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(54) **ELECTRONIC DEVICE FOR PROVIDING REPRESENTATIVE IMAGE OF EXTERNAL ELECTRONIC DEVICE, METHOD FOR OPERATING SAME, AND STORAGE MEDIUM**

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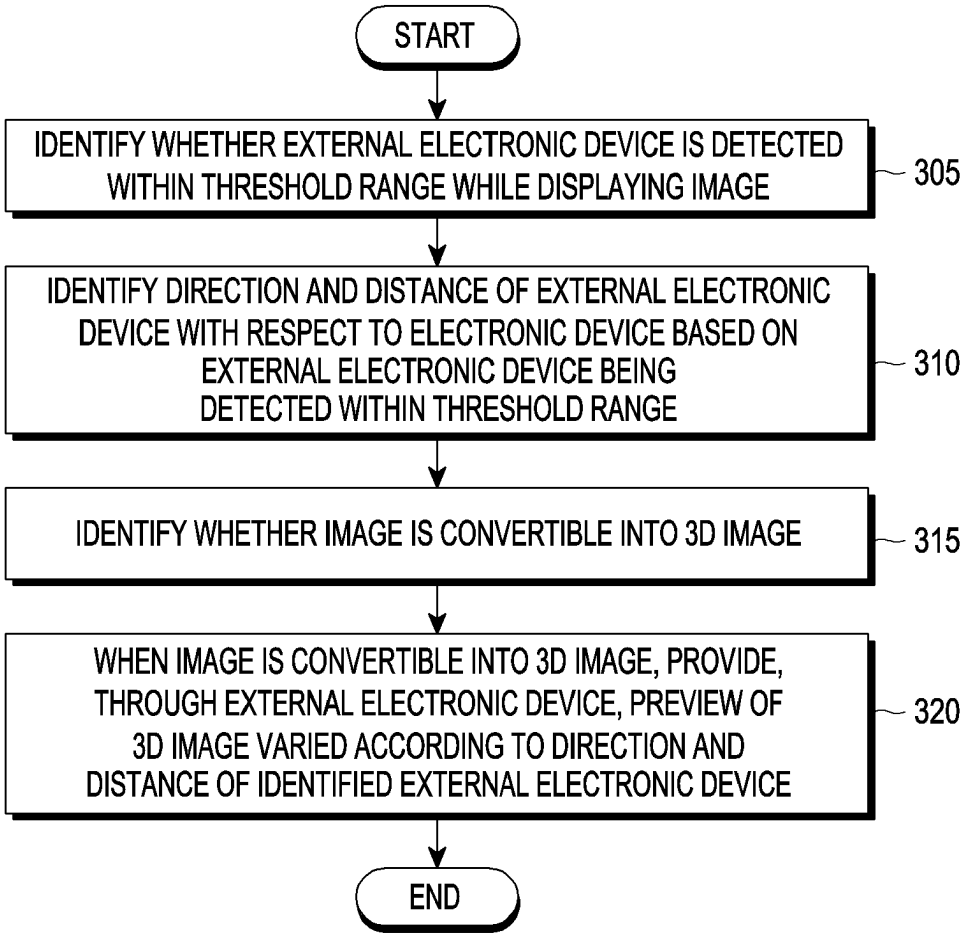
(52) **U.S. Cl.**

CPC ***G06T 15/00*** (2013.01); ***G06F 1/163*** (2013.01); ***G06T 3/40*** (2013.01)

(57) **ABSTRACT**

An electronic device includes: a communication module; a display; a processor; and memory storing instructions that, when executed by the processor individually or collectively, cause the electronic device to: connect to an external electronic device through the communication module; identify whether the external electronic device is within a threshold range while displaying an image on the display; identify a direction and a distance of the external electronic device with respect to the electronic device, based on the external electronic device being within the threshold range; identify whether the image is convertible into a three-dimensional (3D) image; and based on the image being convertible into the 3D image, provide a view of the 3D image that is varied to correspond to the direction and the distance of the external electronic device to the external electronic device.



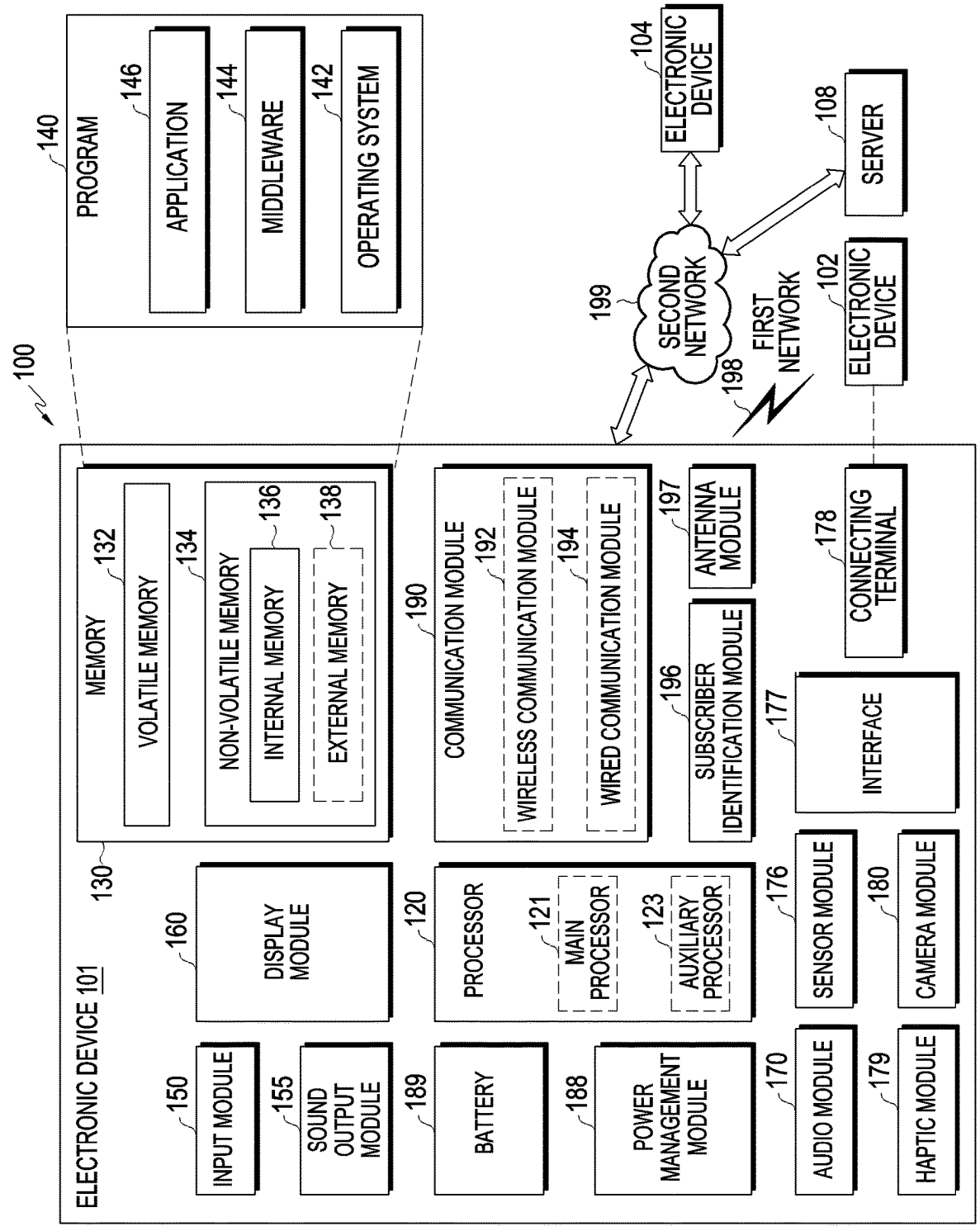

100
ELECTRONIC DEVICE 101
130
MEMORY
132
VOLATILE MEMORY
134
NON-VOLATILE MEMORY
136
INTERNAL MEMORY
138
EXTERNAL MEMORY
190
COMMUNICATION MODULE
192
WIRELESS COMMUNICATION MODULE
194
WIRED COMMUNICATION MODULE
197
ANTENNA MODULE
196
SUBSCRIBER IDENTIFICATION MODULE
177
INTERFACE
178
CONNECTING TERMINAL
160
DISPLAY MODULE
120
PROCESSOR
121
MAIN PROCESSOR
123
AUXILIARY PROCESSOR
176
SENSOR MODULE
180
CAMERA MODULE
150
INPUT MODULE
155
SOUND OUTPUT MODULE
189
BATTERY
188
POWER MANAGEMENT MODULE
170
AUDIO MODULE
179
HAPTIC MODULE
140
PROGRAM
146
APPLICATION
144
MIDDLEWARE
142
OPERATING SYSTEM
199
SECOND NETWORK
198
FIRST NETWORK
104
ELECTRONIC DEVICE
102
ELECTRONIC DEVICE
108
SERVER

FIG. 1

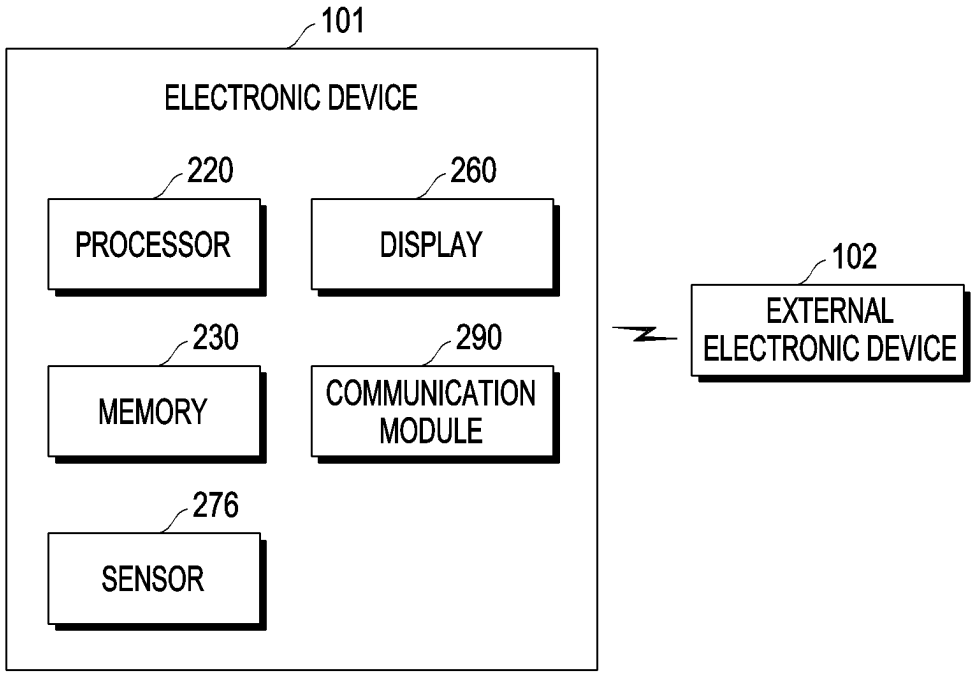

101
ELECTRONIC DEVICE
220
PROCESSOR
260
DISPLAY
230
MEMORY
290
COMMUNICATION MODULE
276
SENSOR
102
EXTERNAL ELECTRONIC DEVICE

FIG. 2

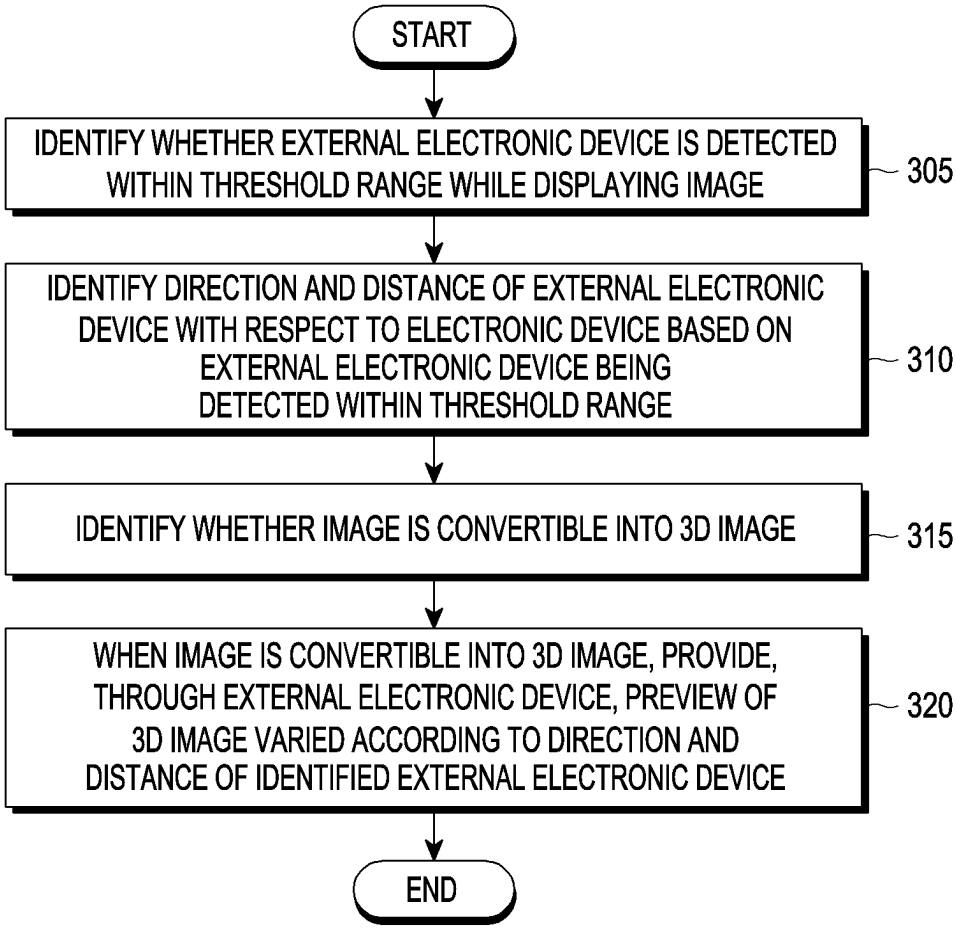

START
IDENTIFY WHETHER EXTERNAL ELECTRONIC DEVICE IS DETECTED WITHIN THRESHOLD RANGE WHILE DISPLAYING IMAGE
305
IDENTIFY DIRECTION AND DISTANCE OF EXTERNAL ELECTRONIC DEVICE WITH RESPECT TO ELECTRONIC DEVICE BASED ON EXTERNAL ELECTRONIC DEVICE BEING DETECTED WITHIN THRESHOLD RANGE
310
IDENTIFY WHETHER IMAGE IS CONVERTIBLE INTO 3D IMAGE
315
WHEN IMAGE IS CONVERTIBLE INTO 3D IMAGE, PROVIDE, THROUGH EXTERNAL ELECTRONIC DEVICE, PREVIEW OF 3D IMAGE VARIED ACCORDING TO DIRECTION AND DISTANCE OF IDENTIFIED EXTERNAL ELECTRONIC DEVICE
320
END

