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Electronic device for controlling external electronic device and method of controlling the same

Abstract

An electronic device and method are disclosed. The electronic device includes a communication module, a first camera disposed on a first surface of a housing, a second camera disposed on a second surface of the housing opposite to the first surface, and a processor. The processor implements the method, including: executing an application; establishing a communication connection with a second external electronic device; detecting at least one of an angle or a distance between the second external electronic device; visually detecting the at least one first external electronic device located in a field-of-view (FOV) of a first camera; detecting a distance between the electronic device and the at least one first external electronic device, based on the at least one of the angle or the distance; and detecting a position of the at least one first external electronic device.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATION(S) (1) This application is a continuation of International Application No. PCT/KR2022/012018 designating the United States, filed on Aug. 11, 2022, in the Korean Intellectual Property Receiving Office and claiming priorities to Korean Patent Application No. 10-2021-0144502, filed on Oct. 27, 2021, in the Korean Intellectual Property Office, and Korean Patent Application No. 10-2022-0010512, filed on Jan. 25, 2022, in the Korean Intellectual Property Office, the disclosures of which are incorporated by reference herein in their entireties.

BACKGROUND
Technical Field
(1) Certain embodiments of the disclosure relate to remote control of electronic devices, and more particular, to registration and control of external devices using camera capture and network communication.
Description of Related Art
(2) An electronic device may refer to a device that executes a one or more functions according to programs and applications loaded thereon. The electronic device may include smart home appliances, electronic notebooks, portable multimedia players, mobile communication terminals, tablet PCs, video/audio players, desktop/laptop computers, in-vehicle navigation systems, smart air conditioners, smart home fans, smart home lighting, and so on. The electronic device may be operated using a remote control. For example, a TV may be operated by a TV remote control, and an air conditioner may be operated by an air conditioner remote control.
(3) Recent times have seen introduction of multi-device remote control functionality which implements different types of remote control functions in a single mobile device. According to a general point-to-control method, when a mobile device that supports an ultra-wideband (UWB) communication function is directed toward another UWB communication-enabled device, the mobile device may identify information of the device and display a control screen by which a user may interact with to control the device. With the use of the UWB communication, the mobile device may be used to control a variety of devices disposed around itself. The mobile device may implement this control function even within indoor areas with global positioning system (GPS) information is not readily available.
SUMMARY
(4) To enable an electronic device to locate and control an external device using ultra-wideband (UWB) communication function, the external device should be equipped with a UWB antenna, and a UWB communication-enabled device equipped with the coordinates of the external device should be disposed within a certain range to enable UWB communication with the external device. To this end, the electronic device may in some cases be oriented towards an external device lacking a UWB antenna, and instead identify the external device using a camera (hereinafter, referred to as a

rear camera) disposed on the rear surface of the electronic device, while performing UWB communication with a UWB-enabled device that periodically broadcasts a UWB signal. According to an embodiment, the UWB device may be a movable electronic device equipped with a UWB antenna or a fixed UWB device, such as an anchor device. For example, when a user orients the rear camera of their device towards an external device to be controlled, during registration of the external device in a control application installed in the electronic device, the electronic device may calculate the distance and angle between the UWB device and the electronic device using UWB communication with the UWB device, and calculate a relative location of the external device (e.g., such as being located along a same line as a wall on which the UWB device is located) based on the calculated distance and angle. This method is applicable when the external device is captured within the field of view of the rear camera of the electronic device, but is not applicable when the object is located outside the rear camera's field of view, such as when it is disposed so as to be captured by a front camera instead.

(5) An electronic device according to certain embodiments of the disclosure may provide a method of locating and controlling an object that is located within the field of view of a front camera of the electronic device, while incapable of UWB communication, using the front camera of the electronic device.

(6) According to certain embodiments, an electronic device is disclosed, including: a communication module; a first camera disposed on a first surface of a housing; a second camera disposed on a second surface of the housing opposite to the first surface; and at least one processor electrically coupled to the communication module, the first camera, and the second camera, wherein the at least one processor is configured to: execute an application for registering and controlling at least one first external electronic device, based on a user input, establish a communication connection with a second external electronic device different from the first external electronic device, using the communication module, detect at least one of an angle or a distance between the second external electronic device and the electronic device, detect a distance between the electronic device and the at least one first external electronic device, based on the detected at least one of the angle or the distance between the second external electronic device and the electronic device, and detect a position of the at least one first external electronic device, based on the detected distance between the electronic device and the at least one first external electronic device.

(7) According to certain embodiments, a method of operating an electronic device is disclosed: executing, via at least one processor, an application for registering and controlling at least one first external electronic device, based on a user input, establishing a communication connection with a second external electronic device different from the first external electronic device, via a communication module, detecting at least one of an angle or a distance between the second external electronic device and the electronic device, visually detecting the at least one first external electronic device located in a field-of-view (FOV) of a first camera disposed on a first surface of a housing of the electronic device, and detecting a distance between the electronic device and the at least one first external electronic device, based on the at least one of the angle or the distance between the second external electronic device and the electronic device, and detecting a position of the at least one first external electronic device, based on the detected distance between the electronic device and the at least one first external electronic device.

