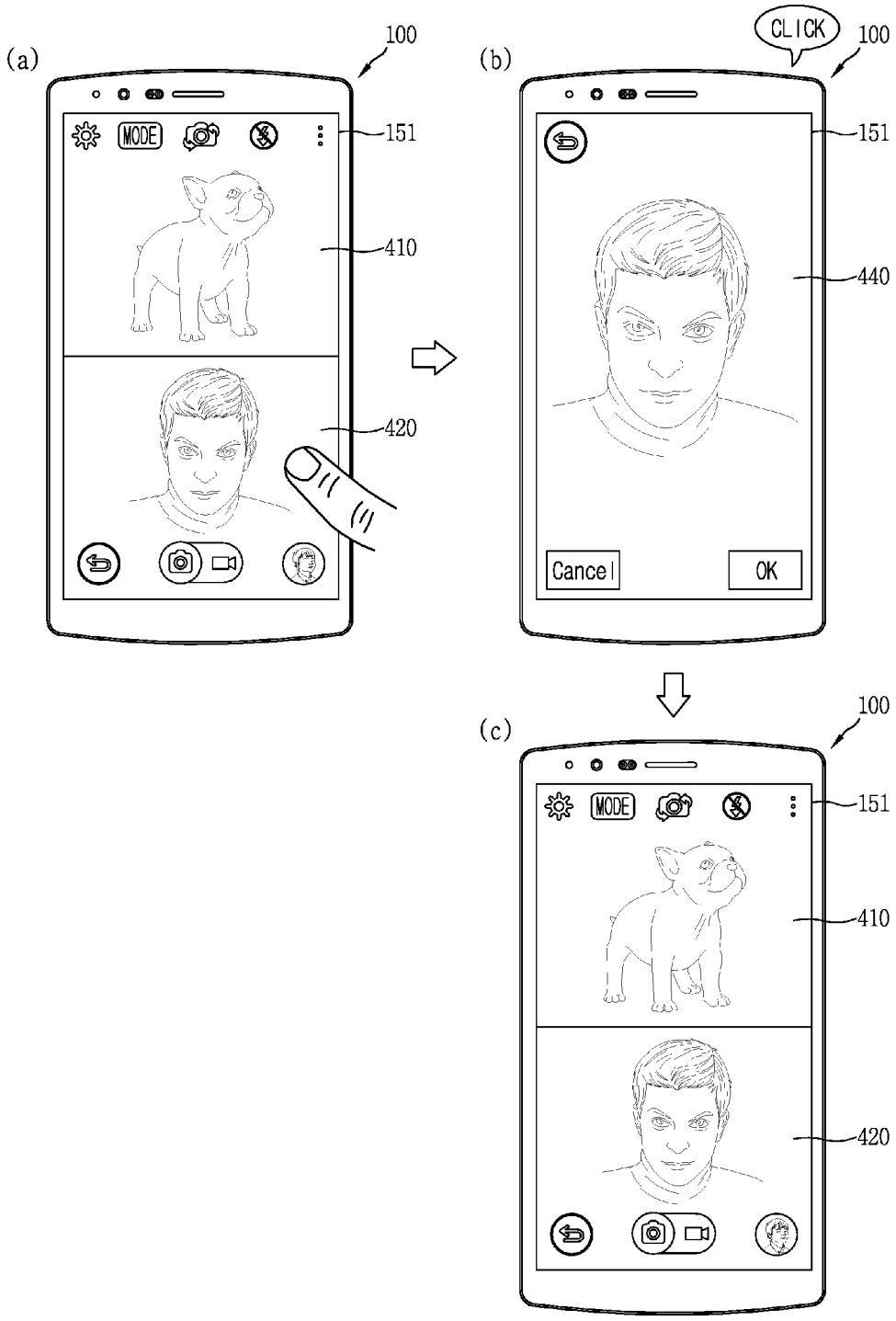

(a)
100
MODE
151
410
420
(b)
CLICK
100
151
440
Cancel
OK
(c)
100
MODE
151
410
420

FIG. 4C

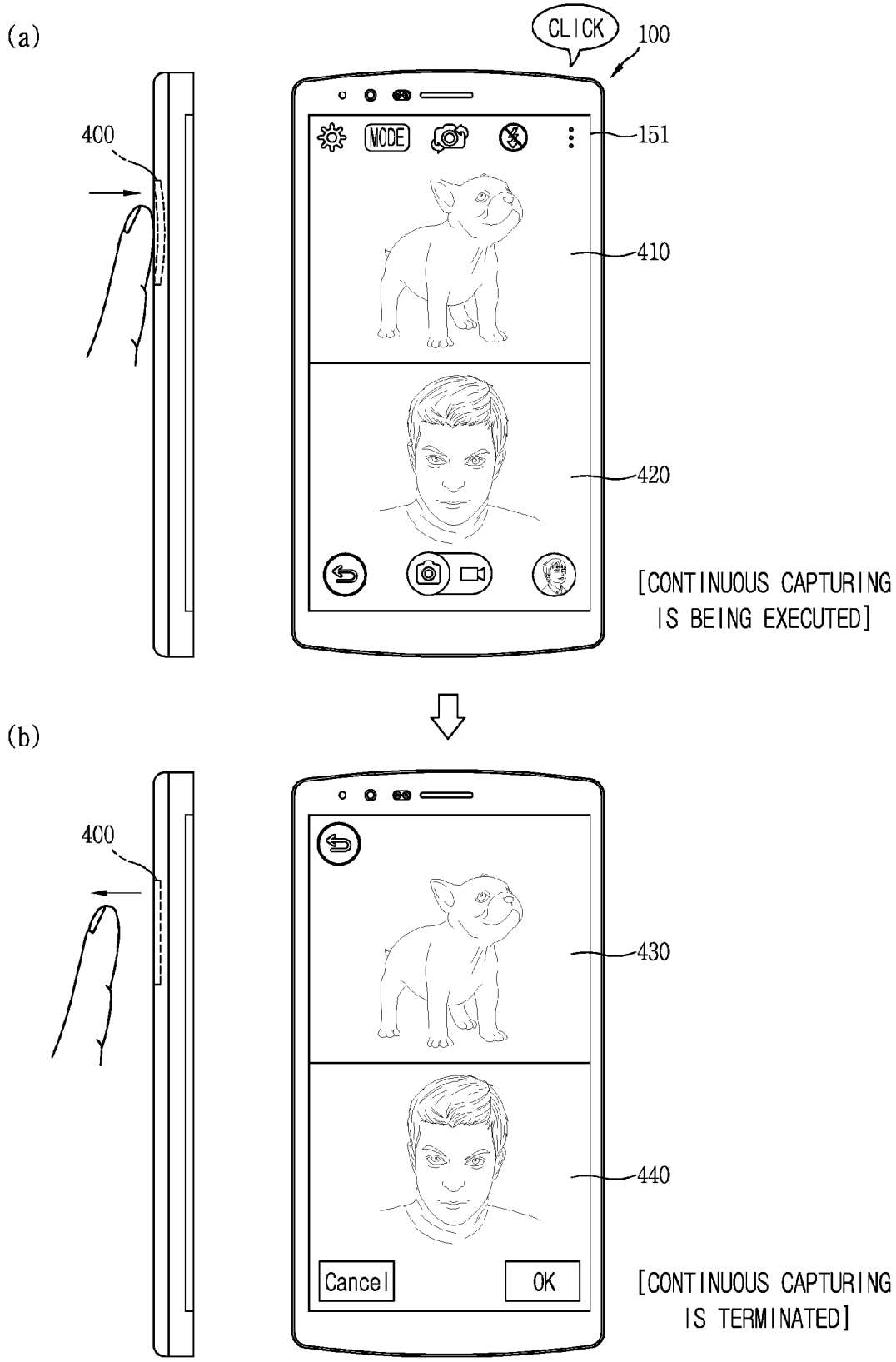

(a)
CLICK
100
400
MODE
151
410
420
[CONTINUOUS CAPTURING IS BEING EXECUTED]
(b)
400
430
440
Cancel
OK
[CONTINUOUS CAPTURING IS TERMINATED]