FIG. 3

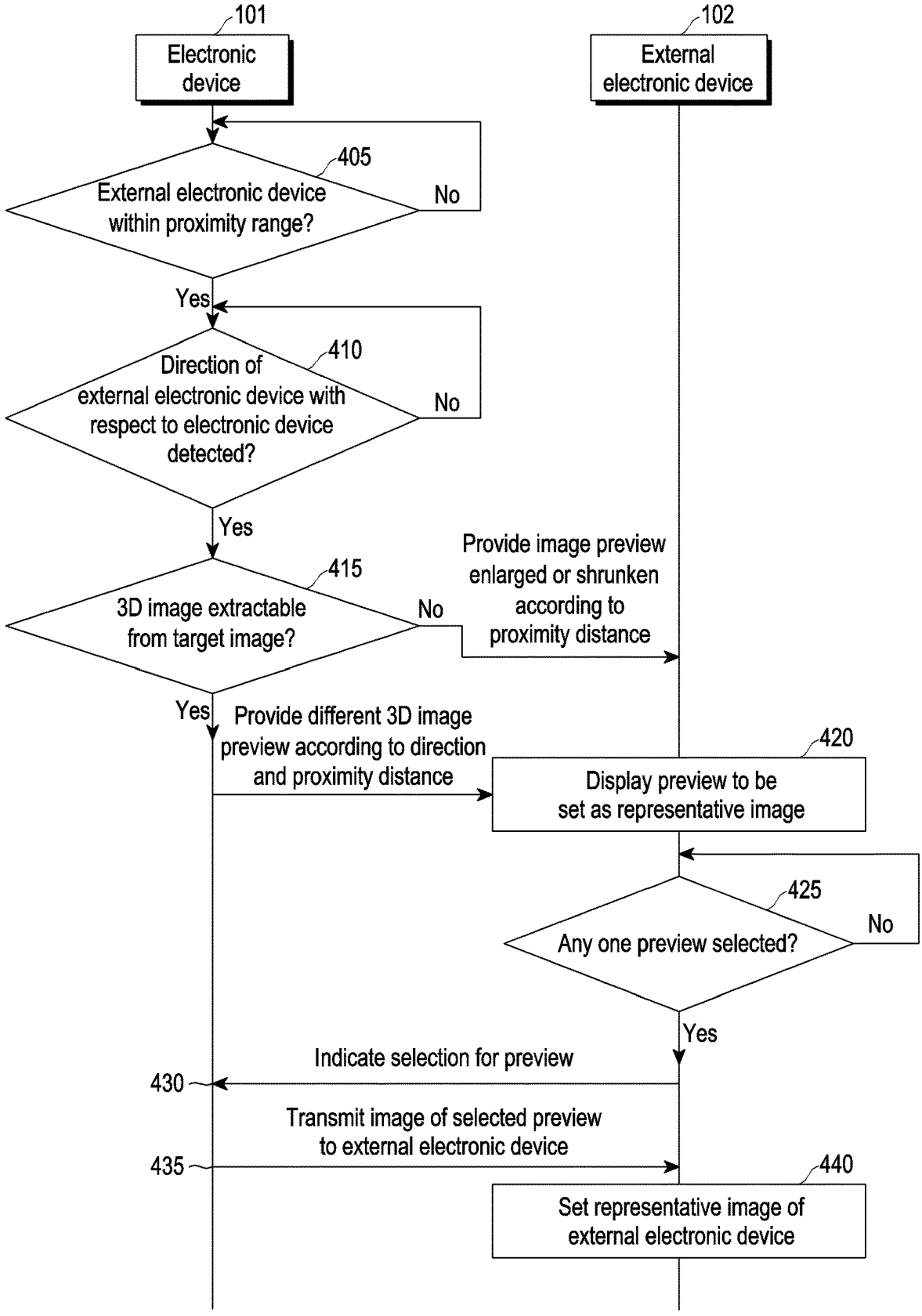
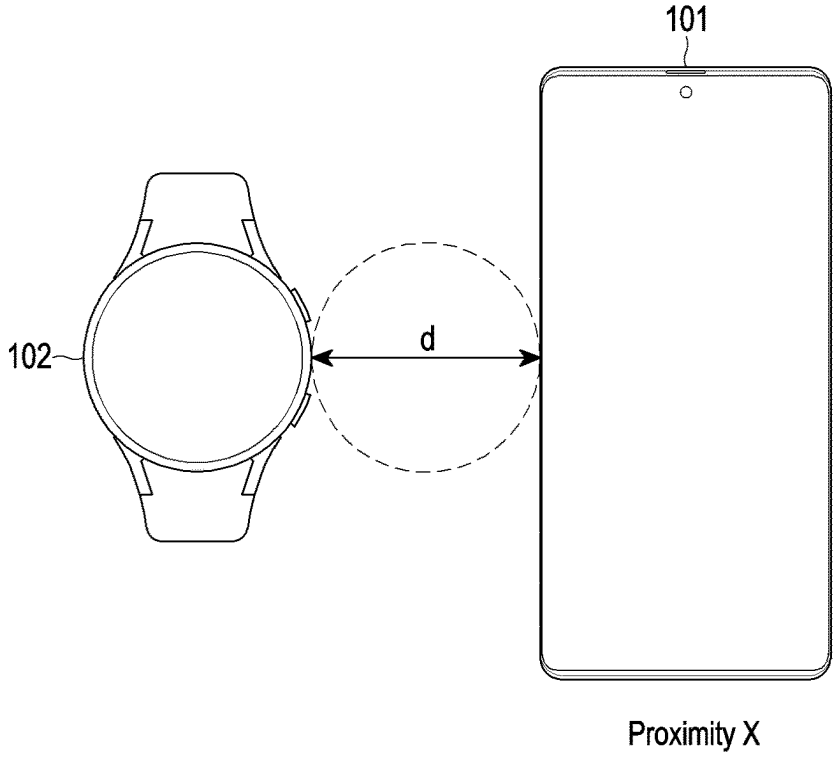
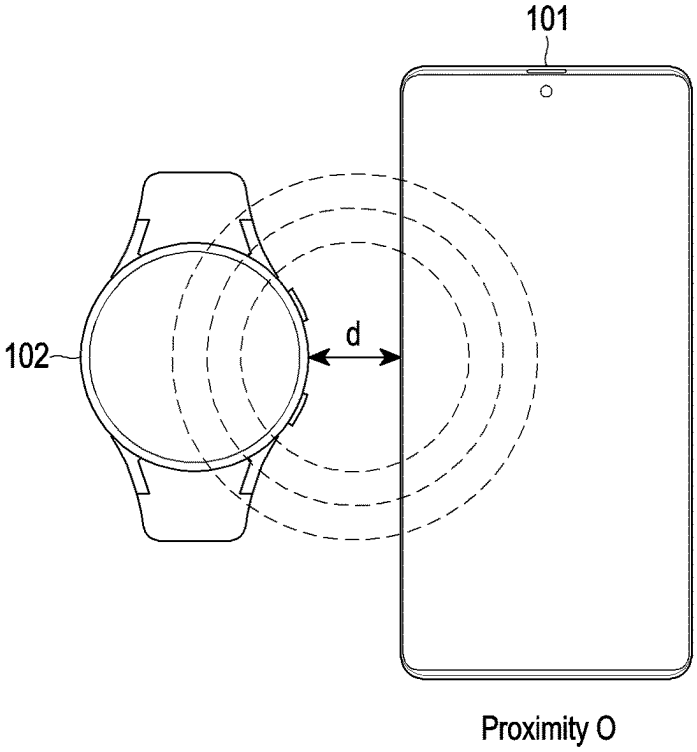

101
Electronic device
102
External electronic device
405
External electronic device within proximity range?
No
Yes
410
Direction of external electronic device with respect to electronic device detected?
No
Yes
415
3D image extractable from target image?
No
Provide image preview enlarged or shrunken according to proximity distance
Yes
Provide different 3D image preview according to direction and proximity distance
420
Display preview to be set as representative image
425
Any one preview selected?
No
Yes
Indicate selection for preview
430
Transmit image of selected preview to external electronic device
435
440
Set representative image of external electronic device

FIG. 4

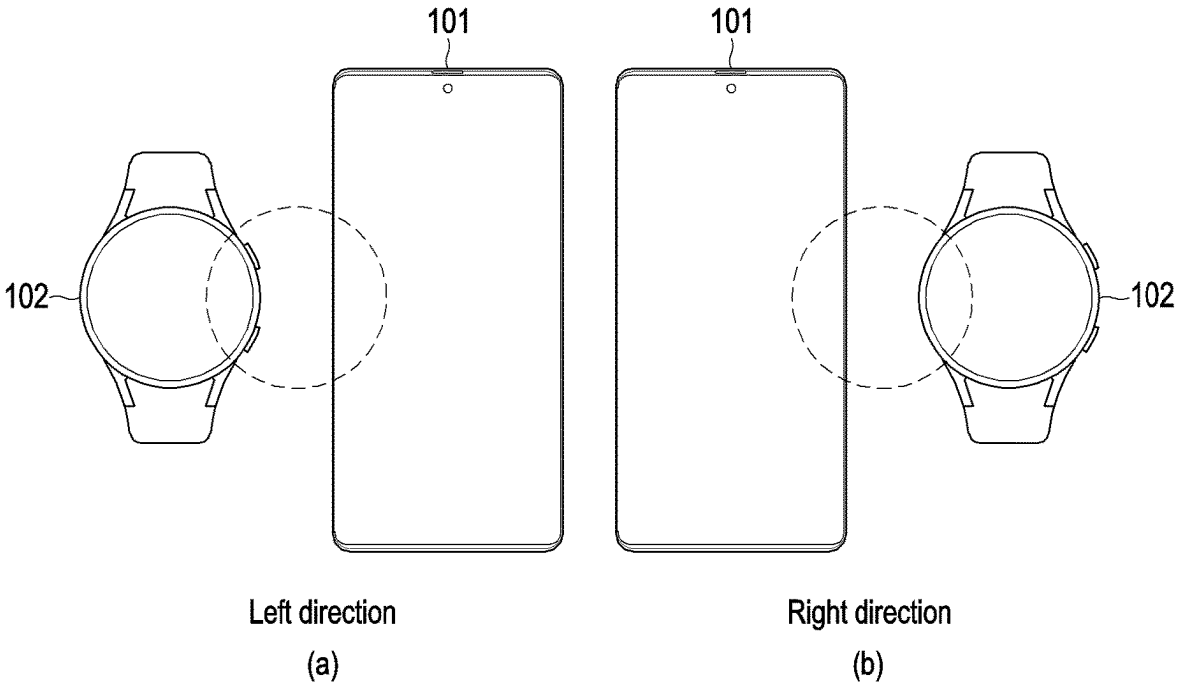


(a)



(b)

FIG. 5


101
101
102
102
Left direction
(a)
Right direction
(b)

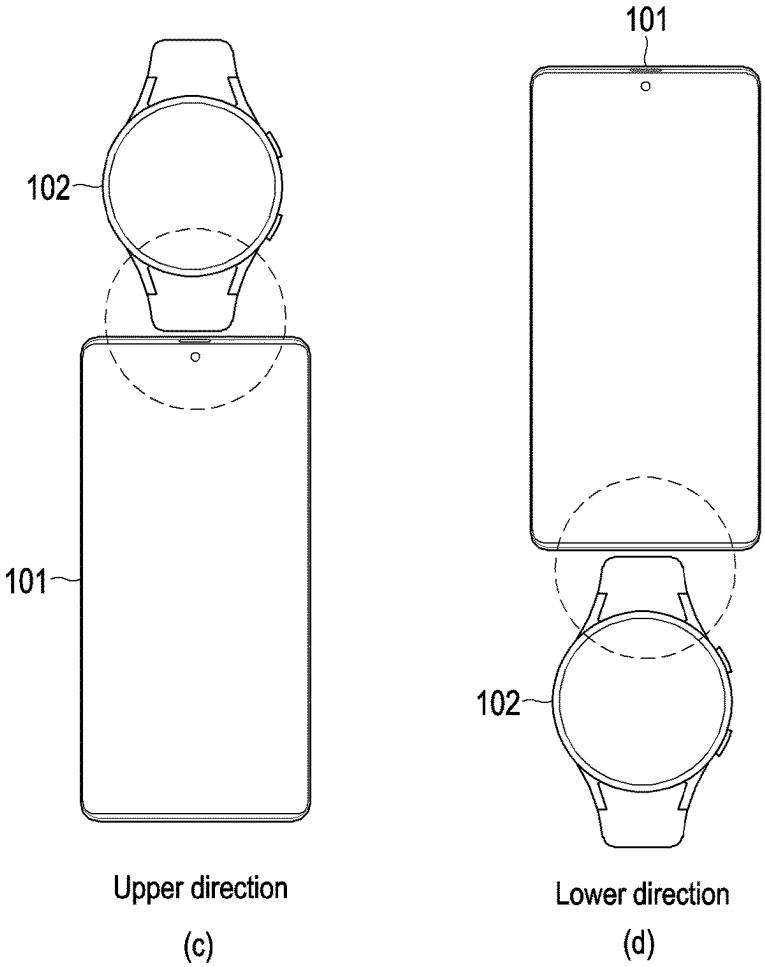

101
102
101
102
Upper direction
(c)
Lower direction
(d)