(8) According to certain embodiments, a method of locating and controlling an external device is disclosed. The external device may be located in in a field of view of a front camera of the electronic device, and is not capable of UWB communication. Accordingly, by using the front camera of the electronic device, the external device for which UWB communication is impossible incapable may nevertheless be located and controlled using the electronic device, regardless of the position of the external device.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) FIG. **1** is a block diagram illustrating an electronic device in a network environment according to certain embodiments.

(2) FIG. **2** is a block diagram illustrating an electronic device according to certain embodiments.

(3) FIGS. **3**A and **3**B are flowcharts illustrating operations of an electronic device according to certain embodiments.

(4) FIG. **4** is a diagram illustrating an operation of an electronic device according to certain embodiments.

(5) FIGS. **5**A and **5**B are flowcharts illustrating operations of registering an external electronic device in a control application by an electronic device according to certain embodiments.

(6) FIG. **6** is a diagram illustrating a method of calculating the position of an external electronic device by an electronic device according to certain embodiments.

(7) FIGS. **7**A and **7**B are flowcharts illustrating an operation of recognizing and positioning an external electronic device to control the external electronic device by an electronic device according to certain embodiments.

(8) FIGS. **8**A and **8**B are diagrams illustrating an operation of registering an external electronic device in a control application by positioning the external electronic device by an electronic device according to certain embodiments.

(9) FIG. **9** is a diagram illustrating a user interface (UI) of a control application to control an external electronic device by an electronic device according to certain embodiments.

DETAILED DESCRIPTION

(10) FIG. **1** is a block diagram illustrating an electronic device **101** in a network environment **100** according to certain embodiments.

(11) Referring to FIG. **1**, the electronic device **101** in the network environment **100** may communicate with an electronic device **102** via a first network **198** (e.g., a short-range wireless communication network), or at least one of 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 some embodiments, at least one of the components (e.g., the connecting terminal **178**) may be omitted from the electronic device **101**, or one or more other components may be added in the electronic device **101**. In some embodiments, some of the components (e.g., the sensor module **176**, the camera module **180**, or the antenna module **197**) may be implemented as a single component (e.g., the display module **160**).

(12) 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 adapted to consume less power than the main processor **121**, or to be specific to a specified function. The auxiliary processor **123** may be implemented as separate from, or as part of the main processor **121**.

(13) 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. An artificial intelligence model may be generated by 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.

(14) 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 thererto. The memory **130** may include the volatile memory **132** or the non-volatile memory **134**.

(15) 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**.

(16) The input module **150** may receive a command or data to be used by another 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, a key (e.g., a button), or a digital pen (e.g., a stylus pen).

(17) 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.

(18) 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 adapted to detect a touch, or a pressure sensor adapted to measure the intensity of force incurred by the touch.

(19) 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**.
(20) 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 acceleration sensor, 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.
(21) 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 electronic 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.
(22) 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, a HDMI connector, a USB connector, a SD card connector, or an audio connector (e.g., a headphone connector).
(23) The haptic module **179** may convert an electrical signal into a mechanical stimulus (e.g., a vibration or a movement) 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.
(24) 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.
(25) 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).
(26) 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.
(27) 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 via the first network **198** (e.g., a short-range communication network, such as Bluetooth™, wireless-fidelity (Wi-Fi) direct, or infrared data association (IrDA)) or the 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., 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 and 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**.
(28) 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.
(29) The antenna module **197** may transmit or receive a signal or power to or from the outside (e.g., the external electronic device) of the electronic device **101**. According to an embodiment, the antenna module **197** may include an antenna including a radiating element implemented using a conductive material or a conductive pattern formed in or 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., array antennas). In such a case, at least one antenna appropriate for a communication scheme used in the communication network, such as the first network **198** or the second network **199**, may be selected, for example, by the communication module **190** (e.g., the wireless communication module **192**) from the plurality of antennas. 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, another component (e.g., a radio frequency integrated circuit (RFIC)) other than the radiating element may be additionally formed as part of the antenna module **197**.
(30) According to certain embodiments, the antenna module **197** may form a mmWave 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 mmWave 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.
(31) 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)).
(32) According to an embodiment, commands 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**. Each of the electronic devices **102** or **104** may be a device of a same type as, 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 healthcare) based on 5G communication technology or IoT-related technology.

(33) FIG. **2** is a block diagram illustrating the electronic device **101** according to certain embodiments.

(34) Referring to FIG. **2**, the electronic device **101** according to an embodiment may include the processor **120**, the display module **160**, the camera module **180**, and the communication module **190**.

(35) According to an embodiment, the camera module **180** may be implemented with at least one camera module (e.g., a first camera module **281** and a second camera module **282**). The first camera module **281** may include one or more lenses, image sensors, image signal processors, or flashes located on the rear surface of a case of the electronic device **101**. Hereinafter, a rear camera is used in the same meaning as the first camera module **281**. The second camera module **282** may include one or more lenses, image sensors, image signal processors, or flashes located on the front surface of the case of the electronic device **101**. Hereinafter, a front camera is used in the same meaning as the second camera module **282**.