FIG. 5A

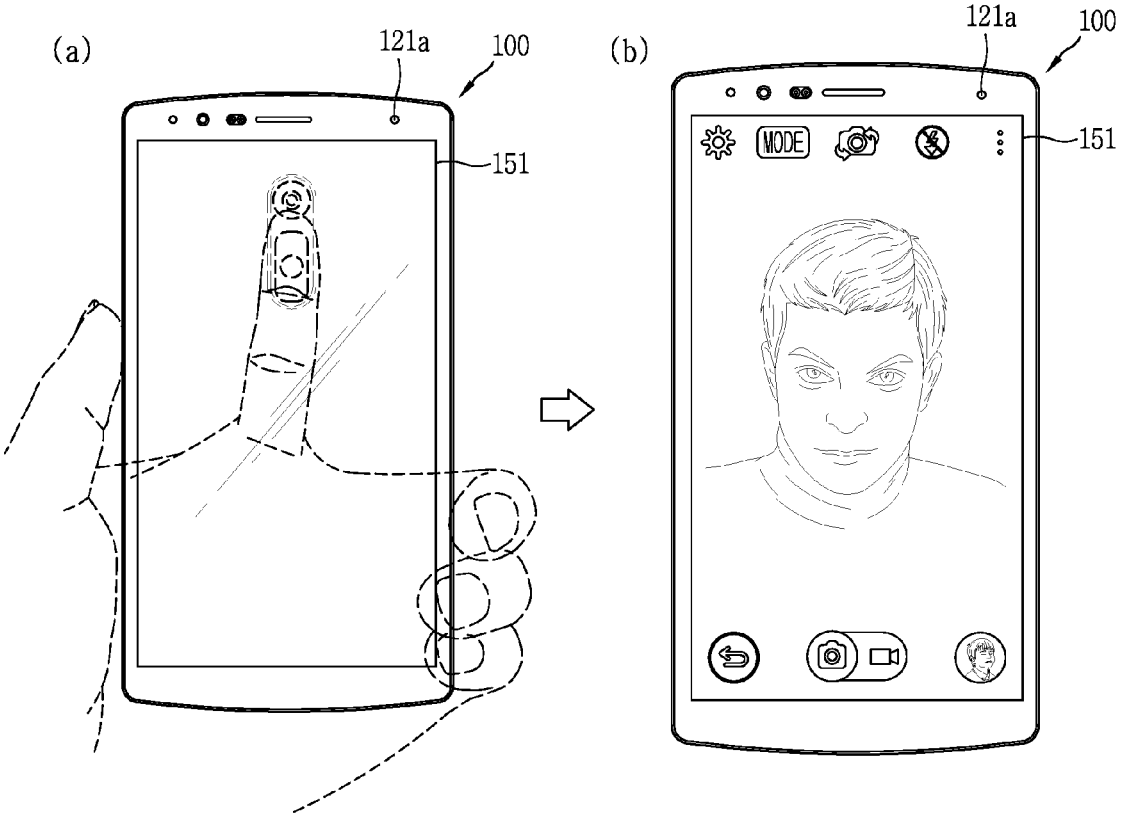


FIG. 5B

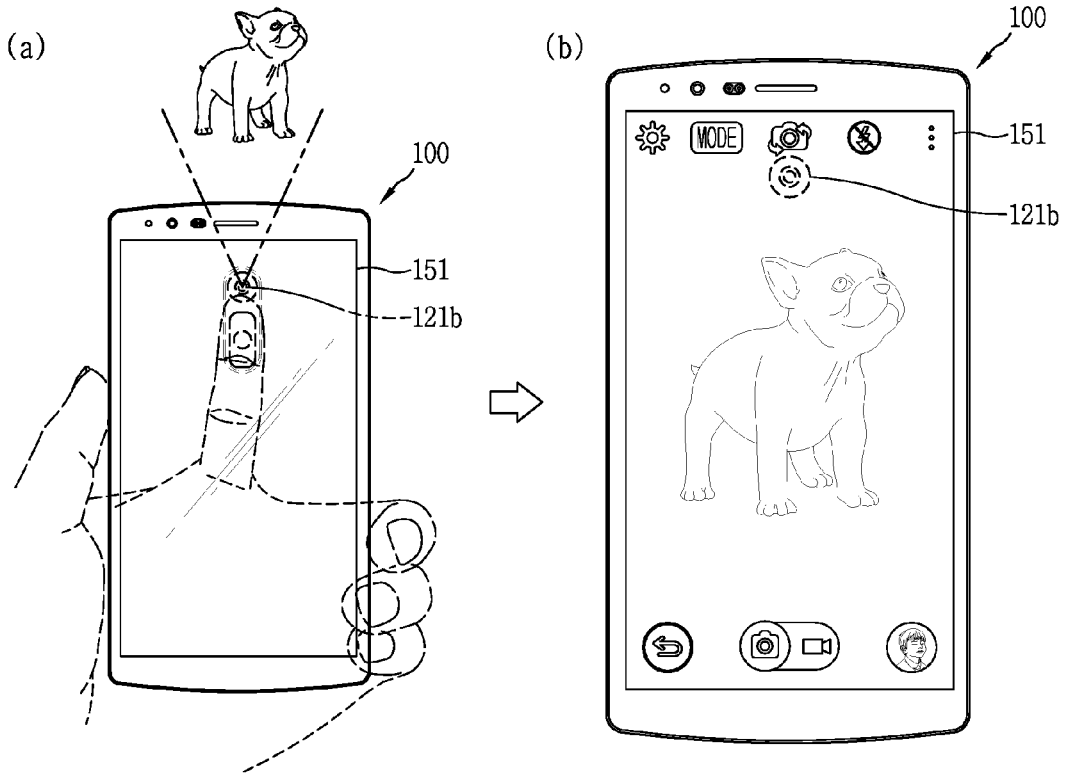


FIG. 6A

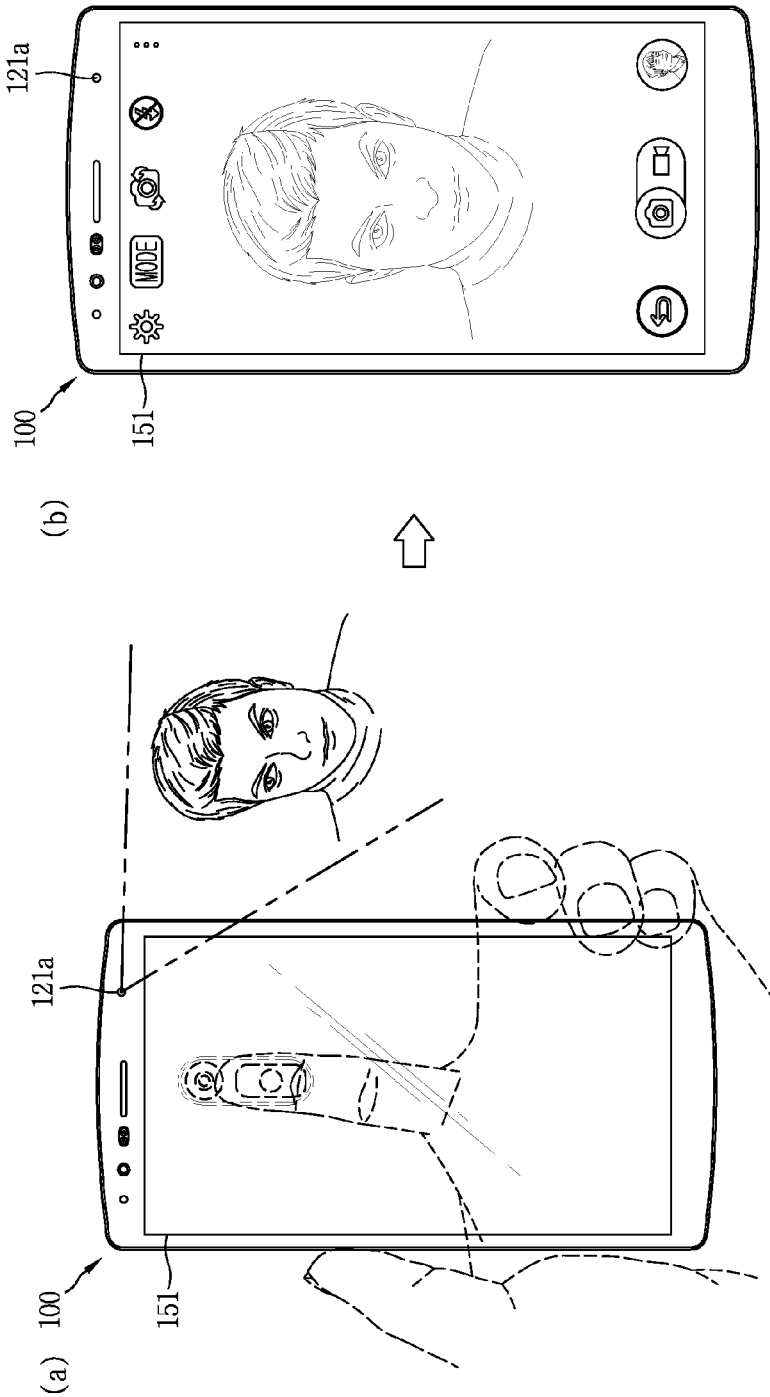


FIG. 6B

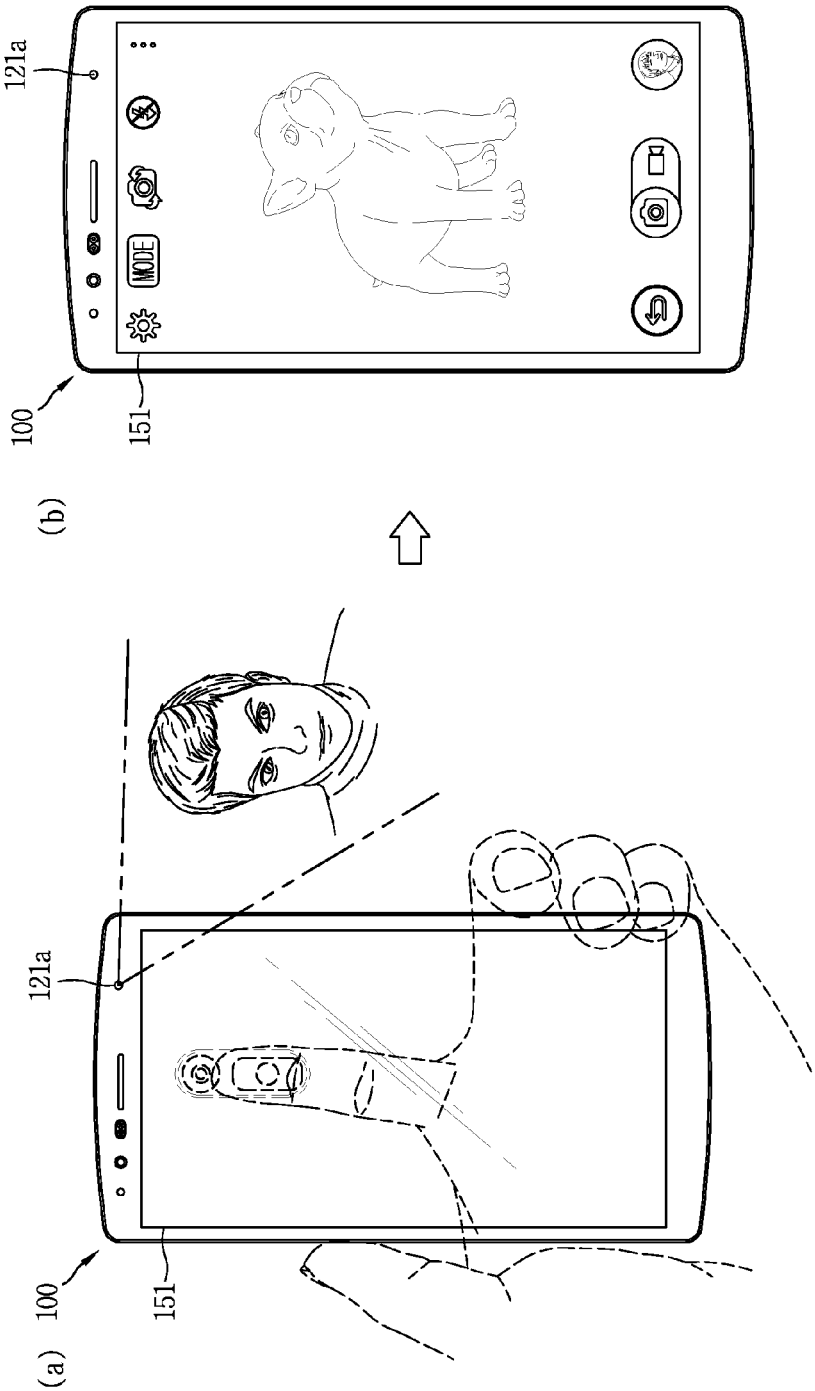


FIG. 7A

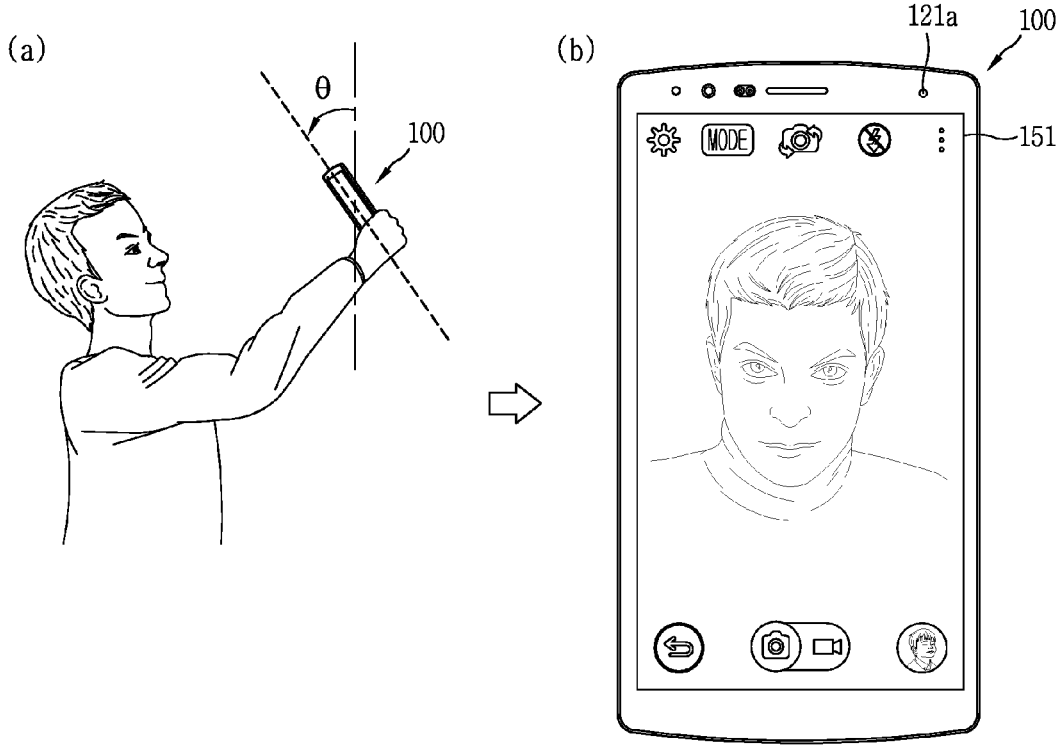


FIG. 7B

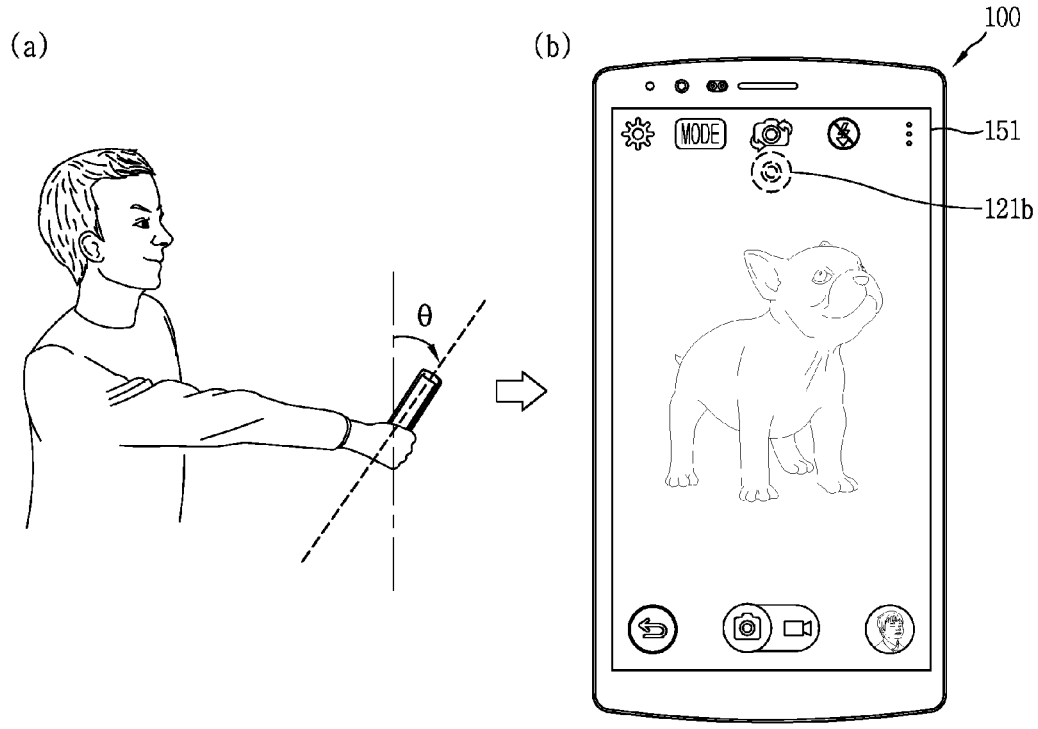


FIG. 8A

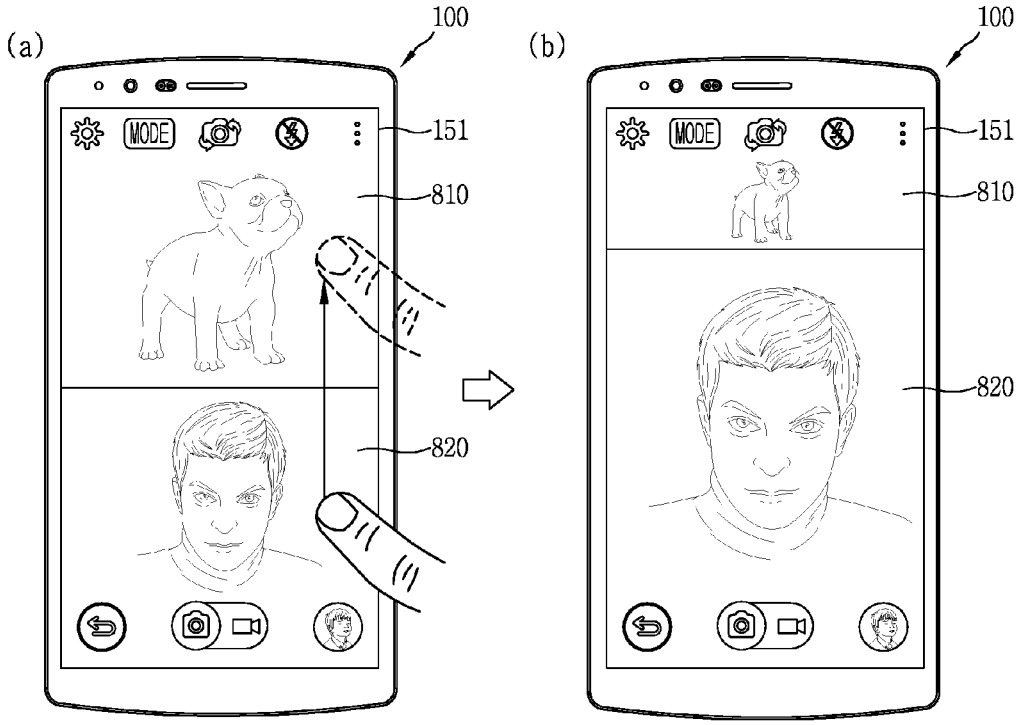


FIG. 8B

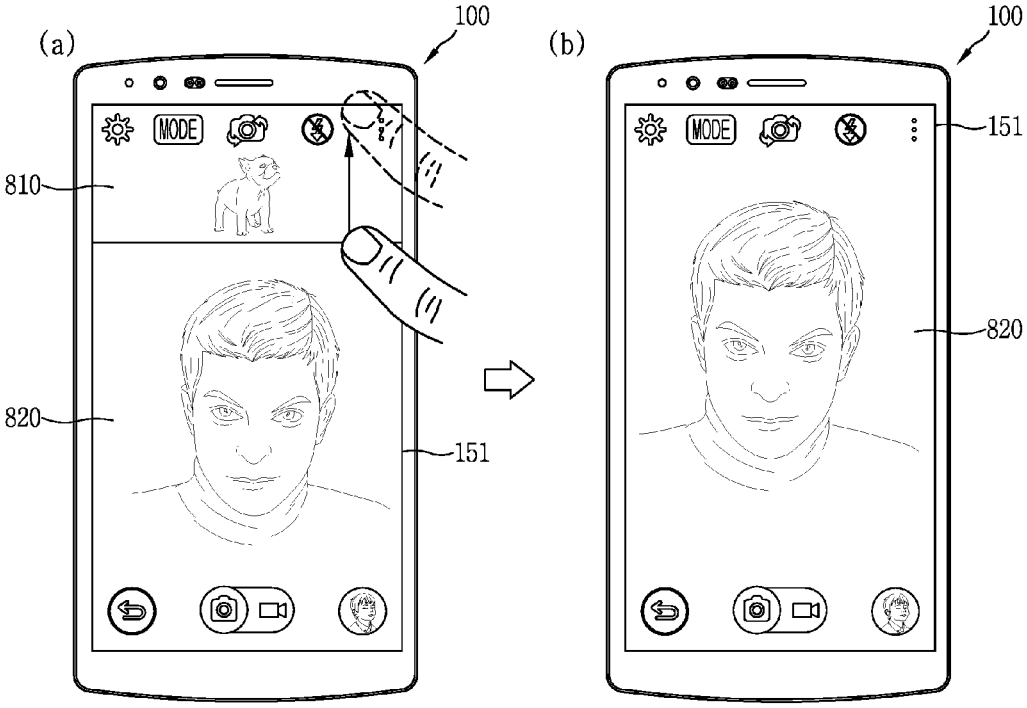


FIG. 9A

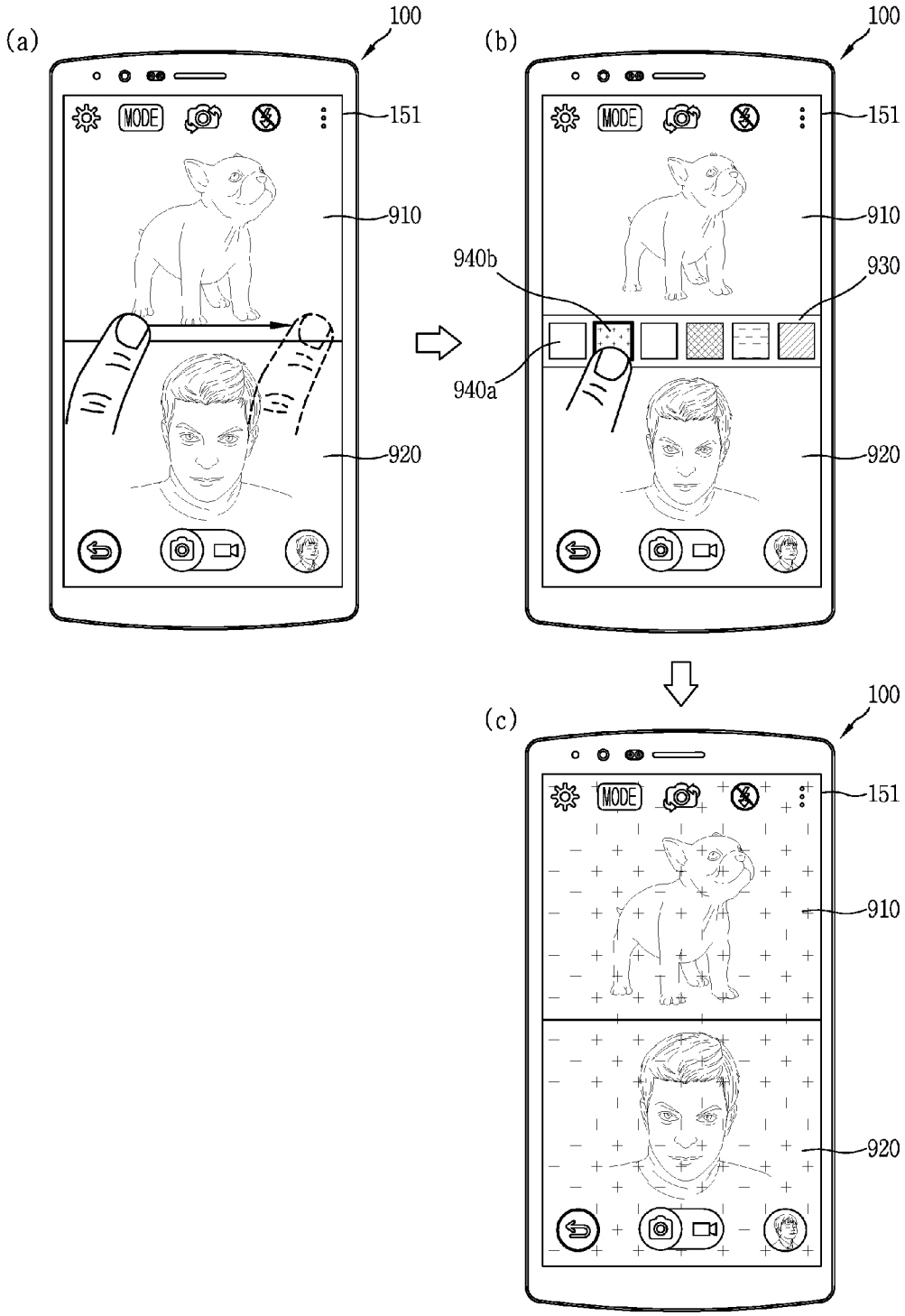

(a)
100
MODE
151
910
920
(b)
100
MODE
151
910
940b
930
940a
920
(c)
100
MODE
151
910
920