FIG. 6

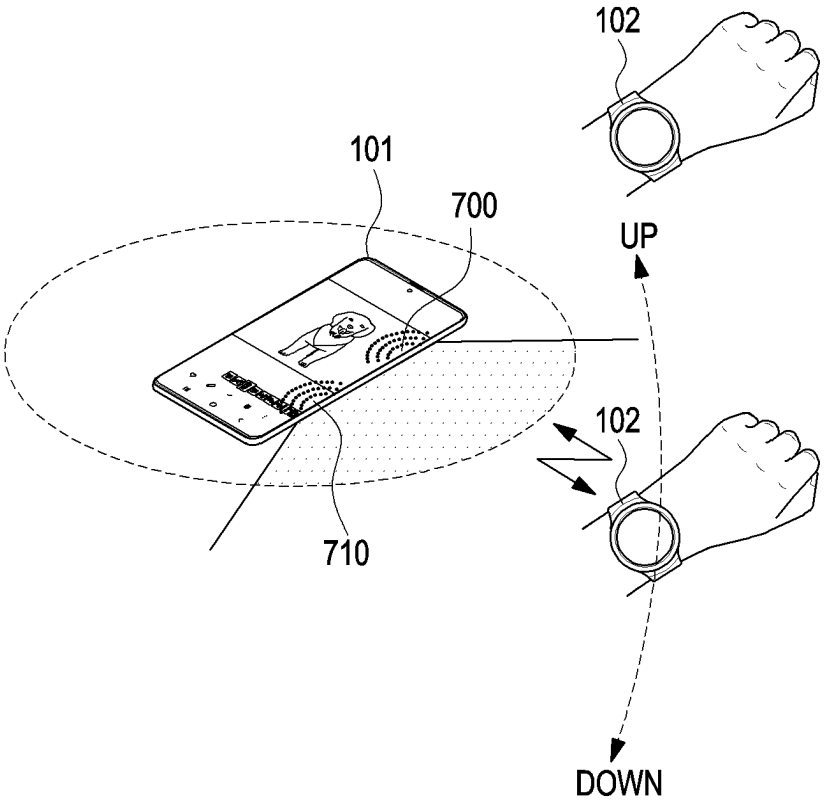


FIG. 7A

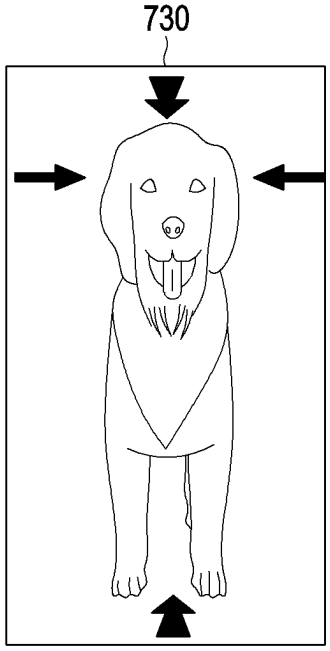


FIG. 7B

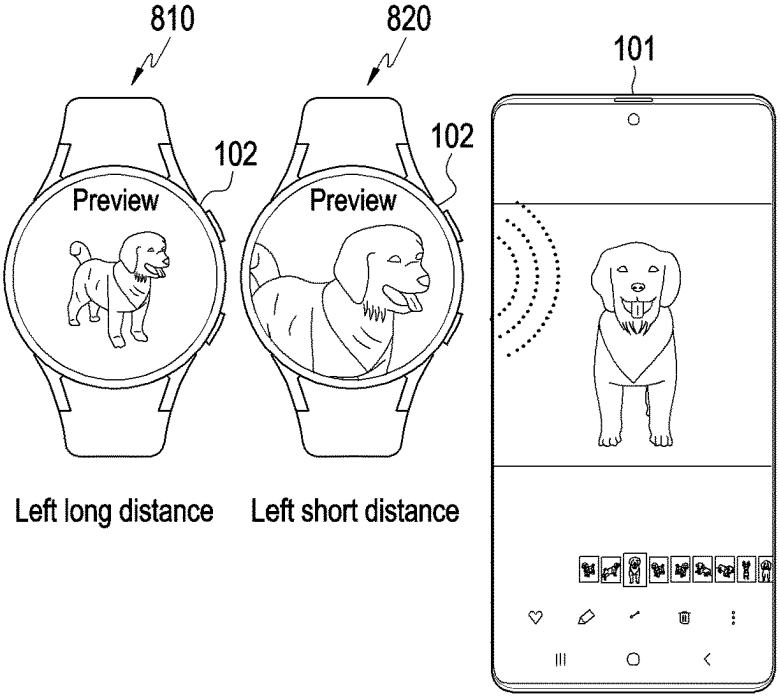

810
820
101
102
102
Preview
Preview
Left long distance
Left short distance

FIG. 8A

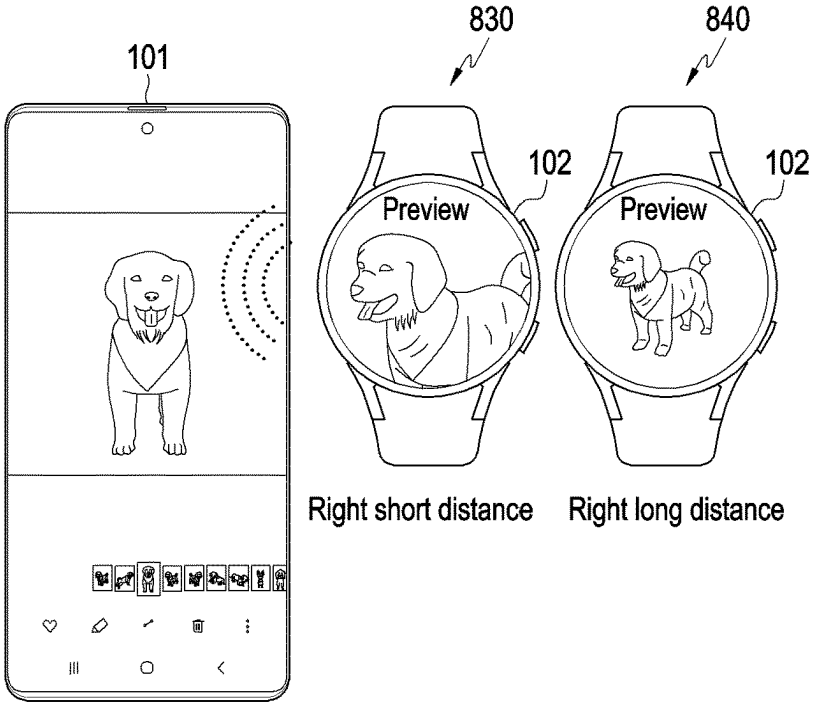

101
830
840
102
102
Preview
Preview
Right short distance
Right long distance

FIG. 8B

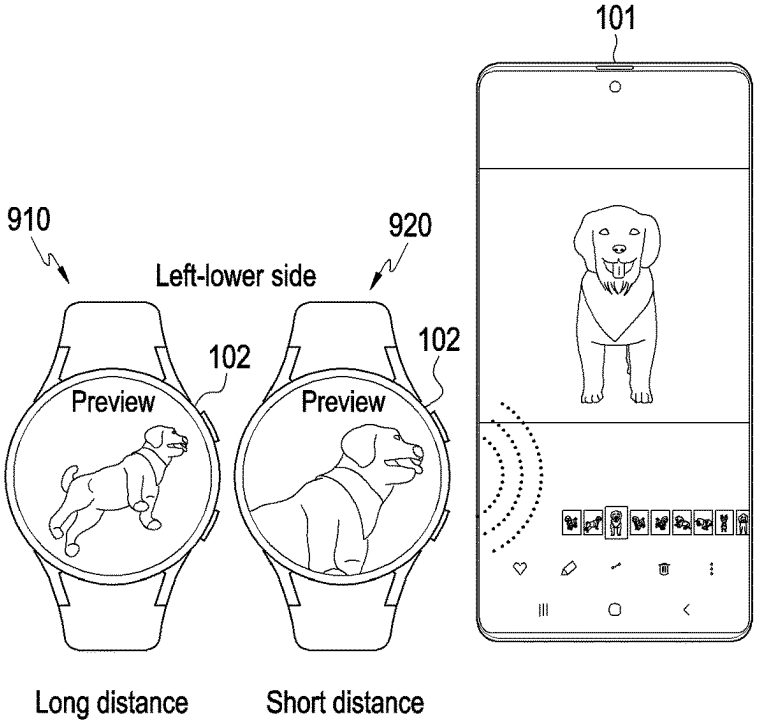

101
910
920
Left-lower side
102
102
Preview
Preview
Long distance
Short distance

FIG. 9A

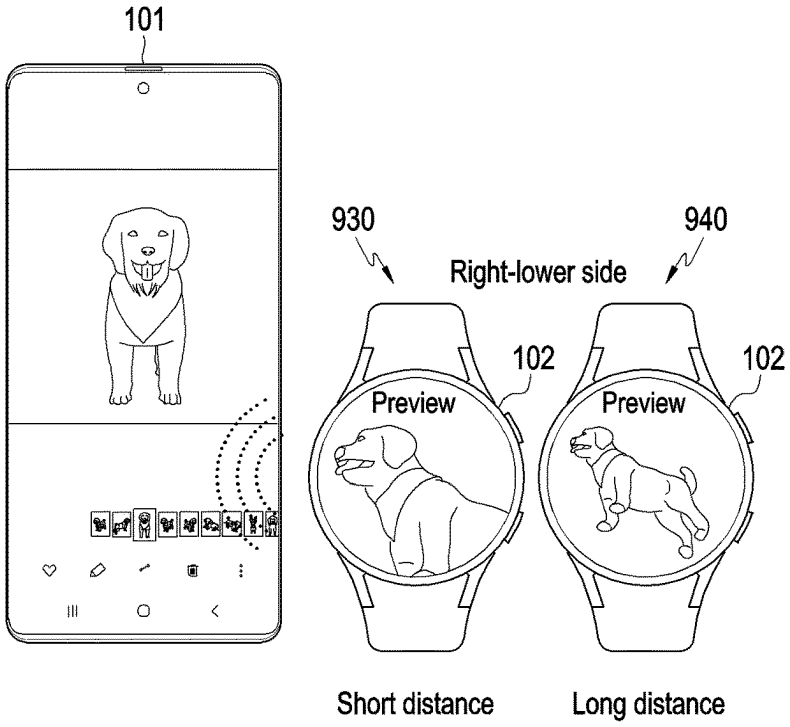

101
930
940
Right-lower side
102
102
Preview
Preview
Short distance
Long distance