(36) According to an embodiment, a communication scheme supported by the communication module **190** of the electronic device **101** may include a communication scheme (e.g., a UWB communication scheme) which enables precise measurement of a direction and a distance.

(37) For example, the electronic device **101** (e.g., the processor **120**) may use the communication module **190** and/or the camera module **180** to identify the position of at least one external electronic device located in the vicinity of the electronic device **101**. For example, the electronic device **101** may use the communication module **190** and/or the camera module **180** to identify the distance from the electronic device **101** to a first external electronic device and/or the direction of at least one second external electronic device with respect to the electronic device **101**. The first external electronic device may be an electronic device having a communication function enabling measurement of a direction and a distance. The at least one second external electronic device may be an electronic device that does not have a communication function enabling measurement of a direction and a distance. The specific type of the communication scheme supported by the above-described communication module **190** is merely an example, and the supported communication scheme is not limited. The electronic device **101** may include a communication module not shown in FIG. **2**, for which reference may be made to the description of FIG. **1**.

(38) According to an embodiment, the communication scheme supported by the communication module **190** of the electronic device **101** is a short-range wireless communication scheme that operates in the first network **198** (e.g., a short-range wireless communication network), inclusive of Bluetooth (or, Bluetooth low energy (BLE)), Zigbee, wireless fidelity (Wi-Fi), and/or near field communication (NFC). For example, the electronic device **101** (e.g., the processor **120**) may perform short-range wireless communication with at least one external electronic device located in the vicinity of the electronic device **101** using the communication module **190**.

(39) According to an embodiment, the communication scheme supported by the communication module **190** of the electronic device **101** may include a communication scheme operating in the second network **199** (e.g., a long-range wireless communication network). For example, the electronic device **101** (e.g., the processor **120**) may perform long-range wireless communication with at least one external electronic device, using the communication module **190**.
(40) According to an embodiment, the processor **120** of the electronic device **101** may execute a control application that controls an external electronic device, based on a user input, and display an execution screen of the control application on the display module **160** to register the external electronic device in the control application or control the external electronic device with the control application.
(41) According to certain embodiments, upon selection of a device registration menu in the control application by a user input, the processor **120** of the electronic device **101** may drive the first camera module **281** to register an external electronic device, and accordingly, display a scene recognized through the rear camera of the electronic device **101** on the display module **160**.
(42) According to certain embodiments, the processor **120** of the electronic device **101** may establish a communication connection with another electronic device (e.g., a UWB communication-enabled UWB device) equipped with a communication function that enables measurement of a direction and a distance, using a communication module (e.g., the communication module **190** of FIG. **2**), and measure the distance between the electronic device **101** and the other electronic device.
(43) According to certain embodiments, the processor **120** of the electronic device **101** may drive the second camera module **282** to register an external electronic device **410** located behind the user in the control application, and accordingly, display a scene including the external electronic device **410** recognized through the front camera of the electronic device **101** on the display module **160**.
(44) According to certain embodiments, the processor **120** of the electronic device **101** may measure the distance between the electronic device **101** and the external electronic device based on the distance between the electronic device **101** and the other electronic device equipped with the communication function that enables measurement of a direction and a distance, and the distance between the other electronic device and a rear wall on which the external electronic device is located and located in a direction in which the first camera faces, and calculate the position of the external electronic device based on the measured distance.
(45) According to certain embodiments, the processor **120** of the electronic device **101** may store the position of the external electronic device in a server (e.g., the server **108** of FIG. **1**) or memory (e.g., the memory **130** of FIG. **1**) of the electronic device **101** to register the external electronic device in the control application.
(46) According to certain embodiments, upon selection of a device control menu in the control application by a user input, the processor **120** of the electronic device **101** may drive the first camera module **281** to control the external electronic device, and accordingly, display a scene recognized through the rear camera of the electronic device **101** on the display module **160**.
(47) According to certain embodiments, the processor **120** of the electronic device **101** may establish a communication connection with the other electronic device, using the communication module (e.g., the communication module **190** of FIG. **2**), and measure the distance between the other electronic device and the electronic devices **101**.
(48) According to certain embodiments, the processor **120** of the electronic device **101** may drive the second camera module **282** to control the external electronic device located behind the user, and thus display a scene including the external electronic device recognized through the front camera of the electronic device **101** on the display module **160**.
(49) According to certain embodiments, the processor **120** of the electronic device **101** may measure the distance between the electronic device **101** and the external electronic device and calculate the position of the external electronic device, based on the distance between the electronic