FIG. 9B

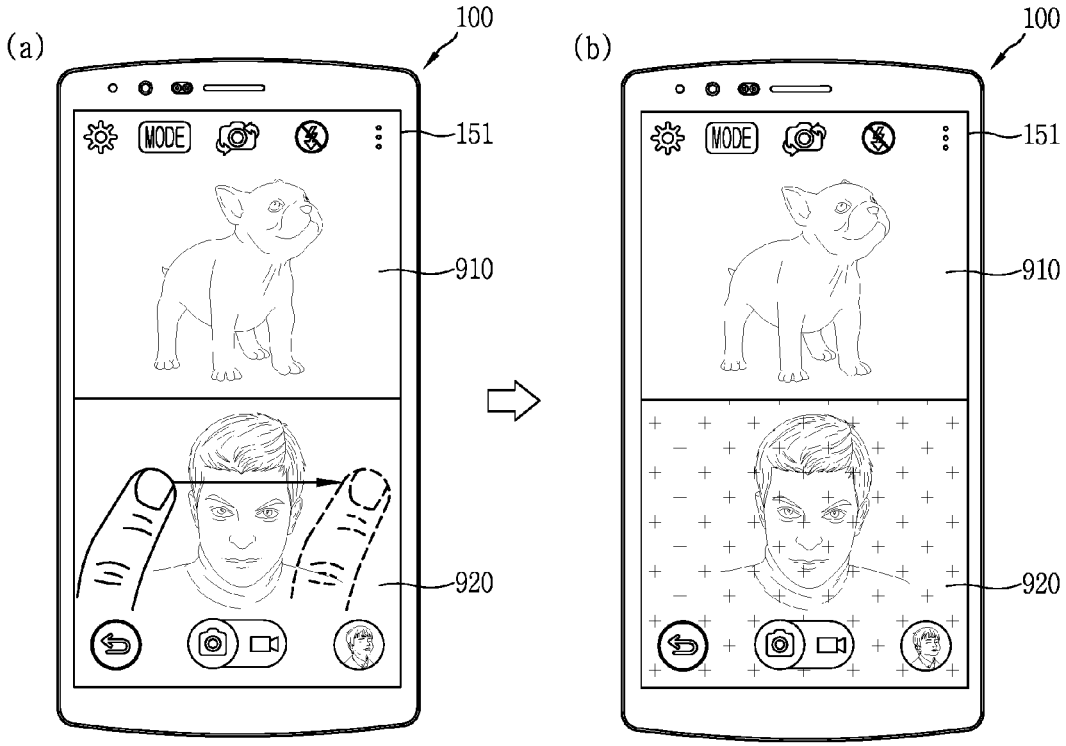


FIG. 10A

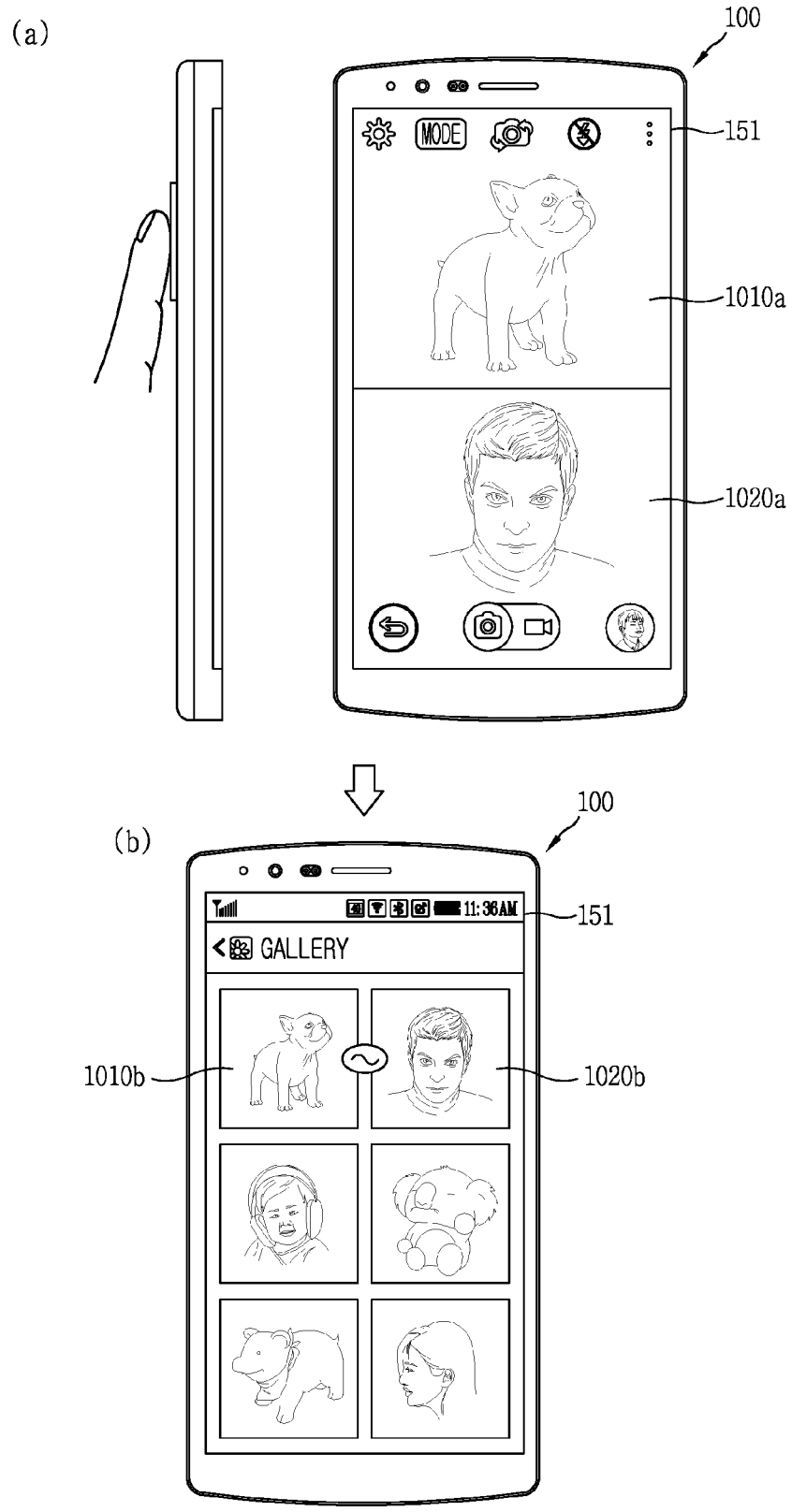

(a)
100
MODE
151
1010a
1020a
(b)
100
11:36AM
151
GALLERY
1010b
1020b

FIG. 10B

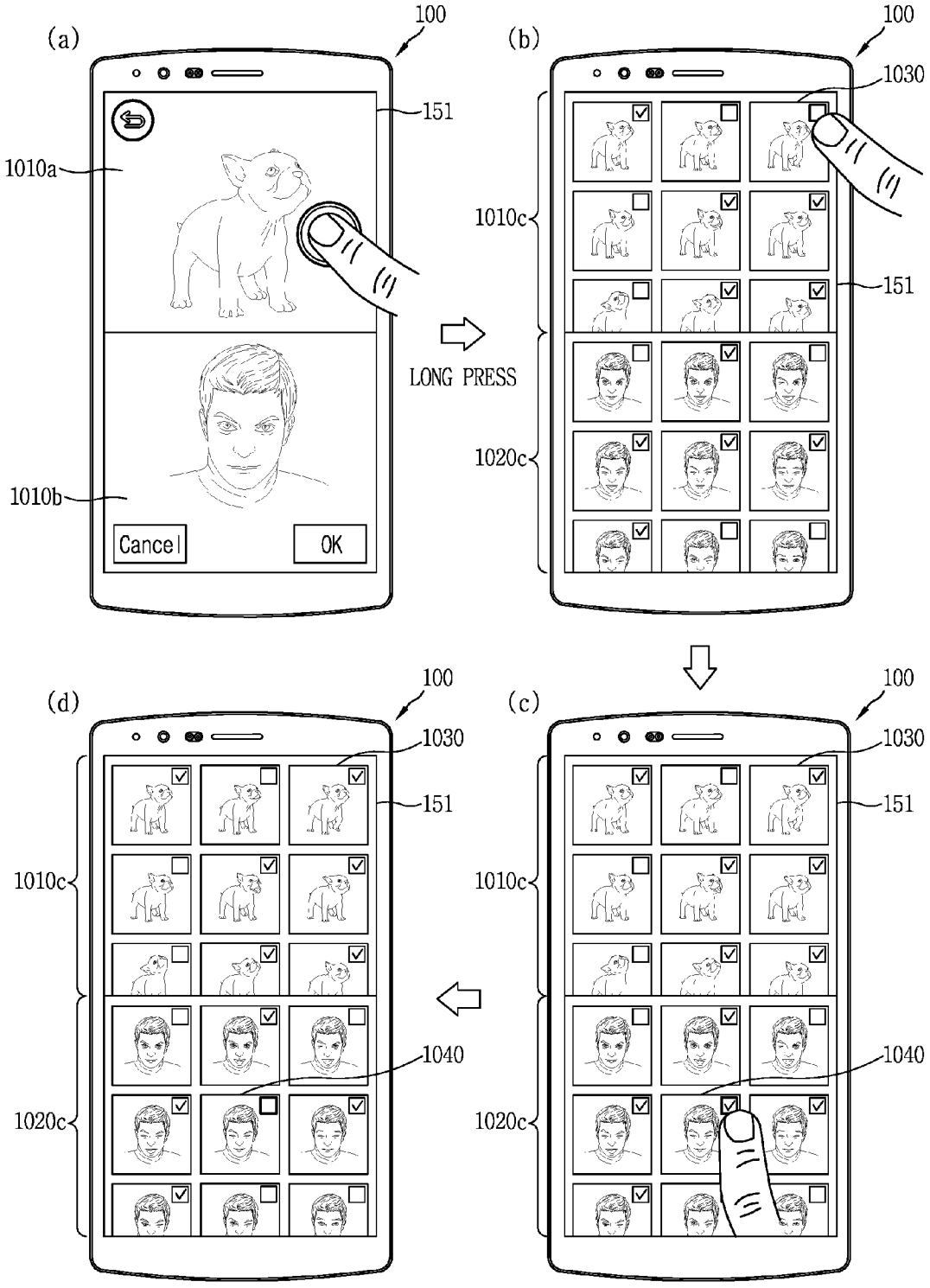

(a)
100
151
1010a
1010b
Cancel
OK
LONG PRESS
(b)
100
1030
1010c
151
1020c
(c)
100
1030
151
1010c
1040
1020c
(d)
100
1030
151
1010c
1040
1020c

FIG. 10C

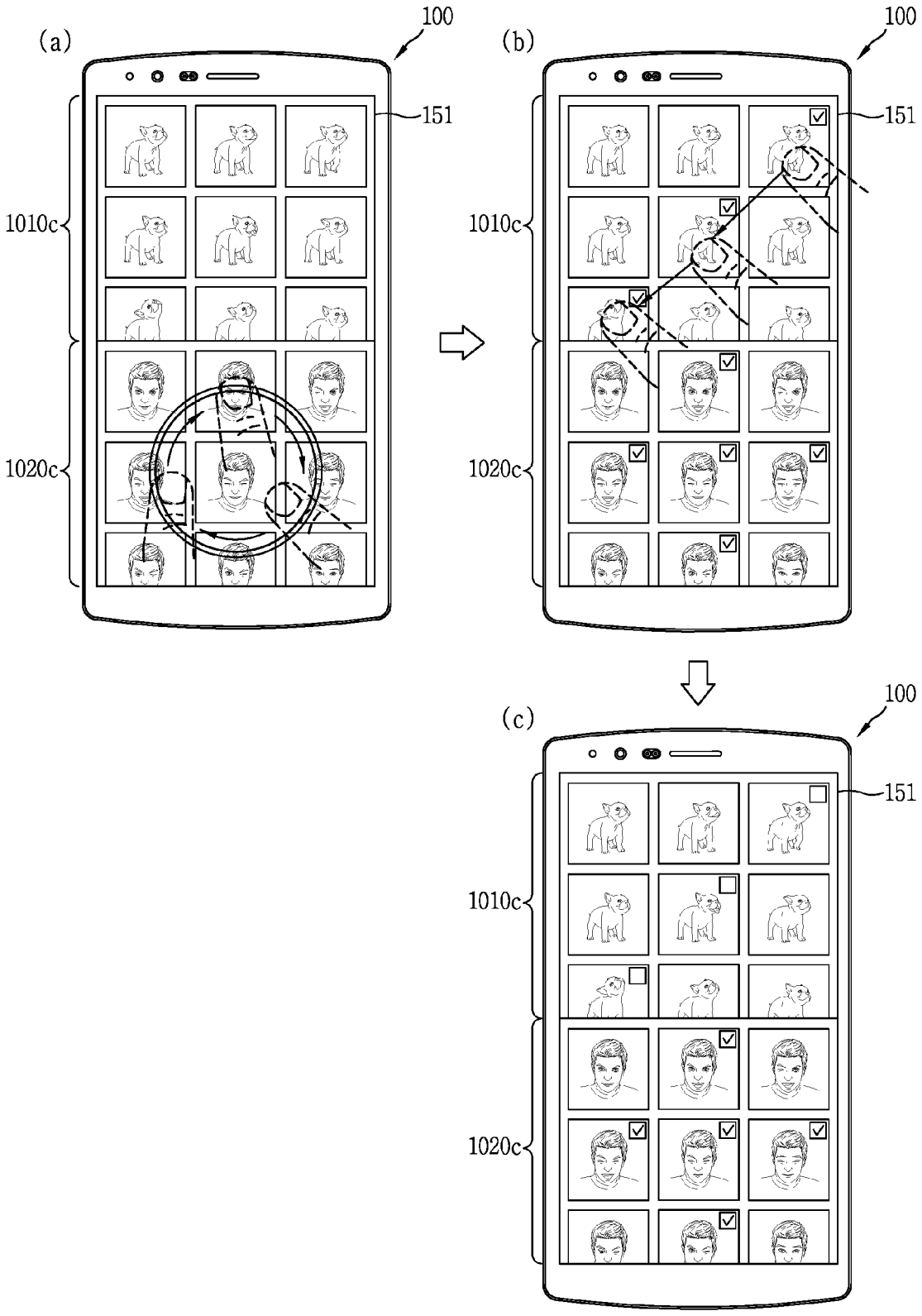

(a)
100
151
1010c
1020c
(b)
100
151
1010c
1020c
(c)
100
151
1010c
1020c

FIG. 10D

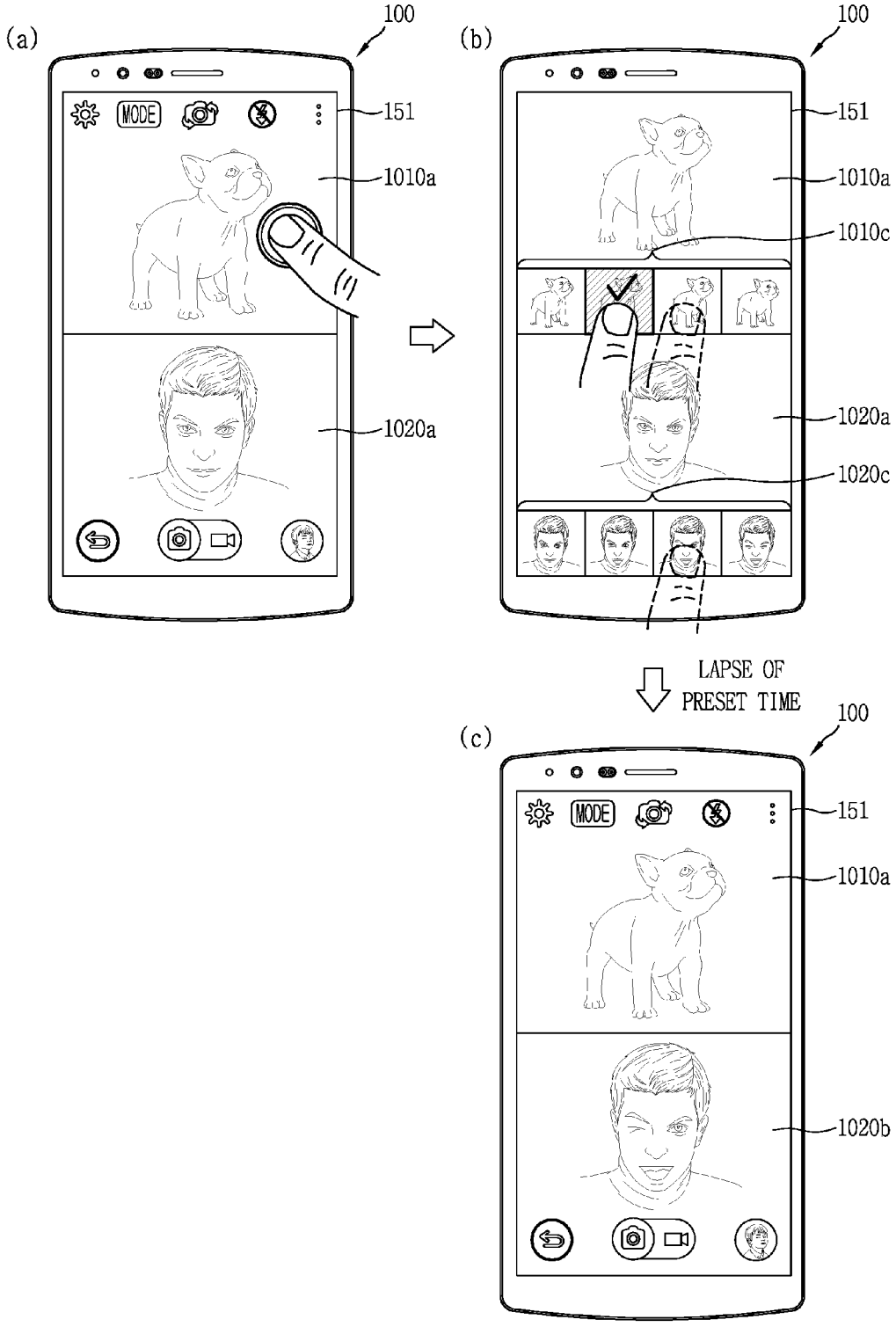

(a)
100
MODE
151
1010a
1020a
(b)
100
151
1010a
1010c
1020a
1020c
LAPSE OF PRESET TIME
(c)
100
MODE
151
1010a
1020b