FIG. 9B

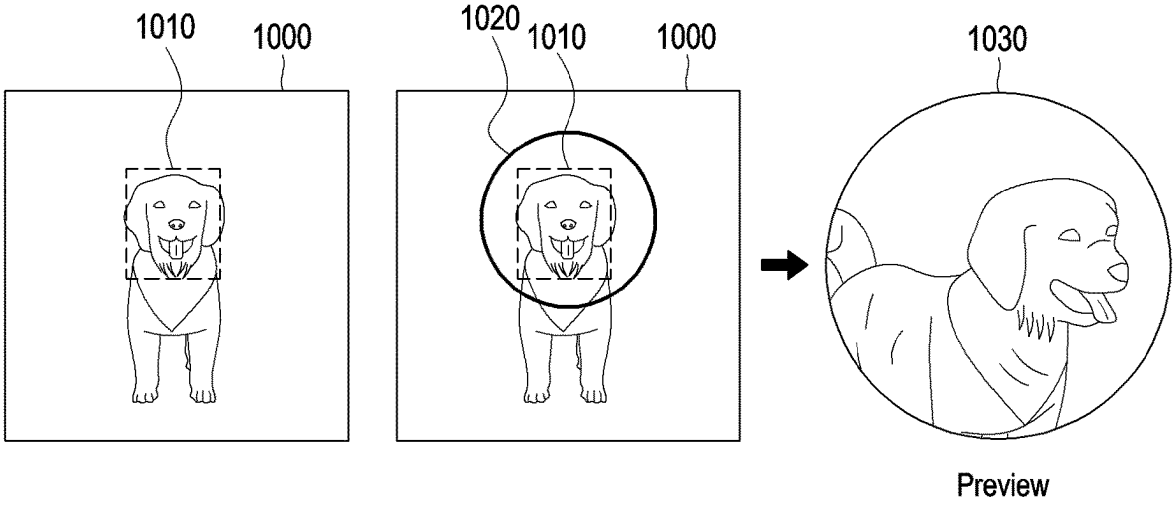


FIG. 10

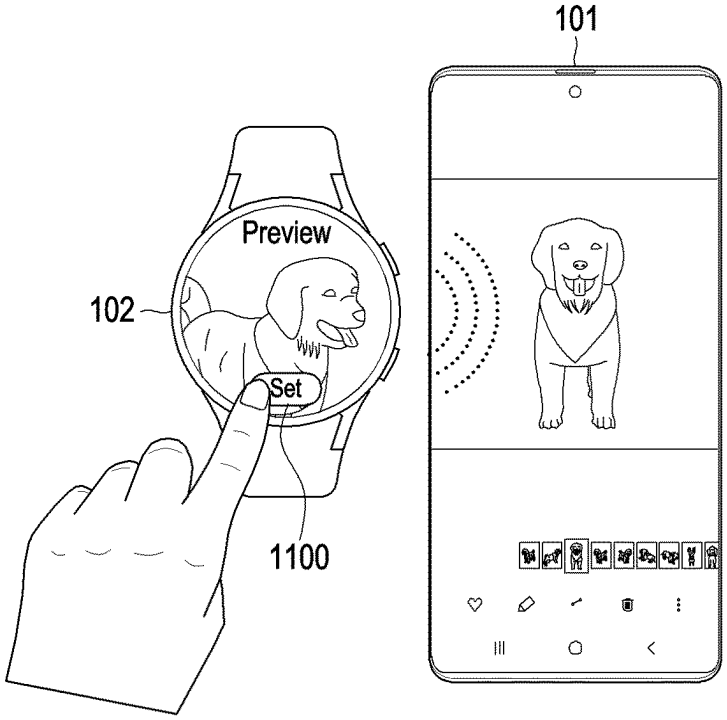


FIG. 11A

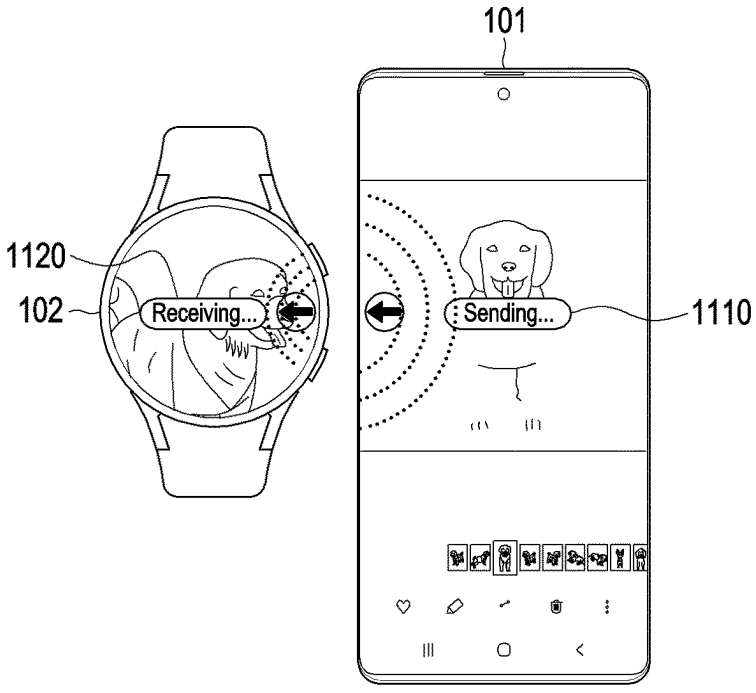


FIG. 11B

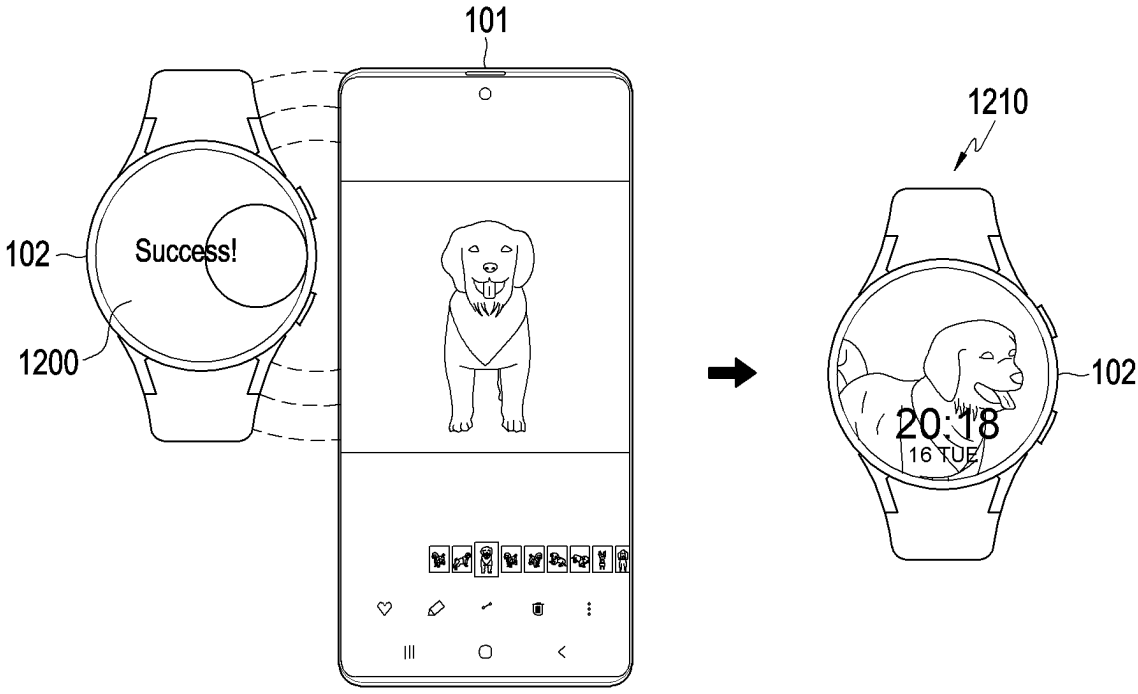


FIG. 12

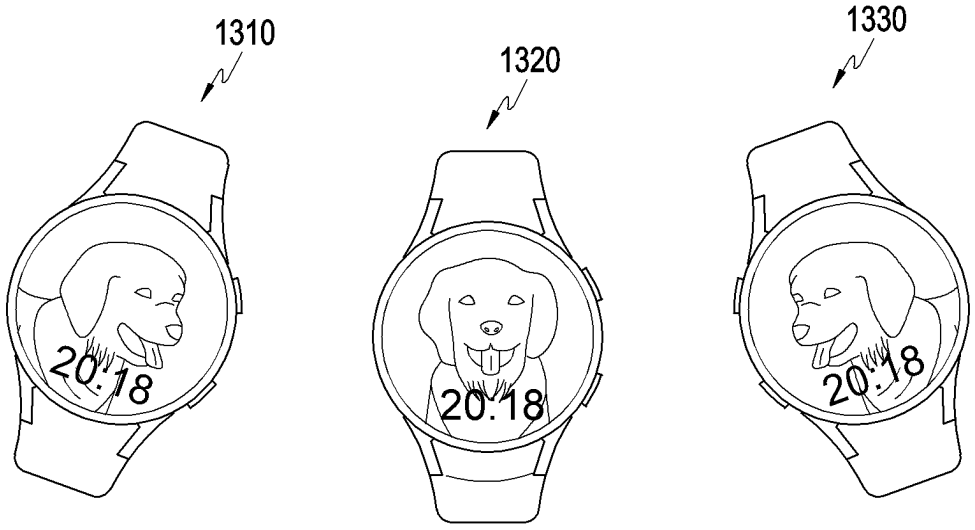


FIG. 13

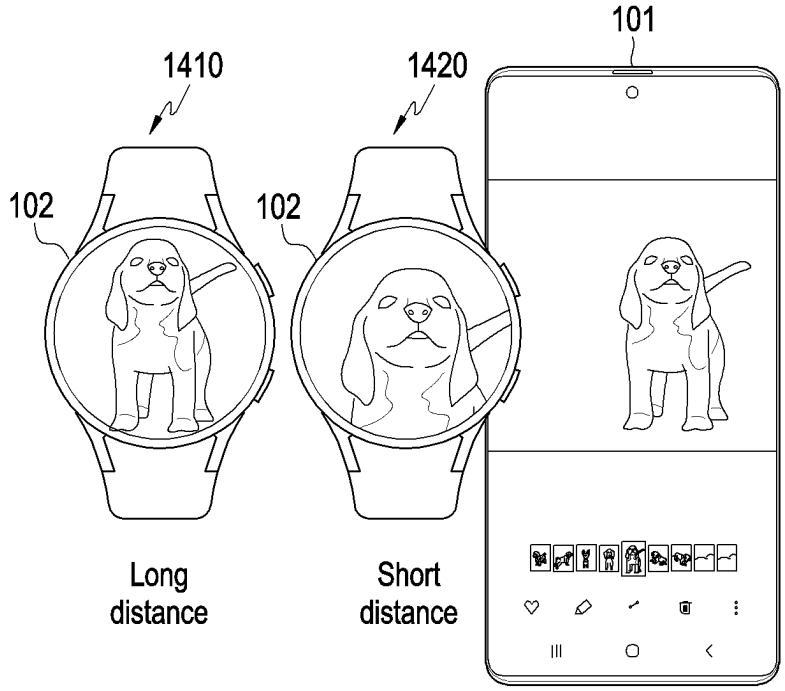


FIG. 14A

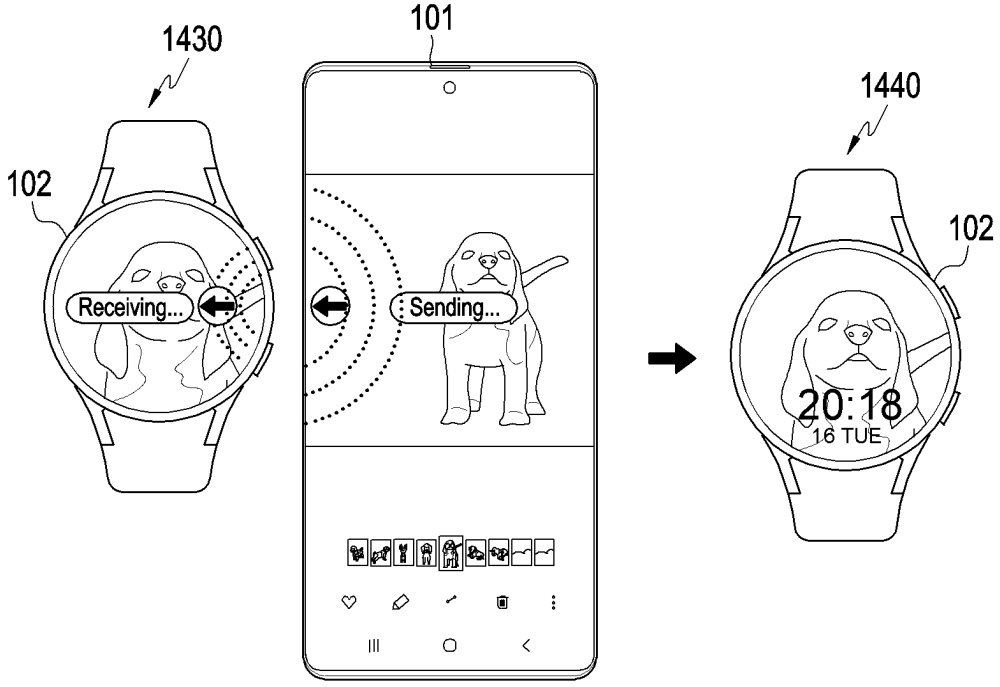


FIG. 14B

ELECTRONIC DEVICE FOR PROVIDING REPRESENTATIVE IMAGE OF EXTERNAL ELECTRONIC DEVICE, METHOD FOR OPERATING SAME, AND STORAGE MEDIUM

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of International Application No. PCT/KR2023/017105, filed on Oct. 31, 2023, in the Korean Intellectual Property Receiving Office, which is based on and claims priority to Korean Patent Application No. 10-2022-0147655, filed on Nov. 8, 2022 and Korean Patent Application No. 10-2022-0149285, filed on Nov. 10, 2022, in the Korean Intellectual Property Office, the disclosures of which are incorporated by reference herein in their entireties.

BACKGROUND

1. Field

[0002] The disclosure relates to an electronic device for providing a representative image of an external electronic device, an operation method thereof, and a storage medium.

2. Description of Related Art

[0003] With the development of communication technologies, wearable electronic devices may come in a more compact and lightweight form factor to be worn on the user's body without discomfort. For example, commercially available wearable electronic devices include head mounted display (HMD) devices, smart watches (or bands), contact lens-type devices, ring-type devices, glove-type devices, shoe-type devices, or clothing-type devices. Since the wearable electronic device is directly worn on the user's body, more portability and user accessibility may be obtained.

[0004] As a recent consumption trend places more importance on design, use convenience of wearable electronic devices, as well as the external design of wearable electronic devices, may be considered a critical factor in the development of wearable electronic devices.

SUMMARY

[0005] According to an aspect of the disclosure, an electronic device may include: a communication module; a display; a processor; and memory storing instructions that, when executed by the processor individually or collectively, cause the electronic device to: connect to an external electronic device through the communication module; identify whether the external electronic device is within a threshold range while displaying an image on the display; identify a direction and a distance of the external electronic device with respect to the electronic device, based on the external electronic device being within the threshold range; identify whether the image is convertible into a three-dimensional (3D) image; and based on the image being convertible into the 3D image, provide a view of the 3D image that is varied to correspond to the direction and the distance of the external electronic device to the external electronic device.

[0006] In the view of the 3D image, a size and surface of an object included in the image may be varied to correspond to the identified direction and distance of the external electronic device.

[0007] The instructions, when executed by the processor individually or collectively, cause the electronic device to: in a state in which the view of the 3D image is displayed by the external electronic device, identify whether the direction and the distance of the external electronic device are varied; provide a view of a 3D image to the external electronic device, wherein a size and a surface of an object included in the image are varied as the direction and the distance of the external electronic device are varied; and based on a selection for a watchface setting of the external electronic device, transmit a 3D image corresponding to the selection for the watchface setting to the external electronic device.

[0008] The instructions, when executed by the processor individually or collectively, cause the electronic device to identify the direction and the distance of the external electronic device with respect to the electronic device based on at least one of an ultra-wide band (UWB) communication scheme or a Bluetooth low energy (BLE) communication scheme of the communication module.

[0009] The instructions, when executed by the processor individually or collectively, cause the electronic device to: identify an object included in the image; and generate the 3D image based on an object area in which the identified object is included.

[0010] The instructions, when executed by the processor individually or collectively, cause the electronic device to provide, to the external electronic device, the view of the 3D image such that a size of the object area in which the identified object is included corresponds to a display size of the external electronic device.

[0011] The external electronic device may include a watch-type wearable electronic device.

[0012] The instructions, when executed by the processor individually or collectively, cause the electronic device to: based on the image not being convertible into the 3D image, provide a view of the image that is sized according to the distance of the external electronic device to the external electronic device.

[0013] The instructions, when executed by the processor individually or collectively, cause the electronic device to: based on transmitting the 3D image corresponding to the selection as the watchface of the external electronic device to the external electronic device, transmit, to the external electronic device, a plurality of 3D images corresponding to a preset angular range such that an object included in the image is varied to correspond to a movement of the external electronic device within the preset angular range.

[0014] The instructions, when executed by the processor individually or collectively, cause the electronic device to: while displaying a 3D graphic image on the display, identify the direction and the distance of the external electronic device with respect to the electronic device, based on the external electronic device being within the threshold range; and transmit a view of the 3D image to the external electronic device such that a view of the 3D graphic image corresponding to the direction and the distance of the external electronic device is provided to the external device.

[0015] According to an aspect of the disclosure, a method for providing a representative image of an external electronic device by an electronic device may include: identifying whether the external electronic device is within a threshold range while displaying an image; identifying a direction and a distance of the external electronic device with respect to the electronic device, based on the external

electronic device being within the threshold range; identifying whether the image is convertible into a three-dimensional (3D) image; and based on the image being convertible into the 3D image, providing a preview of the 3D image that is varied to correspond to the direction and the distance of the external electronic device to the external electronic device.

[0016] In the view of the 3D image, a size and a surface of an object included in the image may be varied to correspond to the direction and the distance of the external electronic device.

[0017] The method may further include: in a state in which the view of the 3D image is displayed by the external electronic device, identifying whether the direction and distance of the external electronic device are varied; providing a view of a 3D image, wherein a size and a surface of an object included in the image are varied as the direction and the distance of the external electronic device are varied, to the external electronic device; and based on a selection for a watchface setting of the external electronic device, transmitting a 3D image corresponding to the selection for the watchface setting to the external electronic device.

[0018] The method may further include: based on the image being convertible into the 3D image, identifying an object included in the image; and generating a 3D image based on an object area in which the identified object is included.

[0019] According to an aspect of the disclosure, a non-transitory computer-readable storage medium storing instructions may be configured to, when executed by a processor of an electronic device, cause the electronic device to perform at least one operation, and the at least one operation may include: identifying whether the external electronic device is within a threshold range while displaying an image; identifying a direction and a distance of the external electronic device with respect to the electronic device, based on the external electronic device being within the threshold range; identifying whether the image is convertible into a three-dimensional (3D) image; and based on the image being convertible into the 3D image, providing a view of the 3D image that is varied to correspond to the direction and the distance of the external electronic device to the external electronic device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] The above and other aspects, features, and advantages of certain embodiments of the present disclosure will be more apparent from the following description taken in conjunction with the accompanying drawings, in which:

[0021] FIG. **1** is a block diagram illustrating an electronic device in a network environment according to an embodiment;

[0022] FIG. **2** is a block diagram illustrating an internal configuration of an electronic device communicating with an external electronic device according to an embodiment;

[0023] FIG. **3** is a flowchart illustrating operations of an electronic device for providing a representative image of an external electronic device according to an embodiment;

[0024] FIG. **4** is a flowchart illustrating signal transmission/reception between an electronic device and an external electronic device according to an embodiment;

[0025] FIG. **5** is a view illustrating a method for identifying a distance from an electronic device to an external electronic device according to an embodiment;

[0026] FIG. **6** is a view illustrating a method for identifying a direction of an external electronic device with respect to an electronic device according to an embodiment;

[0027] FIG. **7**A is a view illustrating a method for identifying an upper or lower direction of an external electronic device with respect to an electronic device according to an embodiment;

[0028] FIG. **7**B is a view illustrating a method for obtaining a 3D image according to an embodiment;

[0029] FIG. **8**A is an example view illustrating an external electronic device displaying a preview that varies depending on a left long distance or a left short distance with respect to an electronic device according to an embodiment;

[0030] FIG. **8**B is an example view illustrating an external electronic device displaying a preview that varies depending on a right long distance or a right short distance with respect to an electronic device according to an embodiment;

[0031] FIG. **9**A is an example view illustrating an external electronic device displaying a preview that varies depending on a left lower long distance or a left lower short distance with respect to an electronic device according to an embodiment;

[0032] FIG. **9**B is an example view illustrating an external electronic device displaying a preview that varies depending on a right lower long distance or a right lower short distance with respect to an electronic device according to an embodiment;

[0033] FIG. **10** is a view illustrating a preview with respect to an object included in an image according to an embodiment;

[0034] FIG. **11**A is a view illustrating a method for setting a representative image according to an embodiment;

[0035] FIG. **11**B is a view illustrating a method for transmitting an image according to a setting of a representative image according to an embodiment;

[0036] FIG. **12** is an example view illustrating setting completion of a representative image according to an embodiment;

[0037] FIG. **13** is an example view illustrating a representative image that varies according to a movement of an external electronic device within a predetermined angular range according to an embodiment;

[0038] FIG. **14**A is an example view illustrating an external electronic device displaying a preview that resizes depending on distance when it is not convertible into a 3D image according to an embodiment; and

[0039] FIG. **14**B is an example view according to setting completion of a representative image when it is not convertible into a 3D image according to an embodiment.