device **101** and the other electronic device and the previously stored distance between the other electronic device and the rear wall.
(50) According to certain embodiments, the processor **120** of the electronic device **101** may identify that the external electronic device is a pre-registered device based on the calculated position of the external electronic device, and display a user interface (UI) for controlling the external electronic device on the display module **160**.
(51) Various methods using a short-range wireless communication scheme such as Bluetooth, Zigbee, Wi-Fi, and/or NFC may be applied to subsequent specific operations in which the electronic device **101** controls the external electronic device **410**, and a description of the schemes is avoided herein.
(52) FIGS. **3**A and **3**B are flowcharts illustrating operations of an electronic device according to certain embodiments. FIGS. **3**A and **3**B will be described with reference to FIG. **4**.
(53) FIG. **4** is a diagram illustrating an operation of an electronic device according to certain embodiments.
(54) Referring to FIG. **4**, a first electronic device **101** (e.g., the electronic device **101** of FIG. **1** or the electronic device **101** of FIG. **2**) may communicate with a second electronic device **430** (e.g., a UWB device) (e.g. by UWB communication). Facing the display module **160** located on the front surface of the first electronic device **101**, a user **420** of the first electronic device **101** may want to control an external electronic device **410** located behind the user, using the first electronic device **101**. According to an embodiment, the external electronic device **410**, which is a device controllable through the first electronic device **101** by short-range wireless communication with the first electronic device **101**, may be an electronic device which is not equipped with a communication function (e.g., a UWB communication function) enabling measurement of a direction and distance, and the type of the external electronic device **410** is not limited. According to an embodiment, the second electronic device **430** may be an electronic device that is capable of communicating with the first electronic device **101** and periodically broadcasts a signal for direction and distance measurement.
(55) Referring to FIG. **3**A, according to certain embodiments, the first electronic device **101** (e.g., the processor **120**) may execute a control application for controlling the external electronic device **410** based on an input of the user **420** and display an execution screen of the control application on the display module **160**, to register the external electronic device **410** in the control application in operation **301**.
(56) According to certain embodiments, the execution screen of the control application may display a menu selection screen for selecting one or more menu elements or objects. The menu selection screen may include at least one object corresponding to the at least one menu. It is understood that the types of objects included in the menu selection screen and the types of menus corresponding to the objects are not limited to the literal disclosures herein, and any suitable arrangements, objects, etc. may be utilized. At least one menu selectable through the menu selection screen may include a device registration option. Device registration may indicate registering a new external electronic device for remote control through the control application of the electronic device.
(57) In operation **302**, according to certain embodiments, upon detecting selection of a device registration menu displayed in the control application by an input of the user **420**, the first electronic device **101** may drive (e.g., activate) the first camera module **281** for registration of the external electronic device **410**, and accordingly, display a preview image captured through the rear camera of the electronic device **101** on the display module **160**.
(58) According to certain embodiments, the first electronic device **101** may recognize the second electronic device **430** as disposed within the vicinity of the first electronic device **101**, using a communication module (e.g., the communication module **190** of FIG. **2**), establish a communication connection with the second electronic device **430**, and measure the position of the second electronic device **430** in operation **303**. According to certain embodiments, the first

electronic device **101** may recognize at least one external electronic device (e.g., the second electronic device **430** illustrated in FIG. **4**) using the communication module **190**, based on the relative positions of the first electronic device **101** and the at least one external device being within a range measurable using the communication module. According to an embodiment, the position of the second electronic device **430** may be determined based on a distance and/or an angle between the electronic device **101** and the second electronic device **430**.

(59) For example, FIG. **4** illustrates that the first electronic device **101** is oriented toward the second electronic device **430** between the second electronic device **430** and the external electronic device **410**. Referring to FIG. **4**, the first electronic device **101** may determine whether the position of the second electronic device **430** is included within a preset range. According to an embodiment, the first electronic device **101** may identify whether the distance between the first electronic device **101** and the second electronic device **430** is disposed within a preset range, using the communication module **190** supporting the UWB communication scheme. According to another embodiment, the first electronic device **101** may identify whether an angle between the first electronic device **101** and the second electronic device **430** is within a preset range. According to another embodiment, it may be identified whether the distance and angle between the first electronic device **101** and the second electronic device **430** are within a preset range.

(60) For example, in FIG. **4**, the first electronic device **101** may capture the second electronic device **430**, without capturing the external electronic device **410**, due to its present orientation toward the second electronic device **430**. According to an embodiment, when the first electronic device **101** recognizes another electronic device (e.g., the second electronic device **430**), this may indicate that the first electronic device **101** identifies that the distance between the first electronic device **101** and the other electronic device (e.g., the second electronic device **430**) is within a preset range based on single-sided two-way ranging (SS-TWR) and/or double-sided two-way ranging (DS-TWR), by transmitting and receiving messages (e.g., a ranging poll message, a ranging response message, and/or a ranging final message in the case of UWB communication) between the first electronic device and the other electronic device (e.g., the second electronic device **430**) in a communication scheme enabling measurement of a direction and a distance. According to another embodiment, when the first electronic device **101** recognizes another electronic device (e.g., the second electronic device **430**), this may indicate that when the first electronic device and the other electronic device (e.g., the second electronic device **430**) transmit and receive a message (e.g., a ranging poll message, a ranging response message, and/or a ranging final message in the case of UWB communication) to and from each other in a communication scheme enabling measurement of a direction and a distance, the first electronic device **101** may measure the angle with the second electronic device **430** based on an angle of arrival (AoA) when receiving the message through two or more antennas, or based on an angle of departure (AoD) when transmitting the message through two or more antennas, and identify that the angle between the first electronic device **101** and the other electronic device (e.g., the second electronic device **430**) is within a preset range.

(61) According to certain embodiments, in operation **304**, the first electronic device **101** may activate the second camera module **282** and accordingly, display a preview including the external electronic device **410** as captured through the front camera of the first electronic device **101** on the display module **160**, to register the external electronic device **410** that is disposed behind the user **420** in the control application.