FIG. 11A

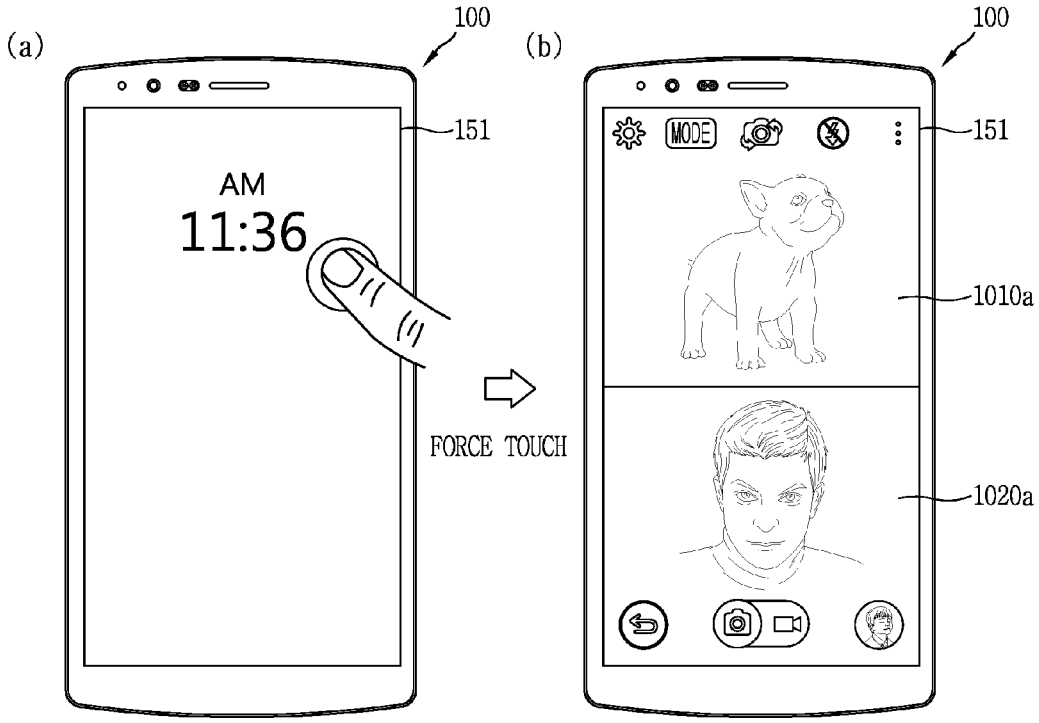


FIG. 11B

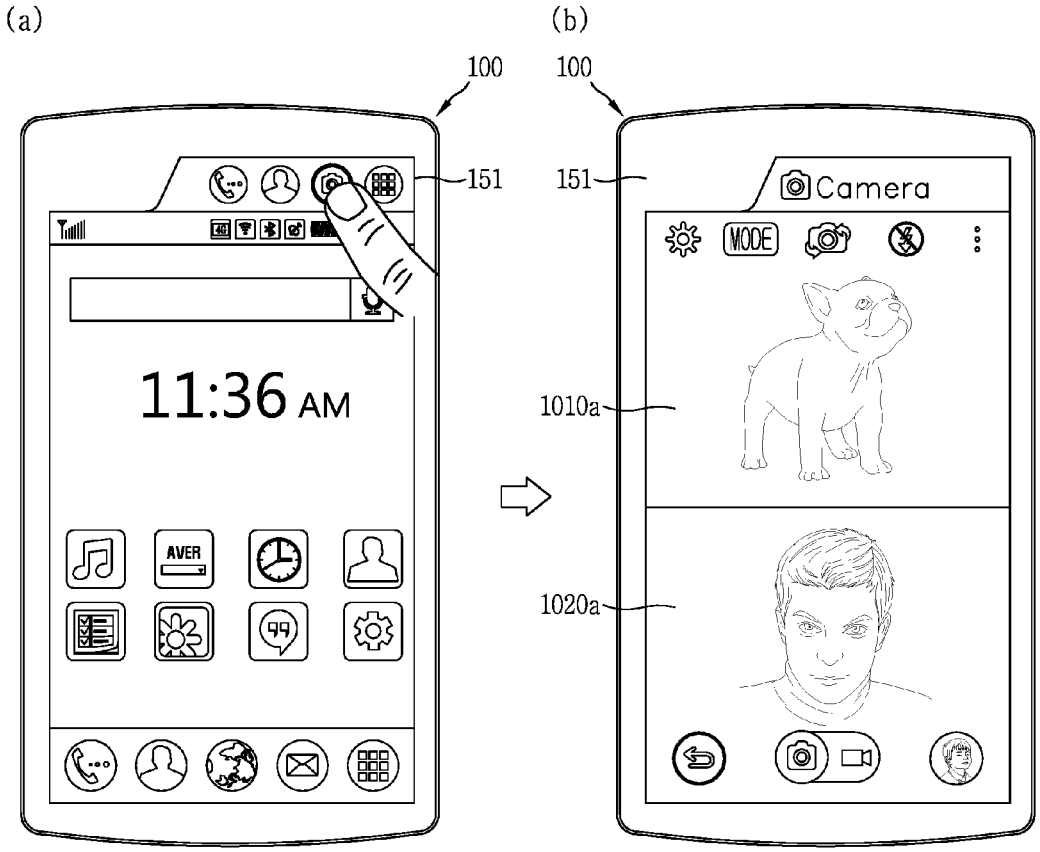


FIG. 12

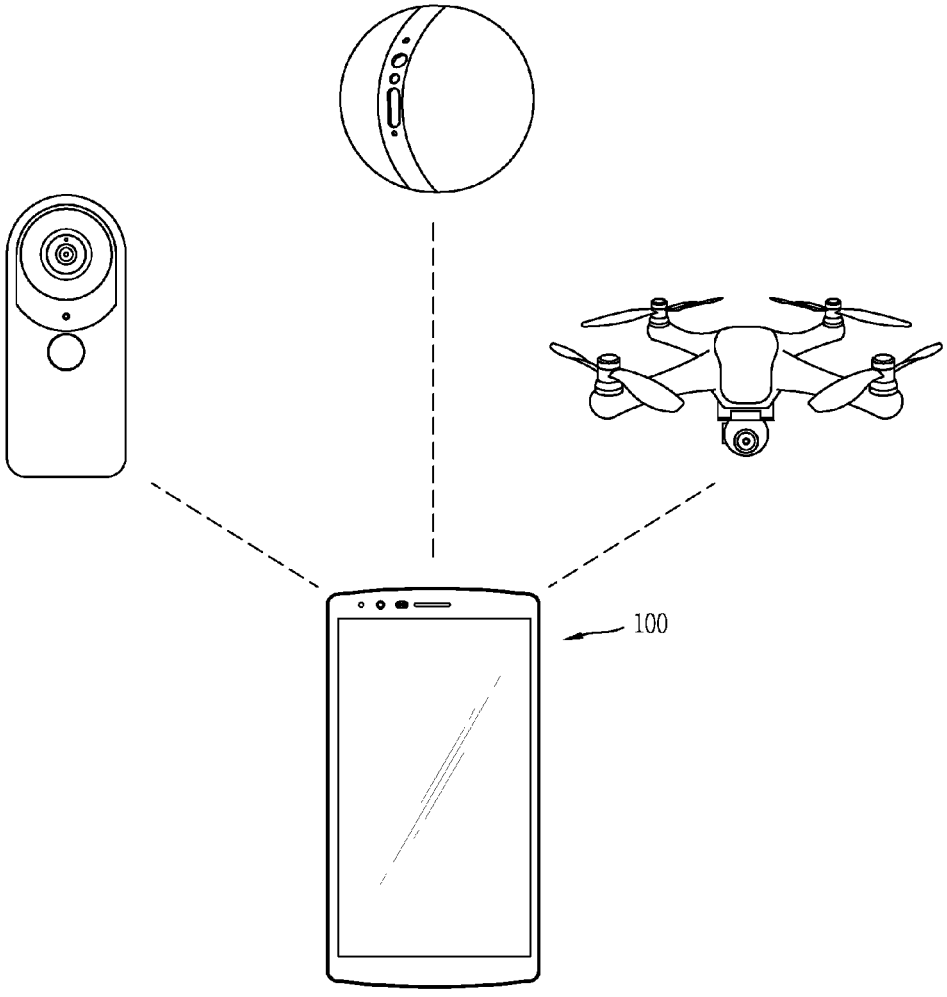


FIG. 13A

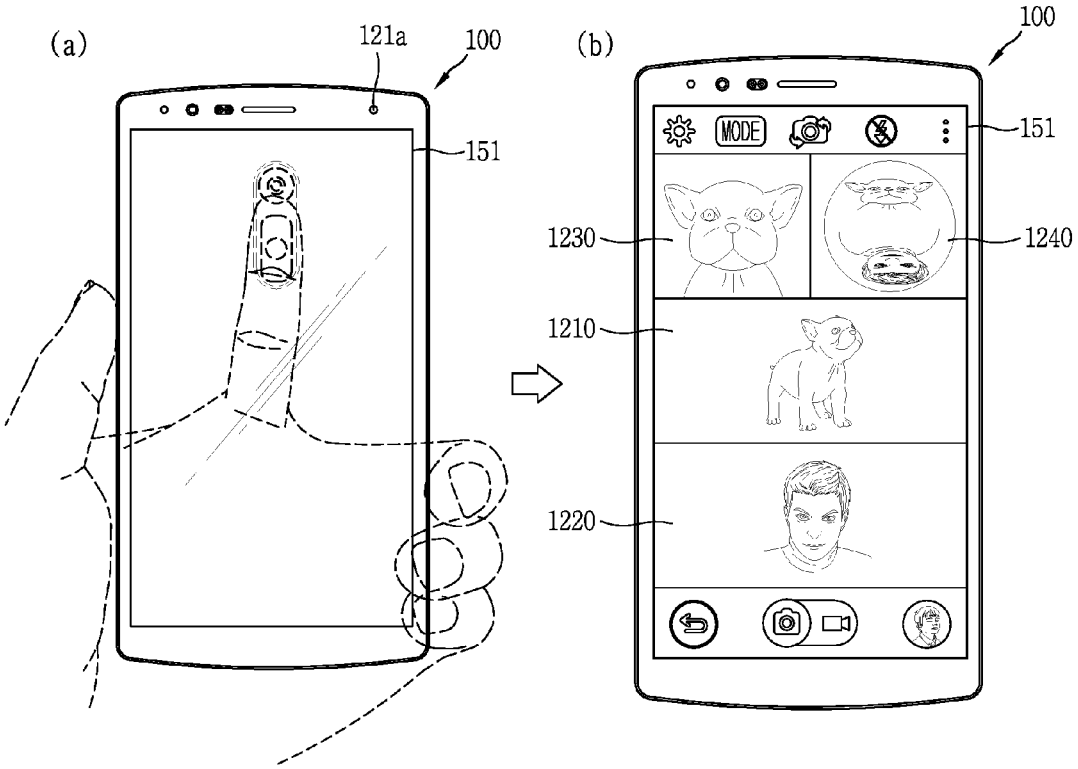


FIG. 13B

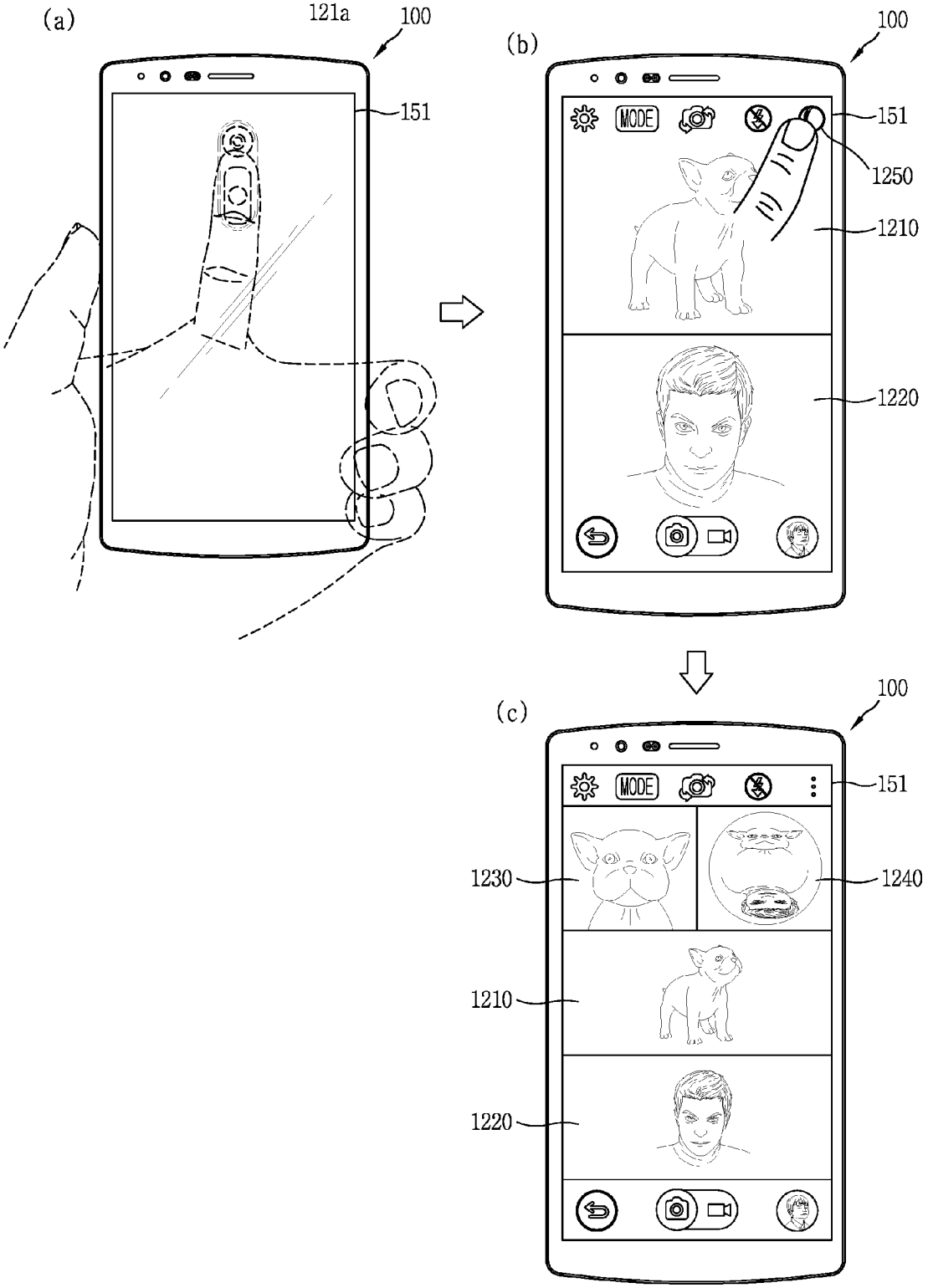

(a)
121a
100
151
(b)
100
MODE
151
1250
1210
1220
(c)
100
MODE
151
1230
1240
1210
1220

FIG. 14A

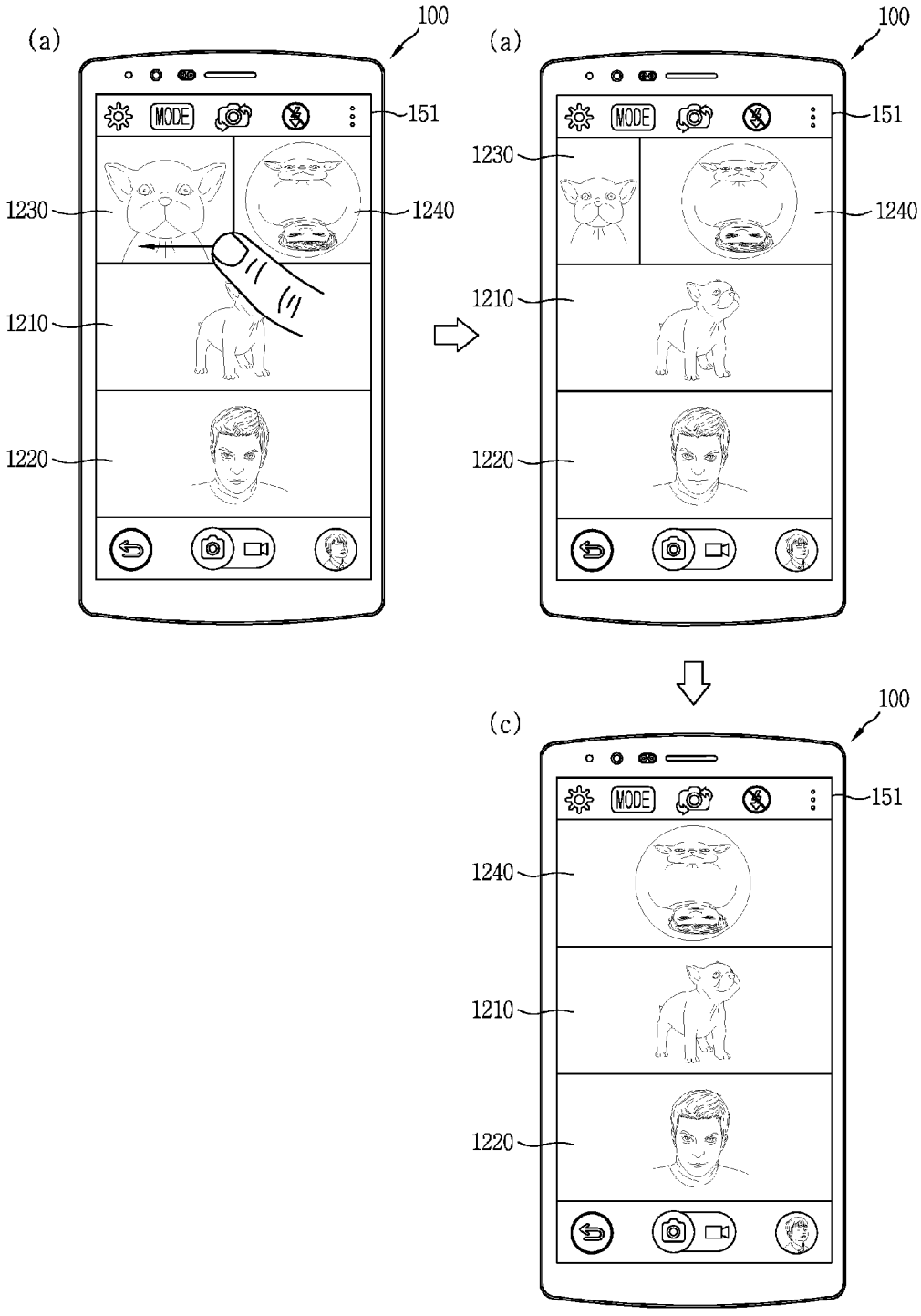
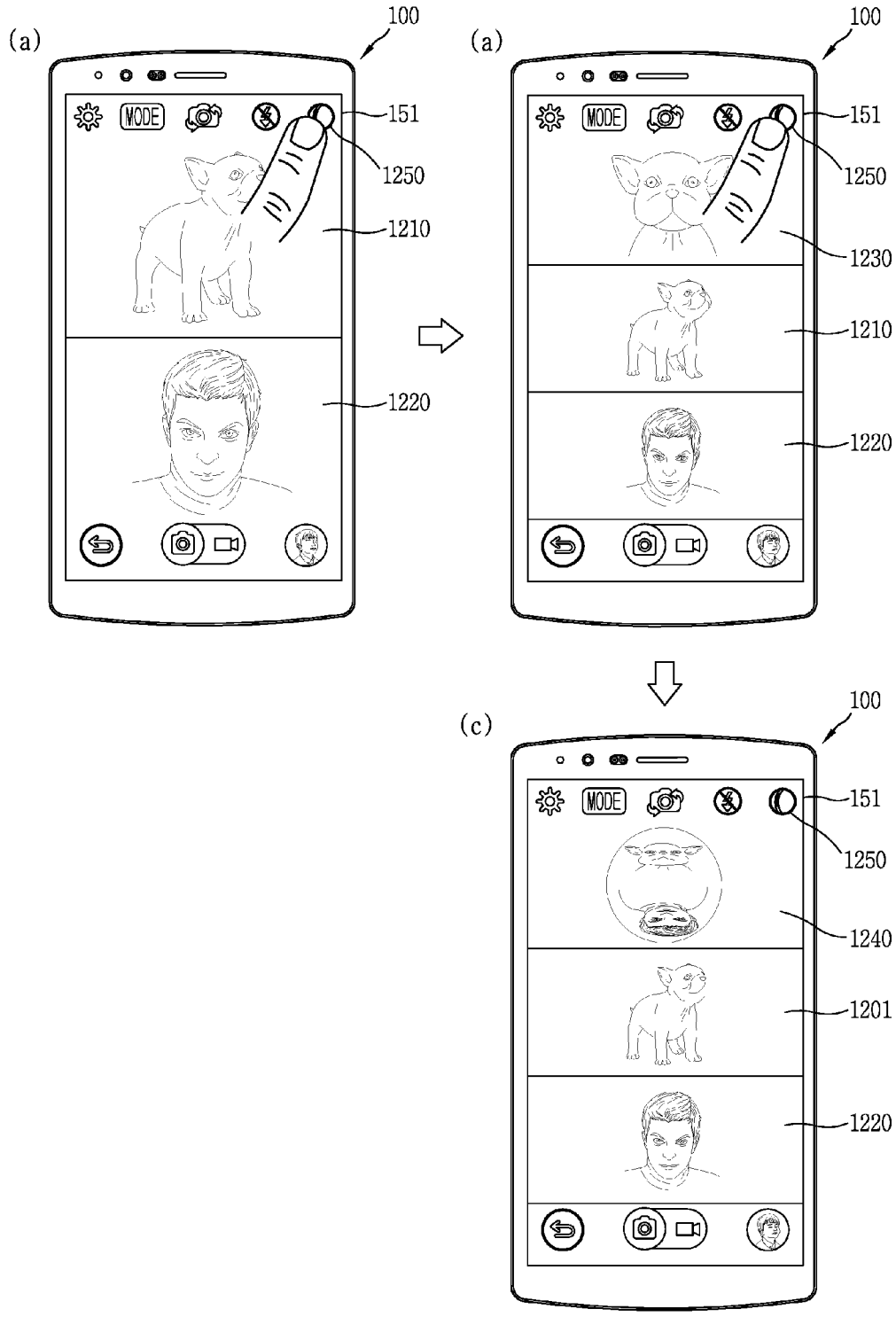

(a)
100
MODE
151
1230
1240
1210
1220
(a)
100
MODE
151
1230
1240
1210
1220
(c)
100
MODE
151
1240
1210
1220

FIG. 14B


(a)
100
MODE
151
1250
1210
1220
(a)
100
MODE
151
1250
1230
1210
1220
(c)
100
MODE
151
1250
1240
1201
1220

MOBILE TERMINAL AND METHOD FOR CONTROLLING THE SAME

CROSS-REFERENCE TO RELATED APPLICATION

[0001] Pursuant to 35 U.S.C. §119(a), this application claims the benefit of an earlier filing date of and the right of priority to Korean Application No. 10-2016-0108413, filed on Aug. 25, 2016, the contents of which are incorporated by reference herein in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0002] This specification relates to a mobile terminal which is capable of capturing an image, and a method for controlling the same.

2. Background of the Invention

[0003] Terminals may be generally classified as mobile/portable terminals or stationary terminals according to their mobility. Mobile terminals may also be classified as handheld terminals or vehicle mounted terminals according to whether or not a user can directly carry the terminal.

[0004] Mobile terminals have become increasingly more functional. Examples of such functions include data and voice communications, capturing images and video via a camera, recording audio, playing music files via a speaker system, and displaying images and video on a display. Some mobile terminals include additional functionality which supports game playing, while other terminals are configured as multimedia players. More recently, mobile terminals have been configured to receive broadcast and multicast signals which permit viewing of content such as videos and television programs.

[0005] Efforts are ongoing to support and increase the functionality of mobile terminals. Such efforts include software and hardware improvements, as well as changes and improvements in the structural components.

[0006] Recently, in the field of a camera for a mobile terminal, various camera-related functions are being developed to satisfy user' needs to execute a camera more rapidly and easily in order to capture moments in the form of still images or moving images (video).

[0007] As one of the functions, a function to immediately enter a camera mode in a locked state is being developed in various manners. However, in the case of immediately entering a camera mode in a locked state, a camera having a user's desired capturing direction may not be selected. This may cause a difficulty in satisfying user's needs to capture moments.

SUMMARY OF THE INVENTION

[0008] Therefore, an aspect of the detailed description is to provide a mobile terminal capable of solving a problem that a user cannot select a capturing direction of an activated camera when executing a camera function.

[0009] Another aspect of the detailed description is to provide a mobile terminal capable of determining a capturing direction of a camera based on a user's intention.

[0010] To achieve these and other advantages and in accordance with the purpose of this specification, as embodied and broadly described herein, there is provided a mobile terminal, including: a terminal body; a plurality of cameras disposed on different regions of the terminal body in a spaced manner, and having different capturing directions; a display unit configured to display video information; and a controller configured to execute a different control in response to a different input applied in a locked state where reception of a user's input is limited, wherein the controller displays a lock screen indicating a locked state, based on a first input received in the locked state, and wherein the controller displays a plurality of preview images received from the plurality of cameras, on the display unit, based on a second input received in the locked state.

[0011] In an embodiment, the plurality of cameras may include: a first camera disposed on a front surface of the terminal body, and having a first capturing direction; and a second camera disposed on a rear surface of the terminal body, and having a second capturing direction, and wherein the controller simultaneously displays preview images received from the first and second cameras when the second input is received.

[0012] In an embodiment, in a displayed state of a plurality of preview images on the display unit, the controller may simultaneously capture the plurality of preview images in response to a touch input received on an arbitrary region of the display unit.

[0013] In an embodiment, the mobile terminal may further include a motion sensor configured to sense a movement of a subject. When the second input is applied, the controller may display, on the display unit, a preview image of a specific camera which is disposed in a direction where a movement of a subject has been sensed, among the plurality of cameras.

[0014] In an embodiment, the mobile terminal may further include an eyeline sensor configured to sense a user's eyeline. When the second input is applied, the controller may display, on the display unit, a preview image of a specific camera among the plurality of cameras, based on a user's eyeline direction.

[0015] In an embodiment, when the user's eyeline direction is toward a specific camera, the controller may display a preview image of the specific camera on the display unit. When the user's eyeline direction is not toward a specific camera, the controller may display, on the display unit, a preview image of another camera positioned on an opposite side to the specific camera among the plurality of cameras.

[0016] In an embodiment, the mobile terminal may further include a gradient sensor configured to sense a gradient of the terminal body. The controller may display, on the display unit, a preview image of a specific camera which is disposed in a direction where the terminal body has been tilted, among the plurality of cameras.

[0017] In an embodiment, in a displayed state of a plurality of preview images on the display unit, if a touch input is applied to a boundary region between the preview images, the controller may change a display size of the plurality of preview images.