DETAILED DESCRIPTION

[0040] FIG. **1** is a block diagram illustrating an electronic device **101** in a network environment **100** according to various embodiments. Referring to FIG. **1**, the electronic device **101** in the network environment **100** may communicate with at least one of an electronic device **102** via a first network **198** (e.g., a short-range wireless communication network), or an electronic device **104** or a server **108** via a second network **199** (e.g., a long-range wireless communication network). According to an embodiment, the electronic device **101** may communicate with the electronic device **104** via the server **108**. According to an embodiment, the electronic device **101** may include a processor **120**, memory **130**, an input module **150**, a sound output module **155**, a

display module **160**, an audio module **170**, a sensor module **176**, an interface **177**, a connecting terminal **178**, a haptic module **179**, a camera module **180**, a power management module **188**, a battery **189**, a communication module **190**, a subscriber identification module (SIM) **196**, or an antenna module **197**. In an embodiment, at least one (e.g., the connecting terminal **178**) of the components may be omitted from the electronic device **101**, or one or more other components may be added in the electronic device **101**. According to an embodiment, some (e.g., the sensor module **176**, the camera module **180**, or the antenna module **197**) of the components may be integrated into a single component (e.g., the display module **160**).

[0041] The processor **120** may execute, for example, software (e.g., a program **140**) to control at least one other component (e.g., a hardware or software component) of the electronic device **101** coupled with the processor **120**, and may perform various data processing or computation. According to an embodiment, as at least part of the data processing or computation, the processor **120** may store a command or data received from another component (e.g., the sensor module **176** or the communication module **190**) in volatile memory **132**, process the command or the data stored in the volatile memory **132**, and store resulting data in non-volatile memory **134**. According to an embodiment, the processor **120** may include a main processor **121** (e.g., a central processing unit (CPU) or an application processor (AP)), or an auxiliary processor **123** (e.g., a graphics processing unit (GPU), a neural processing unit (NPU), an image signal processor (ISP), a sensor hub processor, or a communication processor (CP)) that is operable independently from, or in conjunction with, the main processor **121**. For example, when the electronic device **101** includes the main processor **121** and the auxiliary processor **123**, the auxiliary processor **123** may be configured to use lower power than the main processor **121** or to be specified for a designated function. The auxiliary processor **123** may be implemented as separate from, or as part of the main processor **121**.

[0042] The auxiliary processor **123** may control at least some of functions or states related to at least one component (e.g., the display module **160**, the sensor module **176**, or the communication module **190**) among the components of the electronic device **101**, instead of the main processor **121** while the main processor **121** is in an inactive (e.g., sleep) state, or together with the main processor **121** while the main processor **121** is in an active state (e.g., executing an application). According to an embodiment, the auxiliary processor **123** (e.g., an image signal processor or a communication processor) may be implemented as part of another component (e.g., the camera module **180** or the communication module **190**) functionally related to the auxiliary processor **123**. According to an embodiment, the auxiliary processor **123** (e.g., the neural processing unit) may include a hardware structure specified for artificial intelligence model processing. The artificial intelligence model may be generated via machine learning. Such learning may be performed, e.g., by the electronic device **101** where the artificial intelligence is performed or via a separate server (e.g., the server **108**). Learning algorithms may include, but are not limited to, e.g., supervised learning, unsupervised learning, semi-supervised learning, or reinforcement learning. The artificial intelligence model may include a plurality of artificial neural network layers. The artificial neural network may be a deep neural network (DNN), a convolutional neural network (CNN), a recurrent neural network (RNN), a restricted Boltzmann machine (RBM), a deep belief network (DBN), a bidirectional recurrent deep neural network (BRDNN), deep Q-network or a combination of two or more thereof but is not limited thereto. The artificial intelligence model may, additionally or alternatively, include a software structure other than the hardware structure.

[0043] The memory **130** may store various data used by at least one component (e.g., the processor **120** or the sensor module **176**) of the electronic device **101**. The various data may include, for example, software (e.g., the program **140**) and input data or output data for a command related thereto. The memory **130** may include the volatile memory **132** or the non-volatile memory **134**.

[0044] The program **140** may be stored in the memory **130** as software, and may include, for example, an operating system (OS) **142**, middleware **144**, or an application **146**.

[0045] The input module **150** may receive a command or data to be used by other component (e.g., the processor **120**) of the electronic device **101**, from the outside (e.g., a user) of the electronic device **101**. The input module **150** may include, for example, a microphone, a mouse, a keyboard, keys (e.g., buttons), or a digital pen (e.g., a stylus pen).

[0046] The sound output module **155** may output sound signals to the outside of the electronic device **101**. The sound output module **155** may include, for example, a speaker or a receiver. The speaker may be used for general purposes, such as playing multimedia or playing record. The receiver may be used for receiving incoming calls. According to an embodiment, the receiver may be implemented as separate from, or as part of the speaker.

[0047] The display module **160** may visually provide information to the outside (e.g., a user) of the electronic device **101**. The display module **160** may include, for example, a display, a hologram device, or a projector and control circuitry to control a corresponding one of the display, hologram device, and projector. According to an embodiment, the display module **160** may include a touch sensor configured to detect a touch, or a pressure sensor configured to measure the intensity of a force generated by the touch.

[0048] The audio module **170** may convert a sound into an electrical signal and vice versa. According to an embodiment, the audio module **170** may obtain the sound via the input module **150**, or output the sound via the sound output module **155** or a headphone of an external electronic device (e.g., an electronic device **102**) directly (e.g., wiredly) or wirelessly coupled with the electronic device **101**.

[0049] The sensor module **176** may detect an operational state (e.g., power or temperature) of the electronic device **101** or an environmental state (e.g., a state of a user) external to the electronic device **101**, and then generate an electrical signal or data value corresponding to the detected state. According to an embodiment, the sensor module **176** may include, for example, a gesture sensor, a gyro sensor, an atmospheric pressure sensor, a magnetic sensor, an accelerometer, a grip sensor, a proximity sensor, a color sensor, an infrared (IR) sensor, a biometric sensor, a temperature sensor, a humidity sensor, or an illuminance sensor.

[0050] The interface **177** may support one or more specified protocols to be used for the electronic device **101** to be coupled with the external electronic device (e.g., the elec-

tronic device **102**) directly (e.g., wiredly) or wirelessly. According to an embodiment, the interface **177** may include, for example, a high definition multimedia interface (HDMI), a universal serial bus (USB) interface, a secure digital (SD) card interface, or an audio interface.

[0051] A connecting terminal **178** may include a connector via which the electronic device **101** may be physically connected with the external electronic device (e.g., the electronic device **102**). According to an embodiment, the connecting terminal **178** may include, for example, an HDMI connector, a USB connector, an SD card connector, or an audio connector (e.g., a headphone connector).

[0052] The haptic module **179** may convert an electrical signal into a mechanical stimulus (e.g., a vibration or motion) or electrical stimulus which may be recognized by a user via his tactile sensation or kinesthetic sensation. According to an embodiment, the haptic module **179** may include, for example, a motor, a piezoelectric element, or an electric stimulator.

[0053] The camera module **180** may capture a still image or moving images. According to an embodiment, the camera module **180** may include one or more lenses, image sensors, image signal processors, or flashes.

[0054] The power management module **188** may manage power supplied to the electronic device **101**. According to an embodiment, the power management module **188** may be implemented as at least part of, for example, a power management integrated circuit (PMIC).

[0055] The battery **189** may supply power to at least one component of the electronic device **101**. According to an embodiment, the battery **189** may include, for example, a primary cell which is not rechargeable, a secondary cell which is rechargeable, or a fuel cell.

[0056] The communication module **190** may support establishing a direct (e.g., wired) communication channel or a wireless communication channel between the electronic device **101** and the external electronic device (e.g., the electronic device **102**, the electronic device **104**, or the server **108**) and performing communication via the established communication channel. The communication module **190** may include one or more communication processors that are operable independently from the processor **120** (e.g., the application processor (AP)) and supports a direct (e.g., wired) communication or a wireless communication. According to an embodiment, the communication module **190** may include a wireless communication module **192** (e.g., a cellular communication module, a short-range wireless communication module, or a global navigation satellite system (GNSS) communication module) or a wired communication module **194** (e.g., a local area network (LAN) communication module or a power line communication (PLC) module). A corresponding one of these communication modules may communicate with the external electronic device **104** via a first network **198** (e.g., a short-range communication network, such as Bluetooth™, wireless-fidelity (Wi-Fi) direct, or infrared data association (IrDA)) or a second network **199** (e.g., a long-range communication network, such as a legacy cellular network, a 5G network, a next-generation communication network, the Internet, or a computer network (e.g., local area network (LAN) or wide area network (WAN)). These various types of communication modules may be implemented as a single component (e.g., a single chip), or may be implemented as multi components (e.g., multi chips) separate from each other. The wireless communication module **192** may identify or authenticate the electronic device **101** in a communication network, such as the first network **198** or the second network **199**, using subscriber information (e.g., international mobile subscriber identity (IMSI)) stored in the subscriber identification module **196**.

[0057] The wireless communication module **192** may support a 5G network, after a 4G network, and next-generation communication technology, e.g., new radio (NR) access technology. The NR access technology may support enhanced mobile broadband (eMBB), massive machine type communications (mMTC), or ultra-reliable and low-latency communications (URLLC). The wireless communication module **192** may support a high-frequency band (e.g., the mmWave band) to achieve, e.g., a high data transmission rate. The wireless communication module **192** may support various technologies for securing performance on a high-frequency band, such as, e.g., beamforming, massive multiple-input and multiple-output (massive MIMO), full dimensional MIMO (FD-MIMO), array antenna, analog beam-forming, or large scale antenna. The wireless communication module **192** may support various requirements specified in the electronic device **101**, an external electronic device (e.g., the electronic device **104**), or a network system (e.g., the second network **199**). According to an embodiment, the wireless communication module **192** may support a peak data rate (e.g., 20 Gbps or more) for implementing eMBB, loss coverage (e.g., 164 dB or less) for implementing mMTC, or U-plane latency (e.g., 0.5 ms or less for each of downlink (DL) and uplink (UL), or a round trip of 1 ms or less) for implementing URLLC.

[0058] The antenna module **197** may transmit or receive a signal or power to or from the outside (e.g., the external electronic device). According to an embodiment, the antenna module **197** may include one antenna including a radiator formed of a conductor or conductive pattern formed on a substrate (e.g., a printed circuit board (PCB)). According to an embodiment, the antenna module **197** may include a plurality of antennas (e.g., an antenna array). In this case, at least one antenna appropriate for a communication scheme used in a communication network, such as the first network **198** or the second network **199**, may be selected from the plurality of antennas by, e.g., the communication module **190**. The signal or the power may then be transmitted or received between the communication module **190** and the external electronic device via the selected at least one antenna. According to an embodiment, other parts (e.g., radio frequency integrated circuit (RFIC)) than the radiator may be further formed as part of the antenna module **197**.

[0059] According to various embodiments, the antenna module **197** may form a mm Wave antenna module. According to an embodiment, the mmWave antenna module may include a printed circuit board, a RFIC disposed on a first surface (e.g., the bottom surface) of the printed circuit board, or adjacent to the first surface and capable of supporting a designated high-frequency band (e.g., the mm Wave band), and a plurality of antennas (e.g., array antennas) disposed on a second surface (e.g., the top or a side surface) of the printed circuit board, or adjacent to the second surface and capable of transmitting or receiving signals of the designated high-frequency band.

[0060] At least some of the above-described components may be coupled mutually and communicate signals (e.g., commands or data) therebetween via an inter-peripheral

communication scheme (e.g., a bus, general purpose input and output (GPIO), serial peripheral interface (SPI), or mobile industry processor interface (MIPI)).

[0061] According to an embodiment, instructions or data may be transmitted or received between the electronic device **101** and the external electronic device **104** via the server **108** coupled with the second network **199**. The external electronic devices **102** or **104** each may be a device of the same or a different type from the electronic device **101**. According to an embodiment, all or some of operations to be executed at the electronic device **101** may be executed at one or more of the external electronic devices **102**, **104**, or **108**. For example, if the electronic device **101** should perform a function or a service automatically, or in response to a request from a user or another device, the electronic device **101**, instead of, or in addition to, executing the function or the service, may request the one or more external electronic devices to perform at least part of the function or the service. The one or more external electronic devices receiving the request may perform the at least part of the function or the service requested, or an additional function or an additional service related to the request, and transfer an outcome of the performing to the electronic device **101**. The electronic device **101** may provide the outcome, with or without further processing of the outcome, as at least part of a reply to the request. To that end, a cloud computing, distributed computing, mobile edge computing (MEC), or client-server computing technology may be used, for example. The electronic device **101** may provide ultra low-latency services using, e.g., distributed computing or mobile edge computing. In another embodiment, the external electronic device **104** may include an Internet-of-things (IoT) device. The server **108** may be an intelligent server using machine learning and/or a neural network. According to an embodiment, the external electronic device **104** or the server **108** may be included in the second network **199**. The electronic device **101** may be applied to intelligent services (e.g., smart home, smart city, smart car, or health-care) based on 5G communication technology or IoT-related technology.

[0062] In the following description, the components easy to understand from the description of the above embodiments are denoted with or without the same reference numerals and their detailed description may be skipped. According to an embodiment of the disclosure, an electronic device **101** may be implemented by selectively combining configurations of different embodiments, and the configuration of one embodiment may be replaced by the configuration of another embodiment. However, it is noted that the present disclosure is not limited to a specific drawing or embodiment.

[0063] FIG. **2** is a block diagram illustrating an internal configuration of an electronic device communicating with an external electronic device according to an embodiment.