(62) In operation **305**, according to certain embodiments, the first electronic device **101** may determine the distance between the first electronic device **101** and the external electronic device **410** based on the distance between the first electronic device **101** and the second electronic device **430** and the distance between the second electronic device **430** and the rear wall where the external electronic device **410** is located, and calculate the position of the external electronic device **410** based on the measured distance. The calculation of the distance between the second electronic device **430** and the rear wall where the external electronic device **410** is located will be described

later with reference to FIGS. **5** and **6**.
(63) In operation **306**, according to certain embodiments, the first electronic device **101** may store the position of the external electronic device **410** in the server (e.g., the server **108** of FIG. **1**) or memory (e.g., the memory **130** of FIG. **1**) of the first electronic device **101**, thereby registering the external electronic device **410** in the control application.
(64) Referring to FIG. **3**B, according to certain embodiments, the first electronic device **101** (e.g., the processor **120**) may execute the control application based on an input of the user **420** and display the execution screen of the control application on the display module **160**, to control the external electronic device **410** with the control application in operation **311**.
(65) According to certain embodiments, the execution screen of the control application may display a menu selection screen for selecting at least one object or element from a menu. For example, the menu selection screen may include at least one object corresponding to the at least one menu, and the types of objects included in the menu selection screen and the types of menus corresponding to the objects are not limited. At least one menu selectable through the menu selection screen may include device control. Device control may mean controlling an external electronic device pre-registered in the control application of the electronic device, using the control application.
(66) In operation **312**, according to certain embodiments, upon selection of a device control menu in the control application by an input of the user **420**, the first electronic device **101** may activate the first camera module **281** to facilitate control the external electronic device **410**, and thus display a preview of a field of view captured through the rear camera of the first electronic device **101** on the display module **160**.
(67) In operation **313**, according to certain embodiments, the first electronic device **101** may establish a communication connection with the second electronic device **430**, using the communication module (e.g., the communication module **190** of FIG. **2**), and measure the distance between the second electronic device **430** and the first electronic device **101**.
(68) In operation **314**, according to certain embodiments, the first electronic device **101** may activate the second camera module **282** to control the external electronic device **410** disposed behind the user **420**, and thus display a preview image of a field of view including the external electronic device **410** captured through the front camera of the first electronic device **101** on the display module **160**.
(69) In operation **315**, according to certain embodiments, the first electronic device **101** may determine the distance between the first electronic device **101** and the external electronic device **410**, and determine the position of the external electronic device **410**, based on the distance between the first electronic device **101** and the second electronic device **430** and the pre-stored distance between the second electronic device **430** and the rear wall.
(70) In operation **316**, according to certain embodiments, the first electronic device **101** may identify that the external electronic device **410** is a pre-registered device, based on the calculated position of the external electronic device **410**, and display a UI for controlling the external electronic device **410** on the display module **160**.
(71) Various methods using a short-range wireless communication scheme such as Bluetooth, Zigbee, Wi-Fi, and/or NFC may be applied to specific operations of controlling the external electronic device **410** by the first electronic device **101**, and their description will be avoided herein.
(72) FIGS. **5**A and **5**B are flowcharts illustrating operations of registering an external electronic device in a control application by an electronic device according to certain embodiments. FIG. **5**A illustrates a case in which a server is not included, and FIG. **5**B illustrates a case in which a server **440** is included.
(73) Referring to FIG. **5**A, in operation **501**, according to certain embodiments, the first electronic device **101** (e.g., the processor **120**) may execute a control application based on an input of the user **420**, and display an execution screen of the control application on the display module **160**.