[0018] In an embodiment, when a display size of a preview image among the plurality of preview images is decreased to a value less than a preset size, the controller may control a camera which has transmitted the preview image, such that image information may not be received from the camera which has transmitted the preview image.

[0019] In an embodiment, when preview images are captured by the plurality of cameras, the controller may display

the captured preview images on the display unit. And the controller may display a guide object on at least one recommended image among the captured preview images, in an overlapped manner.

[0020] In an embodiment, for the recommended images, the controller may detect images determined to have moved based on a reference image among the captured preview images, through an image analysis.

[0021] In an embodiment, when the plurality of preview images are simultaneously captured, the controller may store the plurality of captured preview images in a memory. In a case where images stored in the memory are output to the display unit, the controller may display the plurality of captured preview images so as to be visually-distinguishable from other images stored in the memory, in order to indicate that the plurality of preview images have been simultaneously captured.

[0022] In an embodiment, the controller may display a guide object indicating that the plurality of preview images have been simultaneously captured, in an overlapped manner, on display regions of the plurality of preview images.

[0023] In an embodiment, the mobile terminal may further include a wireless communication unit configured to receive an image from an external camera through communication. When the second input is received, the controller may receive a preview image of the external camera through the wireless communication unit, and may display the preview image of the external camera together with the plurality of preview images received from the plurality of cameras.

[0024] In an embodiment, if a display size of the preview image of the external camera is reduced to a value less than a preset size, the controller may release a communication connection state with the external camera.

[0025] Further scope of applicability of the present application will become more apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from the detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate exemplary embodiments and together with the description serve to explain the principles of the invention.

[0027] In the drawings:

[0028] FIG. **1**A is a block diagram illustrating a mobile terminal according to the present invention;

[0029] FIGS. **1**B and **1**C are conceptual views illustrating an example of a mobile terminal according to the present invention, which are viewed from different directions;

[0030] FIG. **2** is a flowchart illustrating a method of executing a camera capturing function in a mobile terminal according to the present invention;

[0031] FIGS. **3**A and **3**B are conceptual views illustrating an executed state of a camera capturing function, in a locked state;

[0032] FIGS. **4**A to **4**C are conceptual views illustrating image capturing using a camera capturing function;

[0033] FIGS. **5**A and **5**B are conceptual views illustrating a method of setting a camera to be activated according to a condition related to a subject's movement;

[0034] FIGS. **6**A and **6**B are conceptual views illustrating a method of setting a camera to be activated according to a condition related to user's eyeline information;

[0035] FIGS. **7**A and **7**B are conceptual views illustrating a method of setting a camera to be activated according to a condition related to a tilted state of a terminal body;

[0036] FIGS. **8**A and **8**B are conceptual views illustrating a method of controlling a size of a preview image;

[0037] FIGS. **9**A and **9**B are conceptual views illustrating a method of setting a filter of an image;

[0038] FIGS. **10**A to **10**D are conceptual views illustrating a method of storing images captured through a camera capturing function;

[0039] FIGS. **11**A and **11**B are conceptual views illustrating different embodiments to execute a camera capturing function, in a mobile terminal according to the present invention; and

[0040] FIGS. **12** to **14**B are conceptual views illustrating a method of executing a camera capturing function using image information received from an external camera.

DETAILED DESCRIPTION OF THE INVENTION

[0041] Description will now be given in detail according to exemplary embodiments disclosed herein, with reference to the accompanying drawings. For the sake of brief description with reference to the drawings, the same or equivalent components may be provided with the same or similar reference numbers, and description thereof will not be repeated. In general, a suffix such as "module" and "unit" may be used to refer to elements or components. Use of such a suffix herein is merely intended to facilitate description of the specification, and the suffix itself is not intended to give any special meaning or function. In the present disclosure, that which is well-known to one of ordinary skill in the relevant art has generally been omitted for the sake of brevity. The accompanying drawings are used to help easily understand various technical features and it should be understood that the embodiments presented herein are not limited by the accompanying drawings. As such, the present disclosure should be construed to extend to any alterations, equivalents and substitutes in addition to those which are particularly set out in the accompanying drawings.

[0042] It will be understood that although the terms first, second, etc. may be used herein to describe various elements, these elements should not be limited by these terms. These terms are generally only used to distinguish one element from another.

[0043] It will be understood that when an element is referred to as being "connected with" another element, the element can be connected with the other element or intervening elements may also be present. In contrast, when an element is referred to as being "directly connected with" another element, there are no intervening elements present.

[0044] A singular representation may include a plural representation unless it represents a definitely different meaning from the context.

[0045] Terms such as "include" or "has" are used herein and should be understood that they are intended to indicate an existence of several components, functions or steps,

disclosed in the specification, and it is also understood that greater or fewer components, functions, or steps may likewise be utilized.

[0046] Mobile terminals presented herein may be implemented using a variety of different types of terminals. Examples of such terminals include cellular phones, smart phones, user equipment, laptop computers, digital broadcast terminals, personal digital assistants (PDAs), portable multimedia players (PMPs), navigators, portable computers (PCs), slate PCs, tablet PCs, ultra books, wearable devices (for example, smart watches, smart glasses, head mounted displays (HMDs)), and the like.

[0047] By way of non-limiting example only, further description will be made with reference to particular types of mobile terminals. However, such teachings apply equally to other types of terminals, such as those types noted above. In addition, these teachings may also be applied to stationary terminals such as digital TV, desktop computers, and the like.

[0048] Reference is now made to FIGS. **1**A-**1**C, where FIG. **1**A is a block diagram of a mobile terminal in accordance with the present disclosure, and FIGS. **1**B and **1**C are conceptual views of one example of the mobile terminal, viewed from different directions.

[0049] The mobile terminal **100** is shown having components such as a wireless communication unit **110**, an input unit **120**, a sensing unit **140**, an output unit **150**, an interface unit **160**, a memory **170**, a controller **180**, and a power supply unit **190**. It is understood that implementing all of the illustrated components is not a requirement, and that greater or fewer components may alternatively be implemented.

[0050] Referring now to FIG. **1**A, the mobile terminal **100** is shown having wireless communication unit **110** configured with several commonly implemented components. For instance, the wireless communication unit **110** typically includes one or more components which permit wireless communication between the mobile terminal **100** and a wireless communication system or network within which the mobile terminal is located.

[0051] The wireless communication unit **110** typically includes one or more modules which permit communications such as wireless communications between the mobile terminal **100** and a wireless communication system, communications between the mobile terminal **100** and another mobile terminal, communications between the mobile terminal **100** and an external server. Further, the wireless communication unit **110** typically includes one or more modules which connect the mobile terminal **100** to one or more networks.

[0052] To facilitate such communications, the wireless communication unit **110** includes one or more of a broadcast receiving module **111**, a mobile communication module **112**, a wireless Internet module **113**, a short-range communication module **114**, and a location information module **115**.

[0053] The input unit **120** includes a camera **121** for obtaining images or video, a microphone **122**, which is one type of audio input device for inputting an audio signal, and a user input unit **123** (for example, a touch key, a push key, a mechanical key, a soft key, and the like) for allowing a user to input information. Data (for example, audio, video, image, and the like) is obtained by the input unit **120** and may be analyzed and processed by controller **180** according to device parameters, user commands, and combinations thereof.

[0054] The sensing unit **140** is typically implemented using one or more sensors configured to sense internal information of the mobile terminal, the surrounding environment of the mobile terminal, user information, and the like. For example, in FIG. **1**A, the sensing unit **140** is shown having a proximity sensor **141** and an illumination sensor **142**. If desired, the sensing unit **140** may alternatively or additionally include other types of sensors or devices, such as a touch sensor, an acceleration sensor, a magnetic sensor, a G-sensor, a gyroscope sensor, a motion sensor, an RGB sensor, an infrared (IR) sensor, a finger scan sensor, a ultrasonic sensor, an optical sensor (for example, camera **121**), a microphone **122**, a battery gauge, an environment sensor (for example, a barometer, a hygrometer, a thermometer, a radiation detection sensor, a thermal sensor, and a gas sensor, among others), and a chemical sensor (for example, an electronic nose, a health care sensor, a biometric sensor, and the like), to name a few. The mobile terminal **100** may be configured to utilize information obtained from sensing unit **140**, and in particular, information obtained from one or more sensors of the sensing unit **140**, and combinations thereof.

[0055] The output unit **150** is typically configured to output various types of information, such as audio, video, tactile output, and the like. The output unit **150** is shown having a display unit **151**, an audio output module **152**, a haptic module **153**, and an optical output module **154**.

[0056] The display unit **151** may have an inter-layered structure or an integrated structure with a touch sensor in order to facilitate a touch screen. The touch screen may provide an output interface between the mobile terminal **100** and a user, as well as function as the user input unit **123** which provides an input interface between the mobile terminal **100** and the user.

[0057] The interface unit **160** serves as an interface with various types of external devices that can be coupled to the mobile terminal **100**. The interface unit **160**, for example, may include any of wired or wireless ports, external power supply ports, wired or wireless data ports, memory card ports, ports for connecting a device having an identification module, audio input/output (I/O) ports, video I/O ports, earphone ports, and the like. In some cases, the mobile terminal **100** may perform assorted control functions associated with a connected external device, in response to the external device being connected to the interface unit **160**.

[0058] The memory **170** is typically implemented to store data to support various functions or features of the mobile terminal **100**. For instance, the memory **170** may be configured to store application programs executed in the mobile terminal **100**, data or instructions for operations of the mobile terminal **100**, and the like. Some of these application programs may be downloaded from an external server via wireless communication. Other application programs may be installed within the mobile terminal **100** at time of manufacturing or shipping, which is typically the case for basic functions of the mobile terminal **100** (for example, receiving a call, placing a call, receiving a message, sending a message, and the like). It is common for application programs to be stored in the memory **170**, installed in the mobile terminal **100**, and executed by the controller **180** to perform an operation (or function) for the mobile terminal **100**.

[0059] The controller **180** typically functions to control overall operation of the mobile terminal **100**, in addition to

the operations associated with the application programs. The controller **180** may provide or process information or functions appropriate for a user by processing signals, data, information and the like, which are input or output by the various components depicted in FIG. **1**A, or activating application programs stored in the memory **170**. As one example, the controller **180** controls some or all of the components illustrated in FIGS. **1**A-**1**C according to the execution of an application program that have been stored in the memory **170**.

[0060] The power supply unit **190** can be configured to receive external power or provide internal power in order to supply appropriate power required for operating elements and components included in the mobile terminal **100**. The power supply unit **190** may include a battery, and the battery may be configured to be embedded in the terminal body, or configured to be detachable from the terminal body.

[0061] Referring still to FIG. **1**A, various components depicted in this figure will now be described in more detail. Regarding the wireless communication unit **110**, the broadcast receiving module **111** is typically configured to receive a broadcast signal and/or broadcast associated information from an external broadcast managing entity via a broadcast channel. The broadcast channel may include a satellite channel, a terrestrial channel, or both. In some embodiments, two or more broadcast receiving modules **111** may be utilized to facilitate simultaneously receiving of two or more broadcast channels, or to support switching among broadcast channels.

[0062] The mobile communication module **112** can transmit and/or receive wireless signals to and from one or more network entities. Typical examples of a network entity include a base station, an external mobile terminal, a server, and the like. Such network entities form part of a mobile communication network, which is constructed according to technical standards or communication methods for mobile communications (for example, Global System for Mobile Communication (GSM), Code Division Multi Access (CDMA), CDMA2000(Code Division Multi Access 2000), Wideband CDMA (WCDMA), High Speed Downlink Packet access (HSDPA), Long Term Evolution (LTE) , and the like).

[0063] Examples of wireless signals transmitted and/or received via the mobile communication module **112** include audio call signals, video (telephony) call signals, or various formats of data to support communication of text and multimedia messages.

[0064] The wireless Internet module **113** is configured to facilitate wireless Internet access. This module may be internally or externally coupled to the mobile terminal **100**. The wireless Internet module **113** may transmit and/or receive wireless signals via communication networks according to wireless Internet technologies.

[0065] Examples of such wireless Internet access include Wireless LAN (WLAN), Wireless Fidelity (Wi-Fi), Wi-Fi Direct, Digital Living Network Alliance (DLNA), Wireless Broadband (WiBro), Worldwide Interoperability for Microwave Access (WiMAX), High Speed Downlink Packet Access (HSDPA), Long Term Evolution (LTE), and the like. The wireless Internet module **113** may transmit/receive data according to one or more of such wireless Internet technologies, and other Internet technologies as well.

[0066] In some embodiments, when the wireless Internet access is implemented according to, for example, WiBro, HSDPA, GSM, CDMA, WCDMA, LTE and the like, as part of a mobile communication network, the wireless Internet module **113** performs such wireless Internet access. As such, the Internet module **113** may cooperate with, or function as, the mobile communication module **112**.

[0067] The short-range communication module **114** is configured to facilitate short-range communications. Suitable technologies for implementing such short-range communications include BLUETOOTH™, Radio Frequency IDentification (RFID), Infrared Data Association (IrDA), Ultra-WideBand (UWB), ZigBee, Near Field Communication (NFC), Wireless-Fidelity (Wi-Fi), Wi-Fi Direct, Wireless USB(Wireless Universal Serial Bus), and the like. The short-range communication module **114** in general supports wireless communications between the mobile terminal **100** and a wireless communication system, communications between the mobile terminal **100** and another mobile terminal **100**, or communications between the mobile terminal and a network where another mobile terminal **100** (or an external server) is located, via wireless area networks. One example of the wireless area networks is a wireless personal area networks.

[0068] In some embodiments, another mobile terminal (which may be configured similarly to mobile terminal **100**) may be a wearable device, for example, a smart watch, a smart glass or a head mounted display (HMD), which is able to exchange data with the mobile terminal **100** (or otherwise cooperate with the mobile terminal **100**). The short-range communication module **114** may sense or recognize the wearable device, and permit communication between the wearable device and the mobile terminal **100**. In addition, when the sensed wearable device is a device which is authenticated to communicate with the mobile terminal **100**, the controller **180**, for example, may cause transmission of data processed in the mobile terminal **100** to the wearable device via the short-range communication module **114**. Hence, a user of the wearable device may use the data processed in the mobile terminal **100** on the wearable device. For example, when a call is received in the mobile terminal **100**, the user may answer the call using the wearable device. Also, when a message is received in the mobile terminal **100**, the user can check the received message using the wearable device.

[0069] The location information module **115** is generally configured to detect, calculate, derive or otherwise identify a position of the mobile terminal. As an example, the location information module **115** includes a Global Position System (GPS) module, a Wi-Fi module, or both. If desired, the location information module **115** may alternatively or additionally function with any of the other modules of the wireless communication unit **110** to obtain data related to the position of the mobile terminal. As one example, when the mobile terminal uses a GPS module, a position of the mobile terminal may be acquired using a signal sent from a GPS satellite. As another example, when the mobile terminal uses the Wi-Fi module, a position of the mobile terminal can be acquired based on information related to a wireless access point (AP) which transmits or receives a wireless signal to or from the Wi-Fi module.

[0070] The input unit **120** may be configured to permit various types of input to the mobile terminal **120**. Examples of such input include audio, image, video, data, and user input. Image and video input is often obtained using one or more cameras **121**. Such cameras **121** may process image

frames of still pictures or video obtained by image sensors in a video or image capture mode. The processed image frames can be displayed on the display unit **151** or stored in memory **170**. In some cases, the cameras **121** may be arranged in a matrix configuration to permit a plurality of images having various angles or focal points to be input to the mobile terminal **100**. As another example, the cameras **121** may be located in a stereoscopic arrangement to acquire left and right images for implementing a stereoscopic image.

[0071] The microphone **122** is generally implemented to permit audio input to the mobile terminal **100**. The audio input can be processed in various manners according to a function being executed in the mobile terminal **100**. If desired, the microphone **122** may include assorted noise removing algorithms to remove unwanted noise generated in the course of receiving the external audio.

[0072] The user input unit **123** is a component that permits input by a user. Such user input may enable the controller **180** to control operation of the mobile terminal **100**. The user input unit **123** may include one or more of a mechanical input element (for example, a key, a button located on a front and/or rear surface or a side surface of the mobile terminal **100**, a dome switch, a jog wheel, a jog switch, and the like), or a touch-sensitive input, among others. As one example, the touch-sensitive input may be a virtual key or a soft key, which is displayed on a touch screen through software processing, or a touch key which is located on the mobile terminal at a location that is other than the touch screen. On the other hand, the virtual key or the visual key may be displayed on the touch screen in various shapes, for example, graphic, text, icon, video, or a combination thereof.

[0073] The sensing unit **140** is generally configured to sense one or more of internal information of the mobile terminal, surrounding environment information of the mobile terminal, user information, or the like. The controller **180** generally cooperates with the sending unit **140** to control operation of the mobile terminal **100** or execute data processing, a function or an operation associated with an application program installed in the mobile terminal based on the sensing provided by the sensing unit **140**. The sensing unit **140** may be implemented using any of a variety of sensors, some of which will now be described in more detail.

[0074] The proximity sensor **141** may include a sensor to sense presence or absence of an object approaching a surface, or an object located near a surface, by using an electromagnetic field, infrared rays, or the like without a mechanical contact. The proximity sensor **141** may be arranged at an inner region of the mobile terminal covered by the touch screen, or near the touch screen.

[0075] The proximity sensor **141**, for example, may include any of a transmissive type photoelectric sensor, a direct reflective type photoelectric sensor, a mirror reflective type photoelectric sensor, a high-frequency oscillation proximity sensor, a capacitance type proximity sensor, a magnetic type proximity sensor, an infrared rays proximity sensor, and the like. When the touch screen is implemented as a capacitance type, the proximity sensor **141** can sense proximity of a pointer relative to the touch screen by changes of an electromagnetic field, which is responsive to an approach of an object with conductivity. In this case, the touch screen (touch sensor) may also be categorized as a proximity sensor.

[0076] The term "proximity touch" will often be referred to herein to denote the scenario in which a pointer is positioned to be proximate to the touch screen without contacting the touch screen. The term "contact touch" will often be referred to herein to denote the scenario in which a pointer makes physical contact with the touch screen. For the position corresponding to the proximity touch of the pointer relative to the touch screen, such position will correspond to a position where the pointer is perpendicular to the touch screen. The proximity sensor **141** may sense proximity touch, and proximity touch patterns (for example, distance, direction, speed, time, position, moving status, and the like).

[0077] In general, controller **180** processes data corresponding to proximity touches and proximity touch patterns sensed by the proximity sensor **141**, and cause output of visual information on the touch screen. In addition, the controller **180** can control the mobile terminal **100** to execute different operations or process different data according to whether a touch to a point on the touch screen is either a proximity touch or a contact touch.

[0078] A touch sensor can sense a touch applied to the touch screen, such as display unit **151**, using any of a variety of touch methods. Examples of such touch methods include a resistive type, a capacitive type, an infrared type, and a magnetic field type, among others.

[0079] As one example, the touch sensor may be configured to convert changes of pressure applied to a specific part of the display unit **151**, or convert capacitance occurring at a specific part of the display unit **151**, into electric input signals. The touch sensor may also be configured to sense not only a touched position and a touched area, but also touch pressure and/or touch capacitance. A touch object is generally used to apply a touch input to the touch sensor. Examples of typical touch objects include a finger, a touch pen, a stylus pen, a pointer, or the like.

[0080] When a touch input is sensed by a touch sensor, corresponding signals may be transmitted to a touch controller. The touch controller may process the received signals, and then transmit corresponding data to the controller **180**. Accordingly, the controller **180** may sense which region of the display unit **151** has been touched. Here, the touch controller may be a component separate from the controller **180**, the controller **180**, and combinations thereof.

[0081] In some embodiments, the controller **180** may execute the same or different controls according to a type of touch object that touches the touch screen or a touch key provided in addition to the touch screen. Whether to execute the same or different control according to the object which provides a touch input may be decided based on a current operating state of the mobile terminal **100** or a currently executed application program, for example.

[0082] The touch sensor and the proximity sensor may be implemented individually, or in combination, to sense various types of touches. Such touches includes a short (or tap) touch, a long touch, a multi-touch, a drag touch, a flick touch, a pinch-in touch, a pinch-out touch, a swipe touch, a hovering touch, and the like.