[0064] Referring to FIG. **2**, according to an embodiment, an electronic device **101** (e.g., the electronic device **101** of FIG. **1**) may include a processor **220** (e.g., the processor **120** of FIG. **1**), memory **230** (e.g., the memory **130** of FIG. **1**), a display **260** (e.g., the display module **160** of FIG. **1**), a sensor **276** (e.g., the sensor module **176** of FIG. **1**), and/or a communication module or communication interface **290** (e.g., the communication module **190** of FIG. **1**). Not all of the components of FIG. **2** are essential ones of the electronic device **101** but the electronic device **101** may be implemented with more or less than the components of FIG. **2**. The external electronic device **102** of FIG. **2** may be the electronic device **102** of FIG. **1**. According to an embodiment, the external electronic device **102** may be a watch-type wearable electronic device.

[0065] According to an embodiment, the memory **230** may store a program or at least one application supporting at least one user function, executed through an operating system related to the operation of the electronic device **101** and/or the electronic device **101**. According to an embodiment, the memory **230** may store a control program for controlling the electronic device **101**, a UI related to an application downloaded from the outside or provided by the manufacturer and images for providing the UI, user information, documents, databases, or related data. For example, the memory **230** may store user settings related to an operation for setting a representative image of the external electronic device **102**.

[0066] According to an embodiment, the processor **220** may store, in the memory **230**, a setting related to the control of displaying, through the external electronic device **102**, an image in which a size or shown portion is varied according to the position of the external electronic device **102** with respect to the electronic device **101** and, in response to a selection for the image displayed on the external electronic device **102**, setting the selected image as a representative image of the external electronic device **102**. For example, the position of the external electronic device **102** may indicate the direction and/or distance of the external electronic device **102** within a predetermined range of the electronic device **101** with respect to the electronic device **101**.

[0067] According to an embodiment, the image in which the size or shown portion varies according to the position of the external electronic device **102** may be a three-dimensional (3D) image. According to an embodiment, the memory **230** may store a learning network model configured to convert a 2D image into a 3D image (or a 3D modeling image) when the 2D image is input. The memory **230** may store instructions for controlling to display the 3D image obtained by applying the learning network model to the 2D image on the display of the external electronic device **102**. Here, the learning network model may be trained using 2D images. Here, the 2D image may be at least one of a photo, a picture, a still image, or a captured image. The 2D image may include at least one object for converting into a 3D image. Here, the object may correspond to an object capable of specifying the shape of an object included in the image, such as a person or an animal.

[0068] According to an embodiment, the memory **230** may store a 3D image in another form as well as the 3D image obtained by applying the learning network model to the 2D image. For example, the 3D image in the other form may be a 3D graphic image, and may include a virtual 3D character image, such as an avatar. For example, the processor **220** may control to display, through the external electronic device **102**, the 3D graphic image (e.g., 3D character image) in which the size or shown portion is varied according to the position of the external electronic device **102** with respect to the electronic device **101** without the need for performing the operation of converting into a 3D image using the learning network model when the external electronic device **102** approaches within a predetermined

range of the electronic device **101** in a state in which the 3D graphic image (e.g., 3D character image) is displayed on the display **260**.

[0069] According to an embodiment, the communication module **290** may be communicatively connected with an external electronic device **102**. According to an embodiment, the communication module **290** may be connected with one or more external electronic devices (e.g., **102** of FIG. **1**) through a 1:1 connection or 1:n connection. Further, the communication module **290** may be wirelessly connected to the external electronic device **102** through various communication schemes.

[0070] According to an embodiment, the communication module **290** may operate based on at least one of ultra-wide band (UWB) communication schemes or Bluetooth low energy (BLE) communication schemes.

[0071] For example, the communication module **290** may include a UWB communication module. The UWB communication module may support the electronic device **101** to perform UWB communication with the external electronic device **102**. The UWB communication module may measure the distance between the electronic device **101** and the external electronic device **102** through UWB communication. The UWB communication module may measure the direction (e.g., angle of arrival (AOA)) of the external electronic device **102** using a plurality of antennas.

[0072] In describing the external electronic device **102**, detailed descriptions of configurations similar to those of the embodiment of FIG. **1** or easily understandable through the embodiment of FIG. **1** may be omitted.

[0073] According to an embodiment, an example is described below in which the electronic device **101** is a device outputting content such as an image, and the external electronic device **102** is a wearable electronic device (e.g., a wearable watch) that may be worn (or attached) on a body part of the user, but the disclosure is not limited thereto. For example, even when the electronic device **101** is, e.g., a tablet, and the external electronic device **102** is, e.g., a smartphone, operations related to the control of providing a preview obtained by converting the image displayed on the tablet screen into a 3D image varied according to the direction and distance of the external electronic device **102** to the external electronic device **102** and setting it as a representative image of the external electronic device **102** in response to selection of the preview may be performed.

[0074] In an embodiment, an example of providing an image varied based on the position or direction of one external electronic device **102** with respect to the electronic device **101** is described, but it is also possible to control an image varied based on the position or direction with respect to two or more external electronic devices **102**. For example, when the user wears a plurality of external electronic devices **102** including a wearable watch and a head-mounted display, the processor **220** may be connected with the n external electronic devices **102** through the 1:n connection supported by the communication module **290**.

[0075] In an embodiment, since the external electronic device **102**, such as a head-mounted display, includes a camera (e.g., ToF camera or eye tracking camera), it may grasp distance information with the electronic device **101** and track the user's gaze.

[0076] In an embodiment, the processor **220** may obtain information related to the user's position from the n external electronic devices **102**. The user position-related information may be used to identify the user's position or direction with respect to the electronic device **101**. For example, the processor **220** may receive user position-related information that combines the distance information, user gaze information, user direction information, and/or user altitude information with the electronic device **101** received from the n external electronic devices **102**. The processor **220** may determine the user's moving position based on the received user position-related information and perform image display control corresponding to the determined user position. As such, when two or more external electronic devices are used, the accuracy for determining the position of the watch-type wearable electronic device may be enhanced.

[0077] The sensor **276** according to an embodiment may include a proximity sensor for detecting approach of the external electronic device **102**. For example, the processor **220** may identify whether the external electronic device **102** is detected within a predetermined range using the proximity sensor. According to an embodiment, the processor **220** may identify the direction and distance of the external electronic device **102** with respect to the electronic device **101** based on the external electronic device **102** being detected within the predetermined range. For example, the processor **220** may identify the direction and distance of the external electronic device **102** based on at least one of an ultra-wide band (UWB) communication scheme or Bluetooth low energy (BLE) communication scheme of the communication module **290**.

[0078] According to an embodiment, the sensor **276** may include a gyro sensor, an accelerometer, and/or a geomagnetic sensor for detecting the state (e.g., posture) of the electronic device **101**. For example, the electronic device **101** may determine a relative azimuth to a reference azimuth using the geomagnetic sensor. The electronic device **101** may obtain the final azimuth using UWB by means of the relative azimuth to the reference azimuth and the UWB angle of arrival (AOA) using the geomagnetic sensor. The sensor **276** may be used as a 9-axis motion sensor using a gyro sensor, accelerometer, and geomagnetic sensor.

[0079] The processor **220** may execute at least one application and visually output content corresponding to the application through the display **260**. For example, processor **220** may output the captured image through the display **260** in response to a selection of a camera application. Further, the processor **220** may output stored images through the display **260** in response to a selection of a gallery application. The image through the display **260** may be referred to as content or may also be referred to as data, screen data, or application execution screen related to the running application.

[0080] For example, the processor **220** may quickly select a photo from the gallery and set it as the representative image of the external electronic device **102**. Here, the representative image may be referred to as a watchface. In this case, while the photo in the gallery is displayed through the display **260** of the electronic device **101**, the processor **220** may control to display, on the display of the external electronic device **102**, a preview in which the photo is varied according to the direction or distance of the external electronic device **102**. For example, the processor **220** may transmit, in real-time to the external electronic device **102**, data related to the preview in which the size or the shown surface according to the direction or distance of the external electronic device **102** is varied. Further, the processor **220**

may transmit, to the external electronic device **102**, a plurality of 3D images (or previews) periodically or every predetermined data unit to display the preview of the 3D image in which the size and the shown surface of the object included in the photo according to the direction and distance of the external electronic device **102**, are varied. Further, when at least one of the direction and distance of the external electronic device **102** is varied by a threshold or more, a plurality of 3D images (or previews) corresponding to the varied direction and distance range may be transmitted to the external electronic device **102**. As such, the time of transmission as to when the data related to the preview to be displayed on the external electronic device **102** is to be transmitted by how much may not be limited.

[0081] According to an embodiment, the processor **220** may provide a function for setting a representative image of the external electronic device **102** when detecting the external electronic device **102** within a threshold range while displaying an image. The function may be activated or inactivated through the settings menu. Accordingly, when the function is set as active, the processor **220** may continuously track the position or direction of the external electronic device **102** while displaying the image through the display **260**. For example, when detecting the external electronic device **102** within the threshold range while displaying the image, the processor **220** may display an icon indicating the detection of the external electronic device **102** or display a notification window indicating that the representative image setting operation is started on at least a portion of the display **260**.

[0082] According to an embodiment, the processor **220** may identify the position or direction of the external electronic device **102** with respect to the electronic device **101** based on at least one of the UWB communication scheme or BLE communication scheme of the communication module **290**. For example, a UWB communication scheme-based UWB angle of arrival (AOA) measurement scheme is a scheme that uses a time difference between a plurality of antenna signals and may identify the position or direction of the external electronic device **102** based on the signal received using the antenna of the communication module **290** and identify the distance from the external electronic device **102** away from the electronic device **101**. For example, the electronic device **101** may further include an antenna module (e.g., UWB antenna) for identifying at least one of the position, direction, or distance of the external electronic device **102**. For example, the antenna module may include a plurality of antennas for measuring at least one of the position, direction, or distance of the external electronic device **102**. For example, the electronic device **101** may measure the distance and/or direction (or angle (e.g., AOA)) from the external electronic device **102** using at least two antennas among the plurality of antennas included in the antenna module.

[0083] According to an embodiment, the processor **220** may detect the external electronic device **102** based on the BLE communication scheme and then activate the UWB signal scanning for UWB AOA measurement. For example, if the external electronic device **102** is discovered through the BLE communication scheme, the processor **220** may activate the UWB signal scanning by transmitting information necessary for UWB communication through BLE communication. The processor **220** may be connected with the external electronic device **102** through UWB communication using the transmitted information. According to an embodiment, the processor **220** may broadcast a ranging message (e.g., ranging control message or ranging request message) to the external electronic device **102**. The processor **220** may broadcast the ranging request message every transmission interval. The processor **220** may receive a ranging response message (e.g., response message) from the external electronic device **102** that has received the ranging request message and identify the relative position of the external electronic device **102** to the electronic device **101**.

[0084] In the foregoing description, the position or direction of the external electronic device **102** is identified using the UWB communication scheme or BLE communication scheme of the communication module **290** as an example, but may not be limited thereto. For example, the processor **220** may detect the external electronic device **102** in any one direction of the upper, lower, left, and right directions with respect to the front center axis of the electronic device **101** using the sensor **276**. To that end, the sensor **276** may include at least one of an infrared sensor, an ultrasonic sensor, a motion sensor, a 3D sensor, and a vision sensor, but the type of the sensor is not limited thereto. A combination of the information sensed by at least two sensors among the sensors may be used to identify the posture (or pose), position, and distance from the electronic device **101** and direction of the external electronic device **102**. Further, a camera (e.g., the camera module **180** of FIG. **1**) and lidar may be used to identify the posture (or pose), position, and distance from the electronic device **101** and direction of the external electronic device **102**.

[0085] For example, the sensor **276** may be an RF spectrum-type sensor. The sensor **276** may use the frequency of the 60 GHz Wi-Fi wireless antenna. For example, the processor **220** may send an RF signal toward the external electronic device **102** using the sensor **276**, receive the returning radio signal, and analyze the pattern of the RF signal radiated and reflected by the target object. The posture (or pose), position, and distance to the electronic device **101** and direction of the external electronic device **102** may be identified based on the pattern of the RF signal. For example, air gesture recognition based on RF signals uses a frequency domain of 5 GHz to 60 GHz and may have a field of view (FOV) of 160 to 180 degrees. When such an RF signal is used, fine control of functions related to preview display according to the direction and distance of the external electronic device **102** may be possible within the proximity range.

[0086] As described above, the processor **220** may recognize the external electronic device **102** in the proximity area of the electronic device **101**, e.g., the spatial range in which the external electronic device **102** is recognized, based on the sensing data of the sensor **276**. According to an embodiment, when the external electronic device **102** is detected in the proximity area, the processor **220** may activate a function for setting a representative image of the external electronic device **102**. By so doing, it is possible to easily set a representative image of the external electronic device **102** even without entering the menu through several stages. According to an embodiment, an icon for setting an image varied according to the direction and distance of the external electronic device **102** as a representative image may be displayed on the screen of the electronic device **101**, and

when the icon is selected, the processor **220** may activate a function for setting a representative image of the external electronic device **102**.

[0087] According to an embodiment, when the external electronic device **102** is detected in the proximity area, the processor **220** may display, through the display of the external electronic device **102**, a preview varied according to the movement of the external electronic device **102**, e.g., varied according to the direction and distance, in the proximity area based on the image currently being displayed on the display **260**. Here, the image currently being displayed on the display **260** may be a 2D image, but the preview displayed through the display of the external electronic device **102** may be a 3D image. The 2D image may include at least one object for converting into a 3D image. Here, the object may correspond to an object capable of specifying the shape of an object included in the image, such as a person or an animal. For example, since a 3D image is stereoscopic, it may be viewed from any direction of 360 degrees, and the size of the 3D image may vary depending on the viewing position. When it is assumed that the object included in the image is an animal, different images may be provided through the external electronic device **102** when the animal is viewed from the front and the animal is viewed from the side. Here, that the animal may be seen from the front or from the side may assume that the 3D image generated in the virtual space is viewed from the front or from the side of the virtual space.

[0088] Thus, when identifying that an object is included in the image, the processor **220** may set an object area centered on the identified object, e.g., the face of the person or animal, and set the size of the object area to correspond to the display size of the external electronic device **102**. For example, the processor **220** may identify whether the object included in the image is a human face based on a face detection algorithm. The method for identifying the object included in the image may not be limited thereto. According to an embodiment, in the case of a person or animal, the object area is set based on the face but, otherwise, an object area may be set based on an object, e.g., the entire subject, included in the image. In other words, the object area may be set to include the entire subject.

[0089] Accordingly, the processor **220** may perform focusing on the object area to provide a focused preview. As such, the processor **220** may provide a preview centered on the object area in the image, so that it is possible to set an optimized representative image.