(74) Upon selection of a device registration menu in the control application by a user input in operation **502**, the first electronic device **101** may establish a communication connection (e.g., a UWB communication connection) with the second electronic device **430** (e.g., the UWB device) and measure the distance between the second electronic device **430** and the first electronic device **101**, using a communication module (e.g., the communication module **190** of FIG. **2**) in operation **503**.
(75) According to certain embodiments, the first electronic device **101** may transmit a broadcast signal and receive a response signal to the broadcast signal from the second electronic device **430**.
(76) Transmission of a broadcast signal by the first electronic device **101** may be understood as performing a scan operation by the first electronic device **101**. Alternatively, when the first electronic device **101** transmits a broadcast signal and receives a response signal to the broadcast signal, it may be understood that the first electronic device **101** performs a scan operation.
(77) When at least one external device (e.g., the second electronic device **430**) is scanned through the scan operation of the first electronic device **101**, the first electronic device **101** may identify that the second electronic device **430** is located in the vicinity of the first electronic device **101**. In an embodiment, the operation of scanning at least one external device by the first electronic device **101** may be distinguished from an operation of recognizing one external device by the first electronic device **101**. For example, when the first electronic device **101** identifies the second electronic device **430** through the scan operation, this may indicate that the first electronic device **101** determines that the second electronic device **430** is located in the vicinity of the first electronic device **101**. When the first electronic device **101** recognizes the second electronic device **430** through communication, this may indicate that as the first electronic device **101** is oriented toward the second electronic device **430**, the first electronic device **101** may identify relative positions of the first electronic device **101** and the second electronic device **430** to be within a preset range. While the operation of scanning an external device and the operation of recognizing an external device have been described separately in the disclosure, it should be understood this is merely for convenience of description, and the operation of scanning an external device may also be understood as included in the operation of recognizing an external device. For example, when it is said that the first electronic device **101** performs a recognition operation on at least one external device (e.g., the second electronic device **430**) through communication, this may be understood that the first electronic device **101** performs the scan operation and performs the operation of recognizing at least one external device (e.g., the second electronic device **430**) located in the vicinity through communication. For example, upon selection of the device registration menu in the control application, the first electronic device **101** may recognize the communication module **190** located in the vicinity, using the communication module **190**. Alternatively, according to an embodiment, the first electron device **101** may identify at least one external device (e.g., the second electronic device **430**) located in the vicinity by performing the scan operation, identify selection of the device registration menu, and then perform the recognition operation.
(78) According to certain embodiments, the first electronic device **101** may recognize the second electronic device **430**, using the communication module **190**. For example, the first electronic device **101** may recognize the second electronic device **430**, using the communication module **190**, based on the relative positions of the first electronic device **101** and the second electronic device **430** corresponding to a set range. For example, referring to FIG. **4**, as the first electronic device **101** is oriented toward the second electronic device **430**, the first electronic device **101** may recognize the second electronic device **430**, using the communication module **190**.
(79) According to certain embodiments, upon selection of the device registration menu in the control application by a user input, the first electronic device **101** may drive the first camera module **281** and accordingly, display a scene recognized through the rear camera of the first electronic device **101** on the display module **160**.
(80) In operation **504**, according to certain embodiments, the first electronic device **101** may switch

a camera mode to a selfie-mode, drive the second camera module **282**, and thus display a scene including the external electronic device **410**, recognized through the front camera of the external electronic device **410**, on the display module **160**, to register the external electronic device **410** located behind the user **420** in the control application.

(81) According to certain embodiments, the camera mode may be switched to use the second camera module **282** by an input of the user **420**. According to certain embodiments, the camera mode may be switched to use the second camera module **282** by swiping a display screen of the first electronic device or touching a separate camera mode switch icon by the user **420**. According to certain embodiments, the first electronic device **101** may perform mode switching to switch to the second camera module **282** by detecting a voice or gaze movement of the user **420**, using a sensor module (e.g., the sensor module **176**) of the first electronic device **101**. According to certain embodiments, the first electronic device **101** may simultaneously drive the first camera module **281** and the second camera module **282**, and accordingly, display a scene recognized through the rear camera and a scene recognized through the front camera of the electronic device **101** on the display module **160**.

(82) In operation **505**, according to certain embodiments, the first electronic device **101** may be oriented toward the external electronic device **410** to be registered by using the second camera module **282**.

(83) In operation **506**, according to certain embodiments, the first electronic device **101** may calculate the distance and angle between the electronic device **101** and the second electronic device **430**, through communication with the second electronic device **430**.

(84) In operation **507**, according to certain embodiments, the first electronic device **101** may calculate the distance between the first electronic device **101** and the external electronic device **410** based on the distance and angle between the first electronic device **101** and the second electronic device **430**. According to certain embodiments of the disclosure, the first electronic device **101** may calculate the distance between the first electronic device **101** and the external electronic device **410** based on the distance and angle between the first electronic device **101** and the second electronic device **430** and the distance between the rear wall where the external electronic device **410** is located and the second electronic device **430**.

(85) According to certain embodiments, the distance from the rear wall where the external electronic device **410** is located to the second electronic device **430** may be determined by placing the first electronic device **101** on the rear wall and then measuring the distance between the first electronic device **101** and the second electronic device **430**.

(86) According to certain embodiments, the distance from the rear wall where the external electronic device **410** is located to the second electronic device **430** may be obtained using a focal length or a depth sensor of the second camera module **282**.

(87) According to certain embodiments, the distance from the rear wall where the external electronic device **410** is located to the second electronic device **430** may be obtained through a user input.

(88) According to certain embodiments, the first electronic device **101** may measure the distance between the rear wall and the first electronic device **101** through a communication connection with another external electronic device which is located on the rear wall and equipped with a communication function enabling measurement of a direction and a distance, and obtain the distance between the rear wall and the second electronic device **430** based on the measured distance.

(89) In operation **508**, according to certain embodiments, the first electronic device **101** may calculate the position of the external electronic device **410** based on the distance between the first electronic device **101** and the external electronic device **410**. According to certain embodiments, the first electronic device **101** may register the external electronic device **410** in the control application by storing the calculated position of the external electronic device **410** in the memory

(e.g., the memory **130** of FIG. **1**) of the first electronic device **101**. According to certain embodiments, the first electronic device **101** may store a picture of the external electronic device **410** together with the position of the external electronic device **410**, so that when controlling the external electronic device **410** through the control application after the registration, a guideline may be provided on a display screen to increase the recognition rate of the external electronic device **410** and allow the user to accurately direct the first electronic device **101** toward the external electronic device **410**. According to an embodiment, the stored position of the external electronic device **410** may be used for the first electronic device **101** to set a recognition range for the external electronic device **410** or to specify the external electronic device **410** based on the stored position, when the first electronic device **101** controls the external electronic device **410** through the control application after the registration.