[0083] If desired, an ultrasonic sensor may be implemented to recognize position information relating to a touch object using ultrasonic waves. The controller **180**, for example, may calculate a position of a wave generation source based on information sensed by an illumination sensor and a plurality of ultrasonic sensors. Since light is

much faster than ultrasonic waves, the time for which the light reaches the optical sensor is much shorter than the time for which the ultrasonic wave reaches the ultrasonic sensor. The position of the wave generation source may be calculated using this fact. For instance, the position of the wave generation source may be calculated using the time difference from the time that the ultrasonic wave reaches the sensor based on the light as a reference signal.

[0084] The camera **121** typically includes at least one a camera sensor (CCD, CMOS etc.), a photo sensor (or image sensors), and a laser sensor.

[0085] Implementing the camera **121** with a laser sensor may allow detection of a touch of a physical object with respect to a 3D stereoscopic image. The photo sensor may be laminated on, or overlapped with, the display device. The photo sensor may be configured to scan movement of the physical object in proximity to the touch screen. In more detail, the photo sensor may include photo diodes and transistors at rows and columns to scan content received at the photo sensor using an electrical signal which changes according to the quantity of applied light. Namely, the photo sensor may calculate the coordinates of the physical object according to variation of light to thus obtain position information of the physical object.

[0086] The display unit **151** is generally configured to output information processed in the mobile terminal **100**. For example, the display unit **151** may display execution screen information of an application program executing at the mobile terminal **100** or user interface (UI) and graphic user interface (GUI) information in response to the execution screen information.

[0087] In some embodiments, the display unit **151** may be implemented as a stereoscopic display unit for displaying stereoscopic images.

[0088] A typical stereoscopic display unit may employ a stereoscopic display scheme such as a stereoscopic scheme (a glass scheme), an auto-stereoscopic scheme (glassless scheme), a projection scheme (holographic scheme), or the like.

[0089] The audio output module **152** is generally configured to output audio data. Such audio data may be obtained from any of a number of different sources, such that the audio data may be received from the wireless communication unit **110** or may have been stored in the memory **170**. The audio data may be output during modes such as a signal reception mode, a call mode, a record mode, a voice recognition mode, a broadcast reception mode, and the like. The audio output module **152** can provide audible output related to a particular function (e.g., a call signal reception sound, a message reception sound, etc.) performed by the mobile terminal **100**. The audio output module **152** may also be implemented as a receiver, a speaker, a buzzer, or the like.

[0090] A haptic module **153** can be configured to generate various tactile effects that a user feels, perceive, or otherwise experience. A typical example of a tactile effect generated by the haptic module **153** is vibration. The strength, pattern and the like of the vibration generated by the haptic module **153** can be controlled by user selection or setting by the controller. For example, the haptic module **153** may output different vibrations in a combining manner or a sequential manner.

[0091] Besides vibration, the haptic module **153** can generate various other tactile effects, including an effect by stimulation such as a pin arrangement vertically moving to contact skin, a spray force or suction force of air through a jet orifice or a suction opening, a touch to the skin, a contact of an electrode, electrostatic force, an effect by reproducing the sense of cold and warmth using an element that can absorb or generate heat, and the like.

[0092] The haptic module **153** can also be implemented to allow the user to feel a tactile effect through a muscle sensation such as the user's fingers or arm, as well as transferring the tactile effect through direct contact. Two or more haptic modules **153** may be provided according to the particular configuration of the mobile terminal **100**.

[0093] An optical output module **154** can output a signal for indicating an event generation using light of a light source. Examples of events generated in the mobile terminal **100** may include message reception, call signal reception, a missed call, an alarm, a schedule notice, an email reception, information reception through an application, and the like.

[0094] A signal output by the optical output module **154** may be implemented in such a manner that the mobile terminal emits monochromatic light or light with a plurality of colors. The signal output may be terminated as the mobile terminal senses that a user has checked the generated event, for example.

[0095] The interface unit **160** serves as an interface for external devices to be connected with the mobile terminal **100**. For example, the interface unit **160** can receive data transmitted from an external device, receive power to transfer to elements and components within the mobile terminal **100**, or transmit internal data of the mobile terminal **100** to such external device. The interface unit **160** may include wired or wireless headset ports, external power supply ports, wired or wireless data ports, memory card ports, ports for connecting a device having an identification module, audio input/output (I/O) ports, video I/O ports, earphone ports, or the like.

[0096] The identification module may be a chip that stores various information for authenticating authority of using the mobile terminal **100** and may include a user identity module (UIM), a subscriber identity module (SIM), a universal subscriber identity module (USIM), and the like. In addition, the device having the identification module (also referred to herein as an "identifying device") may take the form of a smart card. Accordingly, the identifying device can be connected with the terminal **100** via the interface unit **160**.

[0097] When the mobile terminal **100** is connected with an external cradle, the interface unit **160** can serve as a passage to allow power from the cradle to be supplied to the mobile terminal **100** or may serve as a passage to allow various command signals input by the user from the cradle to be transferred to the mobile terminal there through. Various command signals or power input from the cradle may operate as signals for recognizing that the mobile terminal is properly mounted on the cradle.

[0098] The memory **170** can store programs to support operations of the controller **180** and store input/output data (for example, phonebook, messages, still images, videos, etc.). The memory **170** may store data related to various patterns of vibrations and audio which are output in response to touch inputs on the touch screen.

[0099] The memory **170** may include one or more types of storage mediums including a Flash memory, a hard disk, a solid state disk, a silicon disk, a multimedia card micro type, a card-type memory (e.g., SD or DX memory, etc), a Random Access Memory (RAM), a Static Random Access

Memory (SRAM), a Read-Only Memory (ROM), an Electrically Erasable Programmable Read-Only Memory (EEPROM), a Programmable Read-Only memory (PROM), a magnetic memory, a magnetic disk, an optical disk, and the like. The mobile terminal **100** may also be operated in relation to a network storage device that performs the storage function of the memory **170** over a network, such as the Internet.

[0100] The controller **180** may typically control the general operations of the mobile terminal **100**. For example, the controller **180** may set or release a lock state for restricting a user from inputting a control command with respect to applications when a status of the mobile terminal meets a preset condition.

[0101] The controller **180** can also perform the controlling and processing associated with voice calls, data communications, video calls, and the like, or is perform pattern recognition processing to recognize a handwriting input or a picture drawing input performed on the touch screen as characters or images, respectively. In addition, the controller **180** can control one or a combination of those components in order to implement various exemplary embodiments disclosed herein.

[0102] The power supply unit **190** receives external power or provide internal power and supply the appropriate power required for operating respective elements and components included in the mobile terminal **100**. The power supply unit **190** may include a battery, which is typically rechargeable or be detachably coupled to the terminal body for charging.

[0103] The power supply unit **190** may include a connection port. The connection port may be configured as one example of the interface unit **160** to which an external charger for supplying power to recharge the battery is electrically connected.

[0104] As another example, the power supply unit **190** may be configured to recharge the battery in a wireless manner without use of the connection port. In this example, the power supply unit **190** can receive power, transferred from an external wireless power transmitter, using at least one of an inductive coupling method which is based on magnetic induction or a magnetic resonance coupling method which is based on electromagnetic resonance.

[0105] Various embodiments described herein may be implemented in a computer-readable medium, a machine-readable medium, or similar medium using, for example, software, hardware, or any combination thereof.

[0106] Referring now to FIGS. **1**B and **10**, the mobile terminal **100** is described with reference to a bar-type terminal body. However, the mobile terminal **100** may alternatively be implemented in any of a variety of different configurations. Examples of such configurations include watch-type, clip-type, glasses-type, or as a folder-type, flip-type, slide-type, swing-type, and swivel-type in which two and more bodies are combined with each other in a relatively movable manner, and combinations thereof. Discussion herein will often relate to a particular type of mobile terminal (for example, bar-type, watch-type, glasses-type, and the like). However, such teachings with regard to a particular type of mobile terminal will generally apply to other types of mobile terminals as well.

[0107] The mobile terminal **100** will generally include a case (for example, frame, housing, cover, and the like) forming the appearance of the terminal. In this embodiment, the case is formed using a front case **101** and a rear case **102**. Various electronic components are incorporated into a space formed between the front case **101** and the rear case **102**. At least one middle case may be additionally positioned between the front case **101** and the rear case **102**.

[0108] The display unit **151** is shown located on the front side of the terminal body to output information. As illustrated, a window **151***a* of the display unit **151** may be mounted to the front case **101** to form the front surface of the terminal body together with the front case **101**.

[0109] In some embodiments, electronic components may also be mounted to the rear case **102**. Examples of such electronic components include a detachable battery **191**, an identification module, a memory card, and the like. Rear cover **103** is shown covering the electronic components, and this cover may be detachably coupled to the rear case **102**. Therefore, when the rear cover **103** is detached from the rear case **102**, the electronic components mounted to the rear case **102** are externally exposed.

[0110] As illustrated, when the rear cover **103** is coupled to the rear case **102**, a side surface of the rear case **102** is partially exposed. In some cases, upon the coupling, the rear case **102** may also be completely shielded by the rear cover **103**. In some embodiments, the rear cover **103** may include an opening for externally exposing a camera **121***b* or an audio output module **152***b*.

[0111] The cases **101**, **102**, **103** may be formed by injection-molding synthetic resin or may be formed of a metal, for example, stainless steel (STS), aluminum (Al), titanium (Ti), or the like.

[0112] As an alternative to the example in which the plurality of cases form an inner space for accommodating components, the mobile terminal **100** may be configured such that one case forms the inner space. In this example, a mobile terminal **100** having a uni-body is formed in such a manner that synthetic resin or metal extends from a side surface to a rear surface.

[0113] If desired, the mobile terminal **100** may include a waterproofing unit (not shown) for preventing introduction of water into the terminal body. For example, the waterproofing unit may include a waterproofing member which is located between the window **151***a* and the front case **101**, between the front case **101** and the rear case **102**, or between the rear case **102** and the rear cover **103**, to hermetically seal an inner space when those cases are coupled.

[0114] FIGS. **1**B and **10** depict certain components as arranged on the mobile terminal. However, it is to be understood that alternative arrangements are possible and within the teachings of the instant disclosure. Some components may be omitted or rearranged. For example, the first manipulation unit **123***a* may be located on another surface of the terminal body, and the second audio output module **152***b* may be located on the side surface of the terminal body.

[0115] The display unit **151** outputs information processed in the mobile terminal **100**. The display unit **151** may be implemented using one or more suitable display devices. Examples of such suitable display devices 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 3-dimensional (3D) display, an e-ink display, and combinations thereof.

[0116] The display unit **151** may be implemented using two display devices, which can implement the same or different display technology. For instance, a plurality of the display units **151** may be arranged on one side, either spaced

apart from each other, or these devices may be integrated, or these devices may be arranged on different surfaces.

[0117] The display unit **151** may also include a touch sensor which senses a touch input received at the display unit. When a touch is input to the display unit **151**, the touch sensor may be configured to sense this touch and the controller **180**, for example, may generate a control command or other signal corresponding to the touch. The content which is input in the touching manner may be a text or numerical value, or a menu item which can be indicated or designated in various modes.

[0118] The touch sensor may be configured in a form of a film having a touch pattern, disposed between the window **151***a* and a display on a rear surface of the window **151***a*, or a metal wire which is patterned directly on the rear surface of the window **151***a*. Alternatively, the touch sensor may be integrally formed with the display. For example, the touch sensor may be disposed on a substrate of the display or within the display.

[0119] The display unit **151** may also form a touch screen together with the touch sensor. Here, the touch screen may serve as the user input unit **123** (see FIG. **1**A). Therefore, the touch screen may replace at least some of the functions of the first manipulation unit **123***a*.

[0120] The first audio output module **152***a* may be implemented in the form of a speaker to output voice audio, alarm sounds, multimedia audio reproduction, and the like.

[0121] The window **151***a* of the display unit **151** will typically include an aperture to permit audio generated by the first audio output module **152***a* to pass. One alternative is to allow audio to be released along an assembly gap between the structural bodies (for example, a gap between the window **151***a* and the front case **101**). In this case, a hole independently formed to output audio sounds may not be seen or is otherwise hidden in terms of appearance, thereby further simplifying the appearance and manufacturing of the mobile terminal **100**.

[0122] The optical output module **154** can be configured to output light for indicating an event generation. Examples of such events include a message reception, a call signal reception, a missed call, an alarm, a schedule notice, an email reception, information reception through an application, and the like. When a user has checked a generated event, the controller can control the optical output unit **154** to stop the light output.

[0123] The first camera **121***a* can process image frames such as still or moving images obtained by the image sensor in a capture mode or a video call mode. The processed image frames can then be displayed on the display unit **151** or stored in the memory **170**.

[0124] The first and second manipulation units **123***a* and **123***b* are examples of the user input unit **123**, which may be manipulated by a user to provide input to the mobile terminal **100**. The first and second manipulation units **123***a* and **123***b* may also be commonly referred to as a manipulating portion, and may employ any tactile method that allows the user to perform manipulation such as touch, push, scroll, or the like. The first and second manipulation units **123***a* and **123***b* may also employ any non-tactile method that allows the user to perform manipulation such as proximity touch, hovering, or the like.

[0125] FIG. **1**B illustrates the first manipulation unit **123***a* as a touch key, but possible alternatives include a mechanical key, a push key, a touch key, and combinations thereof.

[0126] Input received at the first and second manipulation units **123***a* and **123***b* may be used in various ways. For example, the first manipulation unit **123***a* may be used by the user to provide an input to a menu, home key, cancel, search, or the like, and the second manipulation unit **123***b* may be used by the user to provide an input to control a volume level being output from the first or second audio output modules **152***a* or **152***b*, to switch to a touch recognition mode of the display unit **151**, or the like.

[0127] As another example of the user input unit **123**, a rear input unit (not shown) may be located on the rear surface of the terminal body. The rear input unit can be manipulated by a user to provide input to the mobile terminal **100**. The input may be used in a variety of different ways. For example, the rear input unit may be used by the user to provide an input for power on/off, start, end, scroll, control volume level being output from the first or second audio output modules **152***a* or **152***b*, switch to a touch recognition mode of the display unit **151**, and the like. The rear input unit may be configured to permit touch input, a push input, or combinations thereof.

[0128] The rear input unit may be located to overlap the display unit **151** of the front side in a thickness direction of the terminal body. As one example, the rear input unit may be located on an upper end portion of the rear side of the terminal body such that a user can easily manipulate it using a forefinger when the user grabs the terminal body with one hand. Alternatively, the rear input unit can be positioned at most any location of the rear side of the terminal body.

[0129] Embodiments that include the rear input unit may implement some or all of the functionality of the first manipulation unit **123***a* in the rear input unit. As such, in situations where the first manipulation unit **123***a* is omitted from the front side, the display unit **151** can have a larger screen.

[0130] As a further alternative, the mobile terminal **100** may include a finger scan sensor which scans a user's fingerprint. The controller **180** can then use fingerprint information sensed by the finger scan sensor as part of an authentication procedure. The finger scan sensor may also be installed in the display unit **151** or implemented in the user input unit **123**.

[0131] The microphone **122** is shown located at an end of the mobile terminal **100**, but other locations are possible. If desired, multiple microphones may be implemented, with such an arrangement permitting the receiving of stereo sounds.

[0132] The interface unit **160** may serve as a path allowing the mobile terminal **100** to interface with external devices. For example, the interface unit **160** may include one or more of a connection terminal for connecting to another device (for example, an earphone, an external speaker, or the like), a port for near field communication (for example, an Infrared Data Association (IrDA) port, a Bluetooth port, a wireless LAN port, and the like), or a power supply terminal for supplying power to the mobile terminal **100**. The interface unit **160** may be implemented in the form of a socket for accommodating an external card, such as Subscriber Identification Module (SIM), User Identity Module (UIM), or a memory card for information storage.

[0133] The second camera **121***b* is shown located at the rear side of the terminal body and includes an image capturing direction that is substantially opposite to the image capturing direction of the first camera unit **121***a*. If desired,

second camera **121***a* may alternatively be located at other locations, or made to be moveable, in order to have a different image capturing direction from that which is shown.

[0134] The second camera **121***b* can include a plurality of lenses arranged along at least one line. The plurality of lenses may also be arranged in a matrix configuration. The cameras may be referred to as an "array camera." When the second camera **121***b* is implemented as an array camera, images may be captured in various manners using the plurality of lenses and images with better qualities.

[0135] As shown in FIG. **1**C, a flash **124** is shown adjacent to the second camera **121***b*. When an image of a subject is captured with the camera **121***b*, the flash **124** may illuminate the subject.

[0136] As shown in FIG. **1**B, the second audio output module **152***b* can be located on the terminal body. The second audio output module **152***b* may implement stereophonic sound functions in conjunction with the first audio output module **152***a*, and may be also used for implementing a speaker phone mode for call communication.

[0137] At least one antenna for wireless communication may be located on the terminal body. The antenna may be installed in the terminal body or formed by the case. For example, an antenna which configures a part of the broadcast receiving module **111** may be retractable into the terminal body. Alternatively, an antenna may be formed using a film attached to an inner surface of the rear cover **103**, or a case that includes a conductive material.

[0138] A power supply unit **190** for supplying power to the mobile terminal **100** may include a battery **191**, which is mounted in the terminal body or detachably coupled to an outside of the terminal body. The battery **191** may receive power via a power source cable connected to the interface unit **160**. Also, the battery **191** can be recharged in a wireless manner using a wireless charger. Wireless charging may be implemented by magnetic induction or electromagnetic resonance.

[0139] The rear cover **103** is shown coupled to the rear case **102** for shielding the battery **191**, to prevent separation of the battery **191**, and to protect the battery **191** from an external impact or from foreign material. When the battery **191** is detachable from the terminal body, the rear case **103** may be detachably coupled to the rear case **102**.

[0140] An accessory for protecting an appearance or assisting or extending the functions of the mobile terminal **100** can also be provided on the mobile terminal **100**. As one example of an accessory, a cover or pouch for covering or accommodating at least one surface of the mobile terminal **100** may be provided. The cover or pouch may cooperate with the display unit **151** to extend the function of the mobile terminal **100**. Another example of the accessory is a touch pen for assisting or extending a touch input to a touch screen.

[0141] The mobile terminal including at least one of the aforementioned components may be in a locked state or a released state.

[0142] The locked state may mean a state where reception of a user input applied to the mobile terminal is restricted. In the locked state, even if a user input is applied to the mobile terminal, the mobile terminal is not operated. However, the mobile terminal may execute a specific function even in the locked state. For instance, the controller **180** may activate a camera as a camera capturing command is applied, even in the locked state. Such a specific function may be preset when the mobile terminal is manufactured, or may be preset to be executable in a locked state by an application installed to the mobile terminal.

[0143] In the locked state, the display unit **151** may be deactivate or activate. The activation of the display unit means a state where video information is displayable on the display unit **151** as light of the display unit **151** is turned on. On the other hand, the deactivation of the display unit means a state where video information is not displayable on the display unit **151** as the light of the display unit **151** is turned off.

[0144] If the display unit **151** is in an activated state, as shown in FIG. **3**A(b), the controller **180** may display a lock screen on the display unit **151**. The lock screen is screen information displayed on the display unit **151** when the mobile terminal is in a locked state, and may be displayed before the locked state is converted into a released state. The lock screen may include a background image, basic information (e.g., time, date and weather) displayed on the background image, password input information for releasing the locked state, etc.

[0145] If a user input to release the locked state is applied onto the lock screen, the controller **180** may convert the locked state into a released state. Here, the user input may be applied through various input manners such as a pattern input, a touch input, a password, an iris recognition, and a fingerprint recognition.

[0146] The released state may mean a state where the mobile terminal is operable according to a user input applied to the mobile terminal. In the released state, the controller **180** may execute a proper function in response to a user input.

[0147] Once the locked state is converted into the released state, the controller **180** may display a home screen page on the display unit **151**. The home screen page is an icon of an application installed to the mobile terminal, or a page including a widget. The home screen page may be called an idle screen, a menu screen, etc.