[0090] According to an embodiment, the processor **220** may identify whether the displayed image may be converted into a 3D image in order to provide an image varied according to the direction and distance of the external electronic device **102** through the external electronic device **102**. If it is possible to convert into a 3D image, it may be converted into a 3D image using images corresponding to each of the direction and distance of the external electronic device **102**.

[0091] On the other hand, if it is not convertible to a 3D image, the processor **220** may provide, through the external electronic device **102**, a preview of an image resized, e.g., enlarged or shrunken, according to the distance of the external electronic device **102** with respect to the electronic device **101**.

[0092] According to an embodiment, when setting a representative image of the external electronic device **102**, the processor **220** may transmit an image of a preview corresponding to a user selection, e.g., an image corresponding to the selected direction and distance, to the external electronic device **102** through the communication module **290**. Accordingly, the external electronic device **102** may set the image corresponding to the selected direction and distance as a representative image of the external electronic device **102**. Further, when the image being displayed is not convertible into a 3D image, the processor **220** may transmit the image corresponding to the distance selected by the user to the external electronic device **102**.

[0093] According to an embodiment, the processor **220** may provide one image itself corresponding to the selected direction and distance to the external electronic device **102**, but may provide a plurality of images to the external electronic device **102** to move within a preset angular range based on the selected direction and distance.

[0094] According to an embodiment, the processor **220** may identify at least one of the direction and the distance of the external electronic device **102** while the external electronic device **102** is positioned within the proximity area. The processor **220** may perform the operation of generating an image varied corresponding to at least one of the direction and distance of the identified external electronic device **102** using the displayed image, and providing the image through the external electronic device **102**. According to an embodiment, the processor **220** may pause the operation of setting the representative image when the external electronic device **102** is not detected within the proximity area while providing the image varied corresponding to at least one of the direction and distance of the identified external electronic device **102** through the external electronic device **102**. Further, the processor **220** may pause the operation of setting the representative image and then terminate the operation of setting the representative image when the external electronic device **102** is not detected within the proximity area for a predetermined time or longer.

[0095] According to an embodiment, an electronic device **101** may comprise a communication module **290**, a display **260**, memory **230** storing instructions, and a processor **220**. According to an embodiment, the instructions may be configured to, when executed by the processor individually or collectively, cause the electronic device to connect to an external electronic device through the communication module. According to an embodiment, the instructions may be configured to, when executed by the processor, cause the electronic device to identify whether the external electronic device is detected within a threshold range while displaying an image on the display. According to an embodiment, the instructions may be configured to, when executed by the processor, cause the electronic device to identify a direction and distance of the external electronic device with respect to the electronic device, based on the external electronic device being detected within the threshold range. According to an embodiment, the instructions may be configured to, when executed by the processor, cause the electronic device to identify whether the image is convertible into a 3D image. According to an embodiment, the instructions may be configured to, when executed by the processor, cause the electronic device to, in case that the image is convertible into the 3D image, provide a preview of the 3D image varying according to the identified direction and distance of the external electronic device through the external electronic device.

[0096] According to an embodiment, in the preview of the 3D image a size and shown surface of an object included in the image, may be varied according to the identified direction and distance of the external electronic device.

[0097] According to an embodiment, the instructions may be configured to cause the electronic device to, while the preview of the 3D image is displayed through the external electronic device, identify whether the direction and distance of the external electronic device are varied, provide a preview of a 3D image, in which a size and shown surface of an object included in the image, are varied as the direction and distance of the external electronic device are varied, through the external electronic device, and in response to a selection for a watchface setting of the external electronic device, transmit a 3D image corresponding to the selection for the watchface setting of the external electronic device to the external electronic device.

[0098] According to an embodiment, the instructions may be configured to cause the electronic device to, when the image is not convertible into the 3D image, provide a preview of the image resized according to the identified distance of the external electronic device through the external electronic device.

[0099] According to an embodiment, the instructions may be configured to cause the electronic device to identify the direction and distance of the external electronic device with respect to the electronic device based on at least one of an ultra-wide band (UWB) communication scheme or Bluetooth low energy (BLE) communication scheme of the communication module.

[0100] According to an embodiment, the instructions may be configured to cause the electronic device to identify an object included in the image, and generate a 3D image based on an object area where the identified object is included.

[0101] According to an embodiment, the instructions may be configured to cause the electronic device to provide, through the external electronic device, the preview of the 3D image set so that a size of the object area where the identified object is included corresponds to a display size of the external electronic device.

[0102] According to an embodiment, the external electronic device may include a watch-type wearable electronic device.

[0103] According to an embodiment, the at least one processor may be configured to, when transmitting a 3D image corresponding to the selection as the watchface of the external electronic device to the external electronic device, transmit, to the external electronic device, a plurality of 3D images corresponding to a preset angular range so that an object included in the image is moved according to a movement of the external electronic device within the preset angular range.

[0104] According to an embodiment, the at least one processor may be configured to, while displaying a 3D graphic image on the display, identify a direction and distance of the external electronic device with respect to the electronic device, based on the external electronic device being detected within the threshold range, and transmit a preview of the 3D image to the external electronic device so that the preview of the 3D graphic image varying according to the identified direction and distance of the external electronic device is displayed on a display of the external electronic device.

[0105] FIG. **3** is a flowchart illustrating operations of an electronic device according to an embodiment. Referring to FIG. **3**, the operation method may include operations **305** to **320**. Each operation of the operation method of FIG. **3** may be performed by an electronic device (e.g., at least one the electronic device **101** of FIGS. **1** and **2** or at least one processor (e.g., the processor **120** of FIG. **1** or the processor **220** of FIG. **2**) of the electronic device). In an embodiment, at least one of operations **305** to **320** may be omitted or changed in order or may add other operations.

[0106] According to an embodiment, in operation **305**, the electronic device **101** may identify whether the external electronic device is detected within a threshold range while displaying an image.

[0107] In operation **310**, the electronic device **101** may identify a direction and distance of the external electronic device with respect to the electronic device, based on the external electronic device being detected within the threshold range. According to an embodiment, the electronic device **101** may identify the direction and distance of the external electronic device with respect to the electronic device based on at least one of an ultra-wide band (UWB) communication scheme or Bluetooth low energy (BLE) communication scheme of the communication module.

[0108] In operation **315**, the electronic device **101** may identify whether the image is convertible into a 3D image. According to an embodiment, when the image is convertible into the 3D image, the electronic device **101** may identify an object included in the image and generate the 3D image based on the object area where the identified object is included.

[0109] In operation **320**, in case that the image is convertible into the 3D image, the electronic device **101** may provide a preview of the 3D image varying according to the identified direction and distance of the external electronic device through the external electronic device. According to an embodiment, in the preview of the 3D image a size and shown surface of an object included in the image, may be varied according to the identified direction and distance of the external electronic device.

[0110] According to an embodiment, the electronic device **101** may provide, through the external electronic device, the preview of the 3D image set so that a size of the object area where the identified object is included corresponds to a display size of the external electronic device.

[0111] According to an embodiment, the electronic device **101** may provide a preview of a 3D image, in which a size and shown surface, of an object included in the image, are varied according to the direction and distance of the identified external electronic device, through the external electronic device.

[0112] According to an embodiment, the electronic device **101** may, while the preview of the 3D image is displayed through the external electronic device, identify whether the direction and distance of the external electronic device are varied, provide a preview of a 3D image, in which a size and shown surface of an object included in the image, are varied as the direction and distance of the external electronic device are varied, through the external electronic device, and in response to a selection for a watchface setting of the external electronic device, transmit a 3D image corresponding to the selection for the watchface setting of the external electronic device to the external electronic device.

[0113] According to an embodiment, the electronic device **101** may transmit, to the external electronic device, a plurality of 3D images corresponding to a preset angular range so that the object included in the image is moved according to a movement of the external electronic device within the preset angular range.

[0114] According to an embodiment, the electronic device **101** may, in case that the image is not convertible into the 3D image, provide a preview of the image resized according to the identified distance of the external electronic device through the external electronic device.

[0115] According to an embodiment, in response to a selection for the preview of the 3D image, the electronic device **101** may transmit, to the external electronic device, the 3D image corresponding to the selection as the representative image of the external electronic device.

[0116] FIG. **4** is a flowchart illustrating signal transmission/reception between an electronic device and an external electronic device according to an embodiment. Referring to FIG. **4**, the operation method may include operations **405** to **440**. In an embodiment, at least one of operations **405** to **440** may be omitted or changed in order or may add other operations. Hereinafter, a description will be made with reference to FIGS. **5** to **7**B to help understanding of the description of FIG. **4**. FIG. **5** is a view illustrating a method for identifying a distance from an electronic device to an external electronic device according to an embodiment. FIG. **6** is a view illustrating a method for identifying a direction of an external electronic device with respect to an electronic device according to an embodiment. FIG. **7**A is a view illustrating a method for identifying an upper or lower direction of an external electronic device with respect to an electronic device according to an embodiment. FIG. **7**B is a view illustrating a method for obtaining a 3D image according to an embodiment.

[0117] In operation **405**, the electronic device **101** may identify whether the external electronic device **102** is within the proximity range. For example, the external electronic device **102** may not be detected when the distance of the external electronic device **102** from the electronic device **101** is out of the proximity range with respect to the electronic device **101** as shown in FIG. **5**(*a*). On the other hand, as shown in FIG. **5**(*b*), when the distance from the electronic device **101** to the external electronic device **102** is within the proximity range with respect to the electronic device **101**, the electronic device **101** may detect the external electronic device **102**. Here, the proximity range (or proximity area) may be, e.g., a range (e.g., within 5 cm) identifiable by the proximity sensor of the sensor **276**.

[0118] In response to identifying that the external electronic device **102** is within the proximity range, in operation **410**, the electronic device **101** may identify whether the direction of the external electronic device **102** with respect to the electronic device **101** is detected. The electronic device **101** may identify which direction the external electronic device **102** is in a state in which the external electronic device **102** is proximate. For example, the external electronic device **102** may be positioned within the proximity range, such as when the external electronic device **102** is positioned in the left direction as shown in FIG. **6**(*a*), when the external electronic device **102** is positioned in the right direction as shown in FIG. **6**(*b*), when the external electronic device **102** is positioned in the upper direction as shown in FIG. **6**(*c*), or when the external electronic device **102** is positioned in the lower direction as shown in FIG. **6**(*d*), with respect to the electronic device **101**.

[0119] For example, as illustrated in FIG. **7**A, the external electronic device **102** may be moved in the upper direction or lower direction within the proximity range. The electronic device **101** may identify vertical movement through UWB altitude tracking as well as UWB direction tracking. For example, when the external electronic device **102** is positioned in the upper direction, a preview of an image in the form of being viewed from top to bottom may be provided through the external electronic device **102**. Further, when the external electronic device **102** is positioned in the lower direction, a preview of an image in the form of being viewed from bottom to top may be provided through the external electronic device **102**. For example, referring to FIG. **7**B, an image **730** is displayed on the display of the electronic device **101**, and when the external electronic device **102** moves from top to bottom within the proximity range, the electronic device **101** may use the image **730** to provide a preview in which the image in the form of being viewed from top to bottom changes into the image in the form of being viewed from bottom to top. Here, when the external electronic device **102** is detected in the upper direction or lower direction within the proximity range, the electronic device **101** may output the indicators **700** and **710** at each position corresponding to the detected direction on the screen. The indicators **700** and **710** may indicate the direction in which the external electronic device **102** is detected.

[0120] In operation **415**, based on the detection of the direction of the external electronic device **102**, the electronic device **101** may identify whether it is possible to extract a 3D image from the target image. On the other hand, when the direction of the external electronic device **102** is not detected within a predetermined time, the electronic device **101** may terminate the operation for setting the representative image. Here, the target image is an image currently displayed on the display of the electronic device **101**, and may be an image for setting as a representative image of the external electronic device **102**.

[0121] In operation **415**, when it is possible to extract a 3D image from the target image, the electronic device **101** may provide another 3D image preview to the external electronic device **102** according to the direction and the proximity distance. On the other hand, when it is not possible to extract a 3D image from the target image, the electronic device **101** may provide an enlarged or shrunken image preview to the external electronic device **102** according to the proximity distance.

[0122] Meanwhile, in response to receiving the preview to be set as a representative image from the electronic device **101**, the external electronic device **102** may display the preview to be set as a representative image in operation **420**. For example, with respect to the image displayed on the electronic device **101**, the image displayed on the external electronic device **102** may vary depending on the direction and distance of the external electronic device **102** as shown in FIGS. **8**A to **9**B.

[0123] FIG. **8**A is an example view illustrating an external electronic device displaying a preview that varies depending on a left long distance or a left short distance with respect to an electronic device according to an embodiment. As shown in FIG. **8**A, when comparing the preview in the external electronic device **102** at the left short distance **820** and the preview in the external electronic device **102** at the left long

distance **810** with respect to the electronic device **101**, the size of the object in the preview corresponding to the left short distance **820** may be larger than the size of the object in the preview corresponding to the left long distance **810**. Further, assuming that an image containing an object in front is displayed on the display of the electronic device **101**, the surface corresponding to the left direction, of the object in the preview in the external electronic device **102**, may be seen. As described above, as the distance to the electronic device **101** decreases, the size of the object in the preview may increase and, as such, a preview of a 3D image may be displayed in which the size and shown surface of the object included in the image vary according to the direction and distance of the external electronic device **102**.

[0124] FIG. **8**B is an example view illustrating an external electronic device displaying a preview that varies depending on a right long distance or a right short distance with respect to an electronic device according to an embodiment. As shown in FIG. **8**B, when comparing the preview in the external electronic device **102** at the right short distance **830** and the preview in the external electronic device **102** at the right long distance **840** with respect to the electronic device **101**, the size of the object in the preview corresponding to the right short distance **830** may be larger than the size of the object in the preview corresponding to the right long distance **840**. Further, assuming that an image containing an object in front is displayed on the display of the electronic device **101**, the object in the preview in the external electronic device **102** may be shown with a surface corresponding to the right direction.

[0125] FIG. **9**A is an example view illustrating an external electronic device displaying a preview that varies depending on a left lower long distance or a left lower short distance with respect to an electronic device according to an embodiment. Referring to FIG. **9**A, the preview of the 3D image in which the size and shown surface of the object included in the image are varied according to the direction and distance of the external electronic device **102** may be displayed as in the preview in the external electronic device **102** at the left lower long distance **910** and in the preview in the external electronic device **102** at the left lower short distance **920**.

[0126] FIG. **9**B is an example view illustrating an external electronic device displaying a preview that varies depending on a right lower long distance or a right lower short distance with respect to an electronic device according to an embodiment. Referring to FIG. **9**B, as in the preview in the external electronic device **102** at the right lower short distance **930** and the preview in the external electronic device **102** at the right lower long distance **940**, the size of the object in the preview corresponding to the right lower short distance **930** may be larger than the size of the object in the preview corresponding to the right lower long distance **940**, according to the direction and distance of the external electronic device **102**. Further, the shown surface of the object included in the image may be varied.