(90) Referring to FIG. **5**B, operations **511** to **517** are identical to operations **501** to **507** of FIG. **5**A, and thus their redundant description will be avoided.

(91) In operation **518**, according to certain embodiments, the first electronic device **101** may calculate the position of the external electronic device **410** based on the distance between the first electronic device **101** and the external electronic device **410**.

(92) In operation **519**, according to certain embodiments, the first electronic device **101** may register the external electronic device **410** in the control application by storing the calculated position of the external electronic device **410** in the external server **440** (e.g., the server **108** of FIG. **1**). According to certain embodiments, the first electronic device **101** may store a captured picture of the external electronic device **410** together with the position of the external electronic device **410**, so that when controlling the external electronic device **410** through the control application after the registration, a guide may be displayed on a display screen to increase the ease of recognition of the external electronic device **410**, and allow the user to accurately direct the first electronic device **101** toward the external electronic device **410**. According to an embodiment, the stored position of the external electronic device **410** may be used for the first electronic device **101** to set a recognition range for the external electronic device **410** or to specify the external electronic device **410** based on the stored position, when the first electronic device **101** controls the external electronic device **410** through the control application after the registration.

(93) FIG. **6** is a diagram illustrating a method of calculating the position of an external electronic device by an electronic device according to certain embodiments.

(94) Referring to FIG. **6**, according to certain embodiments, the first electronic device **101** and the second electronic device **430** (e.g., UWB device) may calculate a distance d**1** between the first electronic device **101** and the second electronic device **430** and an angle (a**2**+a**3**) between the first electronic device **101** and the second electronic device **430** through a communication scheme (e.g., a UWB communication scheme) enabling measurement of a direction and a distance with the second electronic device **430**.

(95) According to certain embodiments, the first electronic device **101** may obtain a distance d from the second electronic device **430** to the rear wall, and obtain a distance d**2** and an angle (a**2**+a**3**) between the first electronic device **101** and the external electronic device **410** based on the angles a**2** and a**3**.

(96) According to certain embodiments of the disclosure, the distance d from the rear wall where the external electronic device **410** is located to the second electronic device **430** may be determined by placing the first electronic device **101** on the rear wall and calculating the distance between the second electronic device **430** and the first electronic device **101**.

(97) According to certain embodiments, the distance d from the rear wall where the external electronic device **410** is located to the second electronic device **430** may be obtained using a focal length or a depth sensor of the second camera module **282**.

(98) According to certain embodiments, the distance d from the rear wall where the external electronic device **410** is located to the second electronic device **430** may be obtained through a user

input.
(99) According to certain embodiments, the first electronic device **101** may measure the distance from the rear wall to the first electronic device **101** through a communication connection with another external electronic device which is located on the rear wall and having a communication function enabling measurement of a direction and a distance, and obtain the distance d from the rear wall to the second electronic device **430** based on the measured distance.
(100) According to certain embodiments, the first electronic device **101** may calculate the position of the external electronic device **410**, using the values d**1**, d**2**, a**2**, and a**3**.
(101) FIGS. **7**A and **7**B are flowcharts illustrating an operation of recognizing and positioning an external electronic device to control the external electronic device by an electronic device according to certain embodiments. FIG. **7**A illustrates a case in which a server is not included, and FIG. **7**B illustrates a case in which the server **440** is included.
(102) Referring to FIG. **7**A, in operation **701**, according to certain embodiments, the first electronic device **101** (e.g., the processor **120**) may execute a control application based on (e.g., responsive to) an input of the user **420**, and display an execution screen of the control application execution screen on the display module **160**.
(103) Upon selection of a device registration menu in the control application by a user input in operation **702**, the first electronic device **101** may establish a communication connection (e.g., UWB communication connection) with the second electronic device **430** (e.g., UWB device) and measure the distance between the second electronic device **430** and the electronic device **101**, using the communication module (e.g., the communication module **190** of FIG. **2**) in operation **703**. According to certain embodiments, upon selection of a device control menu in the control application by an input of the user **420**, the first electronic device **101** may drive the first camera module **281**, and thus display a scene recognized through the rear camera of the first electronic device **101** on the display module **160**.
(104) In operation **704**, according to certain embodiments, the first electronic device **101** may switch a camera mode to a selfie-mode, drive the second camera module **282**, and thus display a scene including the external electronic device **410**, as captured through the front camera of the external electronic device **410**, on the display module **160**, to control the external electronic device **410** located behind the user **420**.
(105) According to certain embodiments, the camera mode may be switched to operation of the second camera module via an input of the user **420**. According to certain embodiments, as the user **420** swipes a display screen of the electronic device **101** or touches a separate camera mode switch icon, operation may switch from the first camera module **281** to the second camera module **282**. According to certain embodiments, the first electronic device **101** may execute mode switch to use the second camera module **282** by detecting a voice or a gaze movement of the user **420** using the sensor module (e.g., the sensor module **176** of FIG. **1**) of the first electronic device **101**. According to certain embodiments, the first electronic device **101** may simultaneously drive the first camera module **281** and the second camera module **282**, and accordingly, display a scene recognized through the rear camera and a scene recognized through the front camera of the first electronic device **101** on the display module **160**.
(106) In operation **705**, according to certain embodiments, the first electronic device **101** may be directed toward the external electronic device **410** to be registered by using the second camera module **282**. According to certain embodiments, the first electronic device **101** may recognize the external electronic device **410** pre-registered in the control application, based on the captured picture of the external electronic device **410** stored together with the position of the external electronic device **410**. Accordingly, as a guide for the recognized external electronic device **410** is displayed on a display screen, the user may be more accurately directed toward the external electronic device **410**.
(107) In operation **706**, according to certain embodiments, the first electronic device **101** may