[0148] If a control command for camera capturing is input in a locked state, the controller **180** may execute a camera capturing function without releasing the locked state.

[0149] The camera capturing function may be a function to activate the camera **121** provided at the mobile terminal, and to receive image information from the activated camera **121**. Alternatively, the camera capturing function may be a function to capture image information received from the activated camera **121** as a still image or a moving image. Here, the activation of the camera **121** means a state where image information (or an image signal) may be received through the camera **121**.

[0150] The control command for camera capturing may be input in a deactivated state of the display unit **151**, or may be input in a state where a lock screen has been displayed on the display unit **151**.

[0151] If the control command for camera capturing is input in a deactivated state of the display unit **151**, the controller **180** may convert a locked state into a released state, and may immediately display a preview image received from the camera without displaying a lock screen on the display unit **151**. The preview image may be image information received real time from the camera **121**, before an image is captured. With such a configuration, a user may execute a camera capturing function without undergoing a step of activating the display unit **151**, a step of converting

a locked state into a released state, and a step of executing a camera capturing function. This may allow the user to capture an instantaneous image more quickly.

[0152] If the control command for camera capturing is input in a state where a lock screen has been displayed on the display unit **151**, the controller **180** may convert a locked state into a released state, and may display an image received from the camera on the display unit **151**. That is, even in this state, the controller **180** may immediately execute a camera capturing function without undergoing two steps of converting a locked state into a released state and executing a camera capturing function. Thus, the controller **180** may immediately convert a lock screen into a preview image received from the camera, without displaying, on the display unit **151**, a home screen page indicating a released state.

[0153] Such a camera capturing function to activate the camera in a locked state of the mobile terminal, without releasing the locked state, may be referred to as a 'quick shot' function. The following camera capturing function means a quick shot function immediately executed in a locked state.

[0154] In the conventional art, when a quick shot function is executed, a most-recently activated camera is activated, and image information received from the activated camera is displayed on the display unit **151**. This may cause a user not to pre-recognize a capturing direction of an activated camera when the quick shot function is executed, and may cause a problem that a camera of a desired capturing direction may not be activated. That is, in the conventional art, capturing an instantaneous image by a quick shot function may fail.

[0155] In order to solve such a problem, the present invention proposes a method of executing a camera capturing function, in a mobile terminal provided with a plurality of cameras having different capturing directions.

[0156] FIG. **2** is a flowchart illustrating a method of executing a camera capturing function in a mobile terminal according to the present invention. FIGS. **3**A and **3**B are conceptual views illustrating an executed state of a camera capturing function, in a locked state. And FIGS. **4**A to **4**C are conceptual views illustrating image capturing using a camera capturing function.

[0157] Referring to FIG. **2**, the controller **180** may receive a control command for camera capturing, in a locked state where reception of a user input is restricted (S**210**).

[0158] In the locked state of the mobile terminal, the controller **180** may receive various user inputs. As aforementioned, the controller **180** may restrict reception of a user input except for a specific user input.

[0159] Once a specific user input is applied, the controller **180** may operate the mobile terminal even in a locked state. The specific user input may be a user input for activating the display unit **151**, or may be a control command for camera capturing.

[0160] For instance, as shown in FIG. **3**A(a), if a push input is applied to a button disposed on a side surface of the mobile terminal in a deactivated state of the display unit **151**, the controller **180** may activate the display unit **151**. Here, if the mobile terminal is in a locked state, the controller **180** may display a lock screen indicating the locked state, on the activated display unit **151**.

[0161] As another example, as shown in FIG. **3**A(b), if a control command for camera capturing is applied in a deactivated state of the display unit **151**, the controller **180** may execute a camera capturing function.

[0162] That is, if the mobile terminal is in a locked state, the controller **180** may operate the mobile terminal only when a specific user input is applied to the mobile terminal.

[0163] Hereinafter, will be explained a case where a control command for camera capturing is applied in a locked state of the mobile terminal.

[0164] In a locked state of the mobile terminal, the controller **180** may receive a control command for camera capturing in various manners. The control command for camera capturing may be input through various input manners such as a touch input, a button input and a fingerprint input. For instance, as shown in FIG. **3**B(a), the control command for camera capturing may be input in a locked state, through a push input consecutively applied to the rear input unit (refer to FIG. **10**) two times. As another example, the control command for camera capturing may be input through a preset type of touch input applied onto a lock screen.

[0165] If the control command for camera capturing is received, the controller **180** may execute a camera capturing function. Once the camera capturing function is executed, the controller **180** may activate a plurality of cameras provided at the mobile terminal such that image information may be received from the plurality of cameras.

[0166] The plurality of cameras may be disposed at different regions of a terminal body in a spaced manner from each other. For instance, the mobile terminal may include the front camera **121***a* disposed on a front surface of the terminal body (refer to FIG. **1**B), and the rear camera **121***b* disposed on a rear surface of the terminal body (refer to FIG. **1**C). The plurality of cameras may be disposed on positions different from the positions shown in FIGS. **1**B and **1**C, which may be determined by a designer.

[0167] The plurality of cameras may have different capturing directions. For instance, the front camera **121***a* may have a first capturing direction, and the rear camera **121***b* may have a second capturing direction.

[0168] The plurality of cameras may include cameras provided at external devices, rather than the cameras provided at the mobile terminal. The external device is an electronic device which may communicate with the mobile terminal in a wired or wireless manner, and may be a drone, a rolling bot, a camera for 360°, etc. In this case, the controller **180** may receive image information from the cameras provided at the external devices, through communication with the external devices.

[0169] The controller **180** may activate all of the plurality of cameras, or may activate only a specific camera among the plurality of cameras based on a preset condition.

[0170] The preset condition may be one of a condition related to a most-recently executed camera, a condition related to a subject's movement, a condition related to user's eyeline information, and a condition related to a movement of the terminal body.

[0171] The condition related to a most-recently executed camera may be a condition related to a camera activated before a control command for camera capturing is received.

[0172] The condition related to a subject's movement may be a condition to sense movements of subjects which exist in capturing directions of the plurality of cameras when a control command for camera capturing is applied. For instance, if a subject which exists in a capturing direction of

the rear camera **121***b* moves, the rear camera **121***b* may be activated. Here, the subject means an object to be captured by the camera, e.g., a man, an animal, a thing, etc.

[0173] The condition related to user's eyeline information may be a condition that the camera is positioned in a user's eyeline direction when a control command for camera capturing is applied. For instance, when a user stares at the front camera **121***a*, the front camera **121***a* may be activated.

[0174] The condition related to a movement of the terminal body may be a condition related to a camera which is disposed in a tilted direction of the terminal body. For instance, if the terminal body is tilted in a direction corresponding to the front camera **121***a*, the front camera **121***a* may be activated.

[0175] Once the camera capturing function is executed, the controller **180** may display a plurality of preview images received from the plurality of cameras of the mobile terminal, on the display unit (S**220**).

[0176] In an activated state or a deactivated state of the display unit **151**, the controller **180** may receive a control command for camera capturing. In an activated state of the display unit **151**, a lock screen indicating a locked state may be displayed on the display unit **151**.

[0177] In the state where the lock screen has been displayed on the display unit **151**, if a control command for camera capturing is received, the controller **180** may display image information received from the plurality of activated cameras, on the display unit **151**. In this case, the image information displayed on the display unit **151** is called a 'preview image'.

[0178] For instance, a plurality of preview images of the same size may be simultaneously displayed on the display unit **151**.

[0179] Likewise, in a deactivated state of the display unit **151**, the controller **180** may receive a control command for camera capturing. In response to the control command for camera capturing, the display unit **151** may be activated. As shown in FIG. **3**B(b), the controller **180** may display a plurality of preview images receives from the plurality of cameras, on the activated display unit **151**.

[0180] The plurality of preview images may be displayed in predetermined sizes, on positions pre-allocated to a plurality of cameras. And the plurality of preview images may be changeable according to a user's manipulation.

[0181] Thus, a user may recognize at a glance image information received through the plurality of cameras having different capturing directions, rather than a most-recently executed camera. This may allow the user to capture an image through a camera having a desired capturing direction.

[0182] Upon activation of only a specific camera among the plurality of cameras, the controller **180** may display only a preview image received from the specific camera, on the display unit **151**.

[0183] In the displayed state of the preview image of the specific camera, the controller **180** may display a preview image of another camera where no preview image has been displayed, according to a user's request, together with the preview image of the specific camera. For instance, in a displayed state of preview images of the front and rear cameras **121***a*, **121***b*, if a camera provided at a drone requests image information, the controller **180** may display a preview image received from the drone camera on the display unit **151**, together with the preview images of the front and rear cameras **121***a*, **121***b*.

[0184] In the displayed state of the preview images, the controller **180** may capture an image based on the image information received from the plurality of activated cameras (S**230**).

[0185] The captured image may include a still image and a moving image. Alternatively, the captured image may include image information which may be captured through the cameras by various capturing techniques. In the following description, it is assumed that the captured image is a still image. However, in the present invention, the captured image may be a moving image, a cinema-graph image, etc.

[0186] After displaying a plurality of preview images on the display unit **151**, the controller **180** may capture images corresponding to the plurality of preview images, automatically or according to a capturing request. This may be set by a user. More specifically, before image capturing, a user may set an image to be captured at the same time when a camera capturing function is executed, or may set an image to be captured according to a capturing command after the camera capturing function is executed.

[0187] In case of an automatic image capturing, if a control command for camera capturing is received, the controller **180** may display a plurality of preview images on the display unit, and may capture images corresponding to the plurality of preview images.

[0188] That is, a user may activate the cameras and at the same time may capture images, without an additional request for image capturing. This may allow the user to capture a moment as an image.

[0189] After displaying a plurality of preview images on the display unit **151**, the controller **180** may capture images corresponding to the plurality of preview images, in response to a capturing command. The capturing command may be a touch input with respect to a preview image.

[0190] For instance, as shown in FIG. **4**A(a), the controller **180** may execute a camera capturing function in a locked state, in response to a control command for camera capturing. In this case, as shown in FIG. **4**A(b), the controller **180** may simultaneously display preview images of the front and rear cameras **121***a*, **121***b*, on the display unit **151**.

[0191] Then, as shown in FIG. **4**A(b), the controller **180** may sense a touch input applied to any region of the display unit **151** where the preview images **410**, **420** have been displayed. In this case, as shown in FIG. **4**A(c), the controller **180** may capture images **430**, **440** corresponding to the preview images **410**, **420**, in response to the touch input. That is, in response to the touch input, the controller **180** may simultaneously capture the images **430**, **440** corresponding to the preview images **410**, **420**, as separate images. With such a configuration, a user may simultaneously capture images of different directions through a single control input.

[0192] Then, as shown in FIG. **4**A(d), the controller **180** may re-output the preview images **410**, **420** to the display unit **151**.

[0193] The controller **180** may selectively capture only an image corresponding to a specific preview image among the plurality of preview images displayed on the display unit **151**.

[0194] For instance, as shown in FIG. **4**B(a), the controller **180** may sense a touch input applied to a region where a

specific preview image **420** between preview images **410**, **420** has been displayed. In this case, as shown in FIG. **4**B(b), the controller **180** may capture only an image **440** corresponding to the specific preview image **420**. That is, the controller **180** may capture only an image corresponding to a specific preview image displayed on a region where a touch input has been applied. With such a configuration, a user may selectively capture only a desired image, while visually recognizing images received from various capturing directions through a plurality of cameras.

[0195] Then, as shown in FIG. **4**B(c), the controller **180** may re-output the preview images **410**, **420** to the display unit **151**.

[0196] In a case where a control command for camera capturing is continuously sensed for a preset time, the controller **180** may continuously capture images corresponding to a plurality of preview images. Here, the continuous capturing is a technique to capture a plurality of images through a single capturing command. For instance, the continuous capturing is a technique to automatically capture a plurality of images at predetermined time intervals, while a touch input corresponding to a capturing command is maintained.

[0197] For instance, as shown in FIG. **4**C(a), a control command for camera capturing may be a push input or a touch input applied to a rear input unit **400** of the mobile terminal. The controller **180** may execute a camera capturing function based on a push input or a touch input applied to the rear input unit **400**.

[0198] As shown in FIG. **4**C(a), after executing the camera capturing function, the controller **180** may continuously sense a push input or a touch input applied to the rear input unit **400** and sensed before the camera capturing function is executed. In this case, the controller **180** may execute a continuous capturing using the plurality of cameras.

[0199] While the continuous capturing is being executed, the controller **180** may automatically capture images at predetermined time intervals. For instance, the controller **180** may automatically capture two images per second. The number of the images to be captured may be preset when the mobile terminal is manufactured, or may be preset when an application for camera capturing is is designed.

[0200] The continuous capturing may be executed until a push input or a touch input applied to the rear input unit **400** is not sensed. For instance, as shown in FIG. **4**C(b), if a push input or a touch input applied to the rear input unit **400** is not sensed during a continuous capturing, the controller **180** may stop the continuous capturing.

[0201] That is, in the present invention, not only a camera function, but also an image capturing function may be executed through a single input. Thus, a user may simultaneously execute two functions through a single control input. Further, a user may continuously capture a plurality of photos in a locked state without applying an additional capturing command, thereby more precisely capturing instantaneous situations as images.

[0202] So far, has been explained a method of capturing images to capture moments.

[0203] Hereinafter, will be explained a method of setting a camera to be activated when a camera capturing function is executed in a mobile terminal according to the present invention.

[0204] FIGS. **5**A to **7**B are conceptual views illustrating a method of setting a camera to be activated according to a preset condition.

[0205] In a locked state, the controller **180** may execute a camera capturing function in response to a control command for camera capturing. Once the camera capturing function is executed, the controller **180** may activate all of a plurality of cameras provided at the mobile terminal, and may output preview images received from the plurality of cameras to the display unit **151**.

[0206] Alternatively, once the camera capturing function is executed, the controller **180** may activate only a specific camera among the plurality of cameras based on a preset condition, and may output a preview image received from the specific camera to the display unit **151**.

[0207] The preset condition may be preset when the mobile terminal is presented out from a factory, or may be selected by a user.

[0208] The preset condition may be one of a condition related to a most-recently executed camera, a condition related to a subject's movement, a condition related to user's eyeline information, and a condition related to a movement of the terminal body.

[0209] For instance, if a most-recently activated camera is the rear camera **121***b* before a control command for camera capturing is received, the controller **180** may activate only the rear camera **121***b* for camera capturing, and may display a preview image received from the rear camera **121***b* on the display unit **151**.

[0210] The controller **180** may select a specific camera when there is a moving subject in a capturing direction of the specific camera. For instance, as shown in FIGS. **5**A(a) and **5**A(b), if a facial movement is sensed in a capturing direction of the front camera **121***a*, the controller **180** may activate the front camera **121***a*. As shown in FIGS. **5**B(a) and **5**B(b), if a dog's movement is sensed in a capturing direction of the rear camera **121***b*, the controller **180** may activate the rear camera **121***b*. Although not shown, if moving subjects are sensed in both a capturing direction of the front camera **121***a* and a capturing direction of the rear camera **121***b*, the controller **180** may activate both of the front and rear cameras **121***a*, **121***b*.

[0211] With such a configuration, in the present invention, the controller may activate a camera having a desired capturing direction, by checking peripheral situations of the mobile terminal and a situation to be captured instantaneously.

[0212] The controller **180** may activate only a specific camera among a plurality of cameras based on a user's eyeline direction.

[0213] For instance, as shown in FIG. **6**A(a), the controller **180** may sense that a user's eyeline is toward the front camera **121***a*. In this case, as shown in FIG. **6**A(b), the controller **180** may activate the front camera **121***a*, and may display a preview image of the front camera **121***a* on the display unit **151**. As shown in FIGS. **6**B(a) and **6**B(b), if a user's eyeline is not towards the front camera **121***a*, the controller **180** may activate the rear camera **121***b* having an opposite capturing direction to the front camera **121***a*.

[0214] The controller **180** may use the front camera **121***a* in order to sense a user's eyeline. For instance, the controller **180** may extract a pupil image from a facial image received from the front camera **121***a*, and may detect an eyeline direction based on the extracted pupil image.

[0215] With such a configuration, in the present invention, the controller may provide a proper preview image by checking a user's capturing intention in advance based on user's eyeline information.

[0216] The controller **180** may activate a specific camera among a plurality of cameras, based on a condition related to a movement of the terminal body. More specifically, the controller **180** may activate a camera disposed at a position corresponding to a tilted direction of the terminal body. For instance, as shown in FIG. **7**A(a), the controller **180** may sense a tilted state of the terminal body in a first direction. Here, the first direction may be a front direction of the terminal body. In this case, as shown in FIG. **7**A(b), the controller **180** may activate the front camera **121***a*. Further, as shown in FIG. **7**B(b), the controller **180** may sense a tilted state of the terminal body in a second direction, a rear direction of the terminal body. In this case, as shown in FIG. **7**B(a), the controller **180** may activate the rear camera **121***b*.

[0217] So far, has been explained a method of activating a specific camera among a plurality of cameras according to a preset condition. With such a configuration, in the present invention, when executing a camera capturing function in a locked state, a user's capturing intention is checked to automatically activate a camera having a proper capturing direction.

[0218] Hereinafter, will be explained a method of controlling preview images received from a plurality of cameras and displayed, in a mobile terminal according to the present invention.

[0219] FIGS. **8**A to **9**B are conceptual views illustrating an embodiment related to control of method of controlling preview images.

[0220] Once the aforementioned camera capturing function is executed, the controller **180** may display a plurality of preview images received from a plurality of cameras on the display unit **151**. For instance, as shown in FIG. **8**A(a), once a camera capturing function is executed, a first preview image **810** received from the front camera **121***a*, and a second preview image **820** received from the rear camera **121***b* may be together displayed on the display unit **151**.

[0221] A size of the plurality of preview images may be determined according to a preset condition or a user's selection.

[0222] The preset condition may be one of a condition related to a tilted direction of the terminal body, and a condition related to a subject's movement. For instance, if the terminal body is tilted in a direction where the front camera **121***a* is positioned, the controller **180** may display a preview image received from the front camera **121***a*, so as to be larger than a preview image received from the rear camera **121***b*. As another example, if a subject's movement is sensed in a capturing direction of the rear camera **121***b*, the controller **180** may display a preview image received from the rear camera **121***b*, so as to be larger than a preview image received from the front camera **121***a*. Thus, a user may easily determine a camera which is to be used to capture an image.

[0223] The controller **180** may control a display size of the preview image based on a touch input applied to the preview image. For instance, as shown in FIG. **8**A(a), if a touch input is applied to a boundary region between the first and second preview images **810**, **820**, the controller **180** may decrease a display size of the first preview image **810**. As shown in FIG. **8**A(b), a display size of the second preview image **820** may be increased in correspondence to the decreased degree of the display size of the first preview image **810**. That is, the display size of the first and second preview images **810**, **820** may be relatively decreased or increased.

[0224] Further, the controller **180** may control an activated state of a camera by controlling a display size of a preview image. More specifically, when a display size of a preview image is decreased to a value less than a preset size, the controller **180** may deactivate a camera which has transmitted the preview image. That is, the controller **180** may deactivate the camera which has transmitted the preview image, such that an image may not be received from the camera any longer.

[0225] For instance, as shown in FIG. **8**B(a), the controller **180** may sense that a display size of a preview image **810** is decreased to a value less than a preset size, based on a touch input. In this case, the controller **180** may deactivate the is front camera **121***a* which has transmitted the first preview image **810**. Once the front camera **121***a* is deactivated, the controller **180** may output the second preview image **820** on the entire region of the display unit **151**.

[0226] In a displayed state of a preview image, the controller **180** may set a filter effect to an image to be captured, based on a preset type of touch input. The filter effect is a function to correct an image for a special effect by changing a chroma, a brightness, a texture, etc. of the image. The filter effect may be set in various manners according to a special effect. For instance, the filter effect may be a gray shadow effect, a sepia effect, a vintage effect, a tone reinforcement effect, a fisheye lens effect, a reversal effect, etc.