[0127] For example, referring to FIG. **10**, the electronic device **101** may identify the object **1010** included in the target image **1000** and generate a preview **1030** of a 3D image for the target image based on the object **1010**. Here, FIG. **10** is a view illustrating a preview with respect to an object included in an image according to an embodiment. For example, the electronic device **101** may set an object area **1020** centered on the identified object **1010**, e.g., the face of a person or animal and set the size of the object area **1020** to correspond to the display size and/or shape of the external electronic device **102**. According to an embodiment, although generating a 3D image, the electronic device **101** may provide a preview of a 3D image having small transmission capacity to the external electronic device **102** considering the transmission load rather than transferring the generated 3D image itself to the external electronic device **102**.

[0128] In operation **425**, the external electronic device **102** may identify whether there is any one preview selection from the user. In operation **430**, the external electronic device **102** may notify the electronic device **101** of the selection for the preview. For example, the external electronic device **102** may transmit information about the preview corresponding to the selection to the electronic device **101** when the user selects the setting **1100** for the currently displayed preview, as shown in FIG. **11**A. Here, FIG. **11**A is a view illustrating a method for setting a representative image according to an embodiment.

[0129] In operation **435**, in response to the selection for the preview, the electronic device **101** may transmit the image of the selected preview to the external electronic device **102**. The electronic device **101** may identify the actual image of the preview corresponding to the selected time point, e.g., the selected direction and distance, and transmit the identified image to the external electronic device **102** as shown in FIG. **11**B. FIG. **11**B is a view illustrating a method for transmitting an image according to a setting of a representative image according to an embodiment. As shown in FIG. **11**B, messages **1110** and **1120** indicating transmission of an image to be set as a representative image of the external electronic device **102** may be displayed on the electronic device **101** and the external electronic device **102**, respectively.

[0130] In operation **440**, the external electronic device **102** may set a representative image of the external electronic device **102** using the received image. For example, as shown in FIG. **12**, after the content **1200** indicating that the setting of the representative image of the external electronic device **102** is successful is displayed, the external electronic device **102** may display the representative image **1210** including an object in which the shown surface and size have been varied corresponding to the direction and distance. Here, FIG. **12** is an example view illustrating setting completion of a representative image according to an embodiment.

[0131] Meanwhile, an example in which the preview displayed on the external electronic device **102** is varied according to the direction and angle in the external electronic device **102** with respect to the electronic device **101** has been described above but, as shown in FIG. **13**, the representative image may be set to be moved within a predetermined angular range according to a movement of the external electronic device **102** itself after the representative image is set. FIG. **13** is an example view illustrating a representative image that varies according to a movement of an external electronic device within a predetermined angular range according to an embodiment.

[0132] Referring to FIG. **13**, the electronic device **101** may transmit, to the external electronic device **102**, a plurality of 3D images corresponding to a preset angular range so that the object included in the representative image is moved according to a movement of the external electronic device **102** within the preset angular range when transmitting the representative image. For example, the external electronic

device **102** may identify a change in movement such as posture of the external electronic device **102** using a sensor, e.g., a gyro sensor, in the external electronic device **102** in a state of receiving a plurality of 3D images corresponding to a preset angular range from the electronic device **101**. The external electronic device **102** may provide an animation effect as if objects in the representative images **1310**, **1320**, and **1330** at different angles are tilted according to the movement change using the plurality of 3D images.

[0133] Meanwhile, although an example in which a 2D image is convertible into a 3D image has been described above, a case where the 2D image is not convertible into the 3D image is described with reference to FIGS. **14**A and **14**B. FIG. **14**A is an example view illustrating an external electronic device displaying a preview that resizes depending on distance when it is not convertible into a 3D image according to an embodiment. FIG. **14**B is an example view according to setting completion of a representative image when it is not convertible into a 3D image according to an embodiment.

[0134] When not convertible into a 3D image, as shown in FIG. **14**A, the electronic device **101** may control to display, through the external electronic device **102**, a preview of an image resized, e.g., a preview **1410** of an image shrunken or a preview **1420** of an image enlarged, according to the distance of the external electronic device **102** with respect to the electronic device **101**. For example, when the external electronic device **102** is positioned at a short distance close to the electronic device **101**, the object in the short distance preview **1420** may be displayed larger than when it is positioned at the long distance preview **1410**. As shown in FIG. **14**B, in response to selection for the preview displayed on the external electronic device **102**, the electronic device **101** may transmit the image of the selected preview to the external electronic device **102**, and the external electronic device **102** may display a screen **1430** indicating that it is being received. Thereafter, if reception of the image of the selected preview is completed, the external electronic device **102** may display a representative image **1440** including the resized object.

[0135] As described above, according to an embodiment, the electronic device **101** may control to adaptively vary and display the preview displayed on the external electronic device **102** based on the position of the external electronic device **102** with respect to the electronic device **101**. As the function for setting a representative image may be activated simply by positioning the external electronic device **102** proximate to the electronic device **101** even without using menus for setting an image in the electronic device **101** as a representative image of the external electronic device **102**, it is possible to enhance user convenience by an intuitive representative image setting method. Further, the electronic device **101** may provide a preview including an object in which a shown surface and size are varied according to the direction and distance of the external electronic device **102** to the external electronic device **102**, increasing user's interest.

[0136] The electronic device according to various embodiments of the disclosure may be one of various types of electronic devices. The electronic devices may include, for example, a portable communication device (e.g., a smartphone), a computer device, a portable multimedia device, a portable medical device, a camera, a wearable device, or a home appliance. According to an embodiment of the disclosure, the electronic devices are not limited to those described above.

[0137] It should be appreciated that various embodiments of the present disclosure and the terms used therein are not intended to limit the technological features set forth herein to particular embodiments and include various changes, equivalents, or replacements for a corresponding embodiment. With regard to the description of the drawings, similar reference numerals may be used to refer to similar or related elements. It is to be understood that a singular form of a noun corresponding to an item may include one or more of the things, unless the relevant context clearly indicates otherwise. As used herein, each of such phrases as "A or B," "at least one of A and B," "at least one of A or B," "A, B, or C," "at least one of A, B, and C," and "at least one of A, B, or C," may include all possible combinations of the items enumerated together in a corresponding one of the phrases. As used herein, such terms as "1st" and "2nd," or "first" and "second" may be used to simply distinguish a corresponding component from another, and does not limit the components in other aspect (e.g., importance or order). It is to be understood that if an element (e.g., a first element) is referred to, with or without the term "operatively" or "communicatively", as "coupled with," "coupled to," "connected with," or "connected to" another element (e.g., a second element), it means that the element may be coupled with the other element directly (e.g., wiredly), wirelessly, or via a third element.

[0138] As used herein, the term "module" may include a unit implemented in hardware, software, or firmware, and may interchangeably be used with other terms, for example, "logic," "logic block," "part," or "circuitry". A module may be a single integral component, or a minimum unit or part thereof, adapted to perform one or more functions. For example, according to an embodiment, the module may be implemented in a form of an application-specific integrated circuit (ASIC).

[0139] Various embodiments as set forth herein may be implemented as software (e.g., the program **140**) including one or more instructions that are stored in a storage medium (e.g., internal memory **136** or external memory **138**) that is readable by a machine (e.g., the electronic device **101**). For example, a processor (e.g., the processor **120**) of the machine (e.g., the electronic device **101**) may invoke at least one of the one or more instructions stored in the storage medium, and execute it, with or without using one or more other components under the control of the processor. This allows the machine to be operated to perform at least one function according to the at least one instruction invoked. The one or more instructions may include a code generated by a complier or a code executable by an interpreter. The storage medium readable by the machine may be provided in the form of a non-transitory storage medium. Wherein, the term "non-transitory" simply means that the storage medium is a tangible device, and does not include a signal (e.g., an electromagnetic wave), but this term does not differentiate between where data is semi-permanently stored in the storage medium and where the data is temporarily stored in the storage medium.

[0140] According to an embodiment, a method according to various embodiments of the disclosure may be included and provided in a computer program product. The computer program products may be traded as commodities between

sellers and buyers. The computer program product may be distributed in the form of a machine-readable storage medium (e.g., compact disc read only memory (CD-ROM)), or be distributed (e.g., downloaded or uploaded) online via an application store (e.g., Play Store™), or between two user devices (e.g., smartphones) directly. If distributed online, at least part of the computer program product may be temporarily generated or at least temporarily stored in the machine-readable storage medium, such as memory of the manufacturer's server, a server of the application store, or a relay server.

[0141] According to various embodiments, each component (e.g., a module or a program) of the above-described components may include a single entity or multiple entities. Some of the plurality of entities may be separately disposed in different components. According to various embodiments, one or more of the above-described components may be omitted, or one or more other components may be added. Alternatively or additionally, a plurality of components (e.g., modules or programs) may be integrated into a single component. In such a case, according to various embodiments, the integrated component may still perform one or more functions of each of the plurality of components in the same or similar manner as they are performed by a corresponding one of the plurality of components before the integration. According to various embodiments, operations performed by the module, the program, or another component may be carried out sequentially, in parallel, repeatedly, or heuristically, or one or more of the operations may be executed in a different order or omitted, or one or more other operations may be added.

[0142] According to an embodiment, in a non-volatile storage medium storing instructions configured to, when executed by a processor **220** of an electronic device **101**, cause the electronic device to perform at least one operation, the at least one operation may comprise identifying whether the external electronic device is detected within a threshold range while displaying an image. According to an embodiment, the at least one operation may comprise identifying a direction and distance of the external electronic device with respect to the electronic device, based on the external electronic device being detected within the threshold range. According to an embodiment, the at least one operation may comprise identifying whether the image is convertible into a 3D image. According to an embodiment, the at least one operation may comprise, in case that the image is convertible into the 3D image, providing a preview of the 3D image varying according to the identified direction and distance of the external electronic device through the external electronic device.

[0143] The above-described embodiments are merely specific examples to describe technical content according to the embodiments of the disclosure and help the understanding of the embodiments of the disclosure, not intended to limit the scope of the embodiments of the disclosure. Accordingly, the scope of various embodiments of the disclosure should be interpreted as encompassing all modifications or variations derived based on the technical spirit of various embodiments of the disclosure in addition to the embodiments disclosed herein.

What is claimed is:

1. An electronic device comprising:

a communication interface;

a display;

a processor; and

memory storing instructions that, when executed by the processor individually or collectively, cause the electronic device to:

connect to an external electronic device through the communication interface;

identify whether the external electronic device is within a threshold range while displaying an image on the display;

identify a direction and a distance of the external electronic device with respect to the electronic device, based on the external electronic device being within the threshold range;

identify whether the image is convertible into a three-dimensional (3D) image; and

based on the image being convertible into the 3D image, provide a view of the 3D image that is varied to correspond to the direction and the distance of the external electronic device to the external electronic device.

2. The electronic device of claim **1**, wherein in the view of the 3D image, a size and a surface of an object included in the image are varied to correspond to the direction and the distance of the external electronic device.

3. The electronic device of claim **1**, wherein the instructions, when executed by the processor individually or collectively, cause the electronic device to:

in a state in which the view of the 3D image is displayed by the external electronic device, identify whether the direction and the distance of the external electronic device are varied;

provide a view of a 3D image to the external electronic device, wherein a size and a surface of an object included in the image are varied as the direction and the distance of the external electronic device are varied; and

based on a selection for a watchface setting of the external electronic device, transmit a 3D image corresponding to the selection for the watchface setting to the external electronic device.

4. The electronic device of claim **1**, wherein the instructions, when executed by the processor individually or collectively, cause the electronic device to identify the direction and the distance of the external electronic device with respect to the electronic device based on at least one of an ultra-wide band (UWB) communication scheme or a Bluetooth low energy (BLE) communication scheme of the communication interface.

5. The electronic device of claim **1**, wherein the instructions, when executed by the processor individually or collectively, cause the electronic device to:

identify an object included in the image; and

generate the 3D image based on an object area in which the identified object is included.

6. The electronic device of claim **5**, wherein the instructions, when executed by the processor individually or collectively, cause the electronic device to provide, to the external electronic device, the view of the 3D image such that a size of the object area in which the identified object is included corresponds to a display size of the external electronic device.

7. The electronic device of claim **1**, wherein the external electronic device comprises a watch-type wearable electronic device.

8. The electronic device of claim 6, wherein the instructions, when executed by the processor individually or collectively, cause the electronic device to:

based on the image not being convertible into the 3D image, provide a view of the image that is resized according to the distance of the external electronic device to the external electronic device.

9. The electronic device of claim 3, wherein the instructions, when executed by the processor individually or collectively, cause the electronic device to:

based on transmitting the 3D image corresponding to the selection as the watchface of the external electronic device to the external electronic device, transmit, to the external electronic device, a plurality of 3D images corresponding to a preset angular range such that the object included in the image is varied to correspond to a movement of the external electronic device within the preset angular range.

10. The electronic device of claim 1, wherein the instructions, when executed by the processor individually or collectively, cause the electronic device to:

while displaying a 3D graphic image on the display, identify the direction and the distance of the external electronic device with respect to the electronic device, based on the external electronic device being within the threshold range; and

transmit a view of the 3D image to the external electronic device such that a view of the 3D graphic image that is varied to correspond to the direction and the distance of the external electronic device is provided to the external electronic device.

11. A method for providing a representative image of an external electronic device by an electronic device, the method comprising:

identifying whether the external electronic device is within a threshold range while displaying an image;

identifying a direction and a distance of the external electronic device with respect to the electronic device, based on the external electronic device being within the threshold range;

identifying whether the image is convertible into a three-dimensional (3D) image; and

based on the image being convertible into the 3D image, providing a view of the 3D image that is varied to correspond to the direction and the distance of the external electronic device to the external electronic device.

12. The method of claim 11, wherein in the view of the 3D image, a size and a surface of an object included in the image are varied to correspond to the direction and the distance of the external electronic device.

13. The method of claim 11, further comprising:

in a state in which the view of the 3D image is displayed by the external electronic device, identifying whether the direction and the distance of the external electronic device are varied;

providing a view of a 3D image, wherein a size and a surface of an object included in the image are varied as the direction and the distance of the external electronic device are varied, to the external electronic device; and

based on a selection for a watchface setting of the external electronic device, transmitting a 3D image corresponding to the selection for the watchface setting to the external electronic device.

14. The method of claim 11, further comprising:

based on the image being convertible into the 3D image, identifying an object included in the image; and

generating a 3D image based on an object area in which the identified object is included.

15. A non-transitory computer-readable storage medium storing instructions configured to, when executed by a processor of an electronic device, cause the electronic device to perform at least one operation, the at least one operation comprising:

identifying whether an external electronic device is within a threshold range while displaying an image;

identifying a direction and a distance of the external electronic device with respect to the electronic device, based on the external electronic device being within the threshold range;

identifying whether the image is convertible into a three-dimensional (3D) image; and

based on the image being convertible into the 3D image, providing a view of the 3D image that is varied to correspond to the direction and the distance of the external electronic device to the external electronic device.

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