[0227] A user may apply the filter effect to a preview image before image capturing. In this case, the user may capture an image having the filter effect.

[0228] The controller **180** of the mobile terminal may preset the filter effect to a preview image before image capturing. For this, as shown in FIG. **9**A(a), in a displayed state of a first preview image **910** received from the front camera **121***a* and a second preview image **920** received from the rear camera **121***b*, the controller **180** may sense a drag input applied onto a boundary region in a specific direction.

[0229] In this case, as shown in FIG. **9**A(b), the controller **180** may display information **930** indicating a filter effect, on the boundary region. The information **930** indicating a filter effect may include graphic objects **940***a*, **940***b* indicating different filter effects. The graphic objects **940***a*, **940***b* indicating different filter effects may be preview images to which a filter effect has been applied.

[0230] If a touch input is applied to the graphic object **940***b* having a specific filter effect between the graphic objects **940***a*, **940***b* indicating different filter effects, the controller **180** may apply the specific filter effect to a preview image. That is, as shown in FIG. **9**A(c), the controller **180** may apply the specific filter effect to the first and second preview images **910**, **920**. Once a filter effect is applied, the controller **180** may capture an image having the filter effect.

[0231] The controller **180** may apply a filter effect to all of a plurality of preview images displayed on the display unit **151**, or may apply the filter effect only to a specific preview image. That is, the controller **180** may individually select some preview images from a plurality of preview images, a nd may apply different filter effects to the selected preview images.

[0232] For instance, as shown in FIG. **9**B(a), in a displayed state of a first preview image **910** and a second preview image **920** on the display unit **151**, the controller **180** may sense a drag input applied onto a display region of the second preview image **920** in a specific direction.

[0233] In this case, as shown in FIG. **9**B(b), the controller **180** may apply a specific filter effect to the second preview image **920**. Here, the controller **180** may not apply the specific filter effect to the first preview image **910**.

[0234] When applying the specific filter effect, the controller **180** may apply the specific filter effect in a preset order. More specifically, the controller **180** may sequentially apply a plurality of filter effects in a preset order, according to the number of times that a drag input has been applied.

[0235] Although not shown, in response to a drag input applied to a display region of the first preview image **910** in a specific direction, the controller **180** may apply a filter effect to the first preview image **910** in an independent manner from the second preview image **920**.

[0236] So far, has been explained a method of controlling a preview image after executing a camera capturing function, in a mobile terminal according to the present invention.

[0237] Hereinafter, will be explained a method of storing images captured through a camera capturing function in a mobile terminal according to the present invention.

[0238] FIGS. **10**A to **10**D are conceptual views illustrating a method of storing images captured through a camera capturing function.

[0239] After executing a camera capturing function, the controller **180** may capture images automatically or in response to a capturing command.

[0240] For instance, as shown in FIG. **10**A(a), if a capturing command is applied in a displayed state of a first preview image **1010***a* and a second preview image **1020***a* on the display unit **151**, the controller **180** may capture a first image corresponding to the first preview image **1010***a* and a second image corresponding to the second preview image **1020***a*.

[0241] Then, in response to a control command for outputting the captured images, the controller **180** may output the captured images, and images stored in the memory **170**. For instance, as shown in FIG. **10**A(a), in response to a push input applied to an upper region of the rear input unit, the controller **180** may output the captured images and images stored in the memory **170**, to the display unit **151**. That is, as shown in FIG. **10**A(b), the controller **180** may output a first image **1010***b* corresponding to the first preview image **1010***a* and a second image **1020***b* corresponding to the second preview image **1020***a*, the first and second images stored in the memory **170**.

[0242] In a case where the first image **1010***b* and the second image **1020***b* are images captured simultaneously, the controller **180** may display the first and second image **1010***b*, **1020***b* so as to be distinguished from other images. For instance, as shown in FIG. **10**A(b), the controller **180** may display a guide object indicating that the first and second images **1010***b*, **1020***b* have been simultaneously captured, on the first and second images **1010***b*, **1020***b*.

[0243] Although not shown, the controller **180** may store one of the first and second images **1010***b*, **1020***b*, using the guide object. Thus, a user may selectively store only a desired image among images captured simultaneously.

[0244] In the present invention, since images of different directions are simultaneously captured through a single control command, a moment may be captured. Further, a user may later check the images captured in different directions, in a visual manner.

[0245] After executing a camera capturing function, the controller **180** may execute a continuous capturing. Then, the controller **180** may output a plurality of images captured consecutively to the display unit **151** according to a user's request. For instance, as shown in FIG. **10**B(a), after a continuous capturing is terminated, the controller **180** may sense a long touch input. In this case, as shown in FIG. **10**B(b), the controller **180** may output images **1010***c*, **1020***c* captured consecutively to the display unit **151**.

[0246] After the continuous capturing is terminated, the controller **180** may store all images captured consecutively in the memory **170**, or may selectively store some of the images captured consecutively in the memory **170**.

[0247] In case of selectively storing some of the images captured consecutively, the controller **180** may detect images recommended so as to be stored in the memory **170** among the images **1010***c*, **1020***c* captured consecutively. Then, as shown in FIG. **10**B(a), the controller **180** may display mark icons on the recommended images in an overlapped manner, such that the recommended images among the consecutively-captured images **1010***c*, **1020***c* may be distinguishable from other images.

[0248] The recommended images may be moving images. For the recommended images, the controller **180** may detect images determined to have moved based on a reference image among consecutively-captured images, through an image analysis. Here, the reference image may be a firstly-captured image, an intermediate image among consecutively-captured images, or an image having a clearest subject among consecutively-captured images. With such a configuration, only moving images among consecutively-captured images may be selectively stored, without a user's direct selection for images. This may allow a user to selectively store only images determined to have different motions at the time of a continuous capturing.

[0249] The recommended images may be determined according to a tilted angle of the terminal body at the time of a continuous capturing. For instance, when the terminal body is tilted in a direction of the front camera **121***a*, the recommended images may be images captured by the front camera **121***a*.

[0250] The controller **180** may store images selected by a user as well as the recommended images, in the memory **170**. For instance, as shown in FIG. **10**B(b), in response to a touch input applied to a display region of a specific image **1030** among the images **1010***b*, **1020***c*captured consecutively, the controller **180** may select the specific image **1030** as an image to be stored in the memory **170**. In this case, as shown in FIG. **10**B(c), a mark icon may be displayed on the specific image **1030** in an overlapped manner.

[0251] The controller **180** may set part of the recommended images not to be stored in the memory **170** according to a user's selection. For instance, as shown in FIG. **10**B(c), in response to a touch input applied to a display region of a specific image **1040** among the recommended images having mark icons, the controller **180** may control the specific image **1040** not to be stored in the memory **170**. In this case, as shown in FIG. **10**B(d), the mark icon on the specific image **1040** may disappear.

[0252] The controller **180** may select a plurality of images among images **1010***c*, **1020***c* captured consecutively, as

images to be stored or not to be stored in the memory **170**, based on a touch pattern corresponding to a touch path.

[0253] In this case, the controller **180** may select images to be stored in the memory **170**, or may determine images not to be stored in the memory **170**, based on a shape of a touch pattern corresponding to a touch path.

[0254] For instance, as shown in FIG. **10**C(a), the controller **180** may sense a circular pattern corresponding to a touch path, on a display region of a plurality of second images **1020***c* among images **1010***c*, **1020***c* captured consecutively. In this case, as shown in FIG. **10**C(b), the controller **180** may select the plurality of second images **1020***c* displayed on regions to which the circular pattern has been applied and displayed in the circular pattern, as images to be stored in the memory **170**. In this case, mark icons may be displayed on the plurality of second images **1020***c* in an overlapped manner.

[0255] As shown in FIG. **10**C(b), the controller **180** may sense a linear pattern corresponding to a touch path, on a display region of a plurality of first images **1010***c* among the images **1010***c*, **1020***c* captured consecutively. In this case, as shown in FIG. **10**C(c), the controller **180** may select the plurality of first images **1010***c* displayed on regions to which the linear pattern has been applied, as images not to be stored in the memory **170**. In this case, the mark icons displayed on the plurality of first images **1010***c* in an overlapped manner may disappear.

[0256] As shown in FIGS. **10**D(a) and **10**D(b), the controller **180** may display images **1010***c*, **1020***c* captured consecutively, on preview images in an overlapped manner, in response to a user's request or after a continuous capturing is terminated.

[0257] If touch inputs are applied to the consecutively-captured images **1010***c*, **1020***c*, the controller **180** may selectively store only images displayed on regions where the touch inputs have been applied. On the other hand, if no touch input is applied to the consecutively-captured images **1010***c*, **1020***c*, the controller **180** may store all of the consecutively-captured images **1010***c*, **1020***c* in the memory **170**.

[0258] Further, as shown in FIG. **10**D(c), if a touch input to the consecutively-captured images **1010***c*, **1020***c* is not sensed for a predetermined time, the controller **180** may control the consecutively-captured images **1010***c*, **1020***c* to disappear from the display unit **151**. And the controller **180** may store all or part of the consecutively-captured images **1010***c*, **1020***c* in the memory **170**.

[0259] Once the consecutively-captured images **1010***c*, **1020***c* disappear, the controller **180** may re-display preview images on the display unit **151**. This may allow a user to perform image re-capturing after storing images, without an to additional control input.

[0260] So far, have been explained various methods of storing images captured through a camera capturing function.

[0261] Hereinafter, will be explained various embodiments to execute a camera capturing function in a mobile terminal according to the present invention.

[0262] FIGS. **11**A and **11**B are conceptual views illustrating different embodiments to execute a camera capturing function, in a mobile terminal according to the present invention.

[0263] In a locked state, the controller **180** may receive a control command for camera capturing in various manners.

[0264] For instance, as shown in FIG. **11**A(a), the controller **180** may execute a camera capturing function, in response to a preset type of touch input applied while an always on display (AOD) function is being executed.

[0265] The AOD function is a function to turn on light of one region of the display unit **151** such that video information is displayed on the one region of the display region in an off-state of the display unit **151**. That is, as shown in FIG. **11**A(a), in an off state of light of the display unit **151**, the date information, time information, etc. may be briefly displayed on one region of the display unit **151**. Such an AOD function may be referred to as an 'always on' function.

[0266] The AOD function may be set by a user, and may be screen information separated from a lock screen indicating a locked state.

[0267] The preset type of touch input may be a long touch, a force touch, etc. The force touch may be a touch input applied to the display unit **151** in a thickness direction with a force more than a predetermined level. As shown in FIG. **11**A(b), if a force touch is applied while an AOD function is being executed, the controller **180** may convert the display unit **151** from a deactivated state into an activated state, and may display a plurality of preview images received from a plurality of cameras on the display unit **151**.

[0268] As another example, as shown in FIG. **11**B, when the mobile terminal is provided with a main display and a sub display, a user may execute a camera capturing function using an icon for a camera capturing function displayed on the sub display. Here, the main display is a display which occupies most of an area of a front surface of the terminal body, which means a display to display an application being driven in the mobile terminal or driving information. The sub display extends from the main display, and has a smaller size than the main display. The sub display means a display which occupies one region of the front surface of the terminal body, which may display thereon a web favorite (bookmark) icon, a notification icon, a shortcut icon, etc.

[0269] Even if the main display is turned off, the sub display may be always turned on due to the aforementioned AOD function. In this case, as shown in FIG.**11**B(a), although light of the display unit is turned off, an icon for a camera capturing function may be displayed on the sub display.

[0270] A user may execute a camera capturing function by selecting the icon for a camera capturing function displayed on the sub display. In this case, as shown in FIG. **11**B(b), the controller **180** may turn on the main display to display preview images.

[0271] So far, have been explained various embodiments to execute a camera capturing function. In the present invention, a camera capturing function may be executed through various inputs as well as the aforementioned method.

[0272] Hereinafter, will be explained a method of executing a camera capturing function based on image information received from an external camera, in a mobile terminal according to the present invention.

[0273] FIGS. **12** to **14**B are conceptual views illustrating a method of executing a camera capturing function using image information received from an external camera. is Referring to FIG. **12**, the mobile terminal **100** according to the present invention may transceive (transmit and receive) information with external devices through wired or wireless

communication. For instance, the mobile terminal **100** may execute short-distance communication with external devices via Bluetooth.

[0274] Such external devices may be electronic devices each having a communication unit. For instance, the external devices may be a flyable terminal (e.g., a drone), a rotatable terminal (e.g., a rolling bot), a terminal which can capture image capturing at 360° (e.g, a 360-camera).

[0275] In case of short-distance communication with one or more external devices, the controller **180** may receive image information from the external devices through communication. In a state where image information can be received from the external devices, the controller **180** may execute a camera capturing function.

[0276] In this case, as shown in FIGS. **13**A(a) and **13**A(b), the controller **180** may simultaneously display, on the display unit **151**, preview images **1210**, **1220** received through cameras of the mobile terminal, and preview images **1230**, **1240** received from the external devices.

[0277] Alternatively, as shown in FIGS. **13**B(a) and **13**B (b), once a camera capturing function is executed, the controller **180** may display an icon **1250** on preview images **1210**, **1220**, the icon indicating that image information can be received from the external devices. In this case, as shown in FIG. **13**B(c),as the icon **1250** is selected, the controller **180** may simultaneously display, on the display unit **151**, preview images **1210**, **1220** received through cameras of the mobile terminal, and preview images **1230**, **1240** received from the external devices.

[0278] Further, the controller **180** may release a communication state with an is external device, by controlling a size of a preview image. For instance, as shown in FIG. **14**A(a), if a user applies a touch input to a display region of a first preview image **1230** received from a first external device, the controller **180** may reduce a size of the first preview image **1230**. If the size of the first preview image **1230** is reduced to a value less than a preset size as shown in FIG. **14**A(b), the controller **180** may release a communication state between the mobile terminal and the first external device. In this case, as shown in FIG. **14**A(c), the first preview image **1230** may not be output to the display unit **151** any longer.

[0279] In a case where the mobile terminal communicates with two or more external devices, the controller **180** may sequentially output preview images received from the two or more external devices according to a user's request. For instance, as shown in FIG. **14**B(a), when the mobile terminal is connected to two or more external devices, the controller **180** may display an icon **1250** on preview images, the icon for outputting an image received from an external terminal. As shown in FIG. **14**B(b), when a touch input is applied to the icon **1250**, the controller **180** may display, on the display unit **151**, a preview image **1230** received from a first external device of two external devices. Then, as shown in FIG. **14**B(c), when a touch input is re-applied to the icon **1250**, the controller **180** may display, on the display unit **151**, a preview image **1240** received from a second external device, rather than the preview image **1230** received from the first external device. That is, the controller **180** may sequentially output preview images received from external devices.

[0280] With such a configuration, the controller **180** may simultaneously capture a plurality of images, based on image information received through external cameras provided at external devices. So far, has been explained a method of providing preview images received through external cameras provided at external devices.

[0281] The mobile terminal according to the present invention may have the following advantages.

[0282] Firstly, if a control command for immediately activating a camera is applied in a locked state of the mobile terminal, preview images captured by a plurality of cameras having different capturing directions may be together displayed on the display unit. With such a configuration, for instantaneous capturing, an image may be captured through a camera having a direction where a subject exists, as a capturing direction.

[0283] Further, in the present invention, an image may be captured by activating a camera having a proper capturing direction according to a user's intention. With such a configuration, a user may capture an instantaneous image by rapidly activating a camera having a proper capturing direction, without additionally selecting a capturing direction with respect to cameras having different capturing directions.

[0284] The present invention can be implemented as computer-readable codes in a program-recorded medium. The computer-readable medium may include all types of recording devices each storing data readable by a computer system. Examples of such computer-readable media may include hard disk drive (HDD), solid state disk (SSD), silicon disk drive (SDD), ROM, RAM, CD-ROM, magnetic tape, floppy disk, optical data storage element and the like. Also, the computer-readable medium may also be implemented as a format of carrier wave (e.g., transmission via an Internet). The computer may include the controller **180** of the terminal. Therefore, it should also be understood that the above-described embodiments are not limited by any of the details of the foregoing description, unless otherwise specified, but rather should be construed broadly within its scope as defined in the appended claims, and therefore all changes and modifications that fall within the metes and bounds of the claims, or equivalents of such metes and bounds are therefore intended to be embraced by the appended claims.

What is claimed is:

1. A mobile terminal, comprising:

a terminal body;

a plurality of cameras disposed on different regions of the terminal body in a spaced manner, and having different capturing directions;

a display unit configured to display video information; and

a controller configured to execute a different control operation in response to a different input applied in a locked state where reception of a user's input is to limited,

wherein the controller displays a lock screen indicating a locked state, based on a first input received in the locked state, and

wherein the controller displays a plurality of preview images received from the plurality of cameras, on the display unit, based on a second input received in is the locked state.

2. The mobile terminal of claim **1**, wherein the plurality of cameras include:

a first camera disposed on a front surface of the terminal body, and having a first capturing direction; and

a second camera disposed on a rear surface of the terminal body, and having a second capturing direction, and

wherein the controller simultaneously displays preview images received from the first and second cameras when the second input is received.

3. The mobile terminal of claim **1**, wherein in a state of displaying a plurality of preview images on the display unit, the controller simultaneously captures the plurality of preview images in response to a touch input received on an arbitrary region of the display unit.

4. The mobile terminal of claim **1**, further comprising a motion sensor configured to sense a movement of a subject,

wherein when the second input is applied, the controller displays, on the display unit, a preview image of a specific camera among the plurality of cameras which is disposed in a direction where a movement of a subject has been sensed, among the plurality of cameras.

5. The mobile terminal of claim **1**, further comprising an eyeline sensor configured to sense a user's eyeline,

wherein when the second input is applied, the controller displays, on the display unit, a preview image of a specific camera among the plurality of cameras, based on a user's eyeline direction.

6. The mobile terminal of claim **5**, wherein when the user's eyeline direction is toward a specific camera, the controller displays a preview image of the specific camera on the display unit, and

wherein when the user's eyeline direction is not toward a specific camera, the controller displays, on the display unit, a preview image of another camera positioned on an opposite side to the specific camera among the plurality of cameras.

7. The mobile terminal of claim **1**, further comprising a gradient sensor configured to sense a gradient of the terminal body,

wherein the controller displays, on the display unit, a preview image of a specific camera among the plurality of cameras which is disposed in a direction where the terminal body has been tilted, among the plurality of cameras.

8. The mobile terminal of claim **1**, wherein in a state of displaying a plurality of preview images on the display unit, if a touch input is applied to a boundary region between the preview images, the controller changes a display to size of the plurality of preview images.

9. The mobile terminal of claim **8**, wherein when a display size of a preview image among the plurality of preview images is decreased to a value less than a preset size, the controller controls a camera which has transmitted the preview image, such that image information is not received from the camera which has transmitted the preview image.

10. The mobile terminal of claim **1**, wherein when preview images are captured by the plurality of cameras, the controller displays the captured preview images on the display unit, and

wherein the controller displays a guide object on at least one recommended image among the captured preview images, in an overlapped manner.

11. The mobile terminal of claim **10**, wherein for the recommended image, the controller detects images determined to have moved based on a reference image among the captured preview images, through an image analysis.

12. The mobile terminal of claim **1**, wherein when the plurality of preview images are simultaneously captured, the controller stores the plurality of captured preview images in a memory, and

wherein in a case where images stored in the memory are output to the display unit, the controller displays the plurality of captured preview images so as to be visually-distinguishable from other images stored in the memory, in order to indicate that the plurality of preview images have been simultaneously captured.

13. The mobile terminal of claim **12**, wherein the controller displays a guide object indicating that the plurality of preview images have been simultaneously captured, in an overlapped manner, on display regions of the plurality of preview images.

14. The mobile terminal of claim **1**, further comprising a wireless communication unit configured to receive an image from an external camera through communication,

wherein when the second input is received, the controller receives a preview image of the external camera through the wireless communication unit, and displays the preview image of the external camera together with the plurality of preview images received from the plurality of cameras.

15. The mobile terminal of claim **14**, wherein if a display size of the preview image of the external camera is reduced to a value less than a preset size, the controller releases a communication connection state with the external camera.

* * * * *