calculate the distance and angle between the first electronic device **101** and the second electronic device **430** through communication with the second electronic device **430**.
(108) In operation **707**, according to certain embodiments, the first electronic device **101** may calculate the distance between the first electronic device **101** and the external electronic device **410**, based on the distance and angle between the first electronic device **101**, and the second electronic device **430** and the distance from the second electronic device **430** and the rear wall, which was obtained and stored during registration of the external electronic device **410** in the control application. According to certain embodiments of the disclosure, the distance between the first electronic device **101** and the external electronic device **410** may be calculated, as illustrated in FIG. **6**.
(109) According to certain embodiments, the distance from the rear wall where the external electronic device **410** is located to the second electronic device **430** may be determined by placing the first electronic device **101** on the rear wall and then calculating the distance between the first electronic device **101** and the second electronic device **430**.
(110) According to certain embodiments, the distance from the rear wall where the external electronic device **410** is located to the second electronic device **430** may be obtained using a focal length or a depth sensor of the second camera module **282**.
(111) According to certain embodiments, the distance from the rear wall where the external electronic device **410** is located to the second electronic device **430** may be obtained through a user input.
(112) According to certain embodiments, the first electronic device **101** may measure the distance between the rear wall and the first electronic device **101** through a communication connection with another external electronic device which is located on the rear wall and equipped with a communication function enabling measurement of a direction and a distance, and obtain the distance between the rear wall and the second electronic device **430** based on the measured distance.
(113) In operation **708**, according to certain embodiments, the first electronic device **101** may calculate the position of the external electronic device **410** based on the distance between the first electronic device **101** and the external electronic device **410**. According to certain embodiments, the first electronic device **101** may display a UI on the display module **160**, to control the external electronic device in operation **709**.
(114) Various methods using a short-range wireless communication scheme such as Bluetooth, Zigbee, Wi-Fi, and/or NFC may be applied to subsequent specific operations in which the electronic device **101** controls the external electronic device **410**, and a description of the methods is avoided herein.
(115) Referring to FIG. **7**B, operations **711** to **717** are identical to operations **701** to **707** of FIG. **7**A, and thus their redundant description will be avoided.
(116) According to certain embodiments, the first electronic device **101** may receive the position of the external electronic device **410**, stored in the external server **440** (e.g., the server **108** of FIG. **1**) in operation **718**, and calculate the position of the external electronic device **410** based on the received position of the external electronic device **410** and the distance between the first electronic device **101** and the external electronic device **410** in operation **719**. According to certain embodiments, the first electronic device **101** may display a UI on the display module **160**, to facilitate user control of the external electronic device **410** in operation **720**.
(117) Various methods using a short-range wireless communication scheme such as Bluetooth, Zigbee, Wi-Fi, and/or NFC may be applied to subsequent specific operations in which the electronic device **101** controls the external electronic device **410**, and a description of the methods is avoided herein.
(118) FIGS. **8**A and **8**B are diagrams illustrating an operation of positioning an external electronic device and registering the external electronic device in a control application by an electronic device

according to certain embodiments.
(119) Referring to (a) of FIG. **8**A, according to certain embodiments, when the first electronic device **101** executes a control application, according to an input of the user **420**, to register the external electronic device **410** (e.g., an air conditioner) in the control application, the rear camera of the first electronic device **101** may operate according to a default setting of the control application, and a scene recognized through the rear camera of the first electronic device **101** may be displayed on a display module **170**. In (a) of FIG. **8**A, the second electronic device **430** (e.g., UWB device) and a TV **810** located in front of the user **420** may be displayed on the display module **170**. Since the air conditioner **410** is located behind the user **420**, the air conditioner **410** may not be displayed on the display module **170** while the rear camera of the first electronic device **101** is operating.
(120) According to an embodiment, when the user **420** wants to register the TV **810** in the control application, the user **420** may touch the TV **810** displayed on the display module **170**, to request calculation of the position of the TV **810**, and registration of the TV **810** in the control application. According to an embodiment, as the TV **810** is located in front of the first electronic device **101**, the first electronic device **101** may calculate the distance and angle between the first electronic device **101** and the second electronic device **430** through communication (e.g., UWB communication) between the first electronic device **101** and the second electronic device **430**, calculate the position of the TV **810** based on the distance and angle between the first electronic device **101** and the second electronic device **430**, and store the position of the TV **810**. According to certain embodiments, as the first electronic device **101** stores a picture of the TV **810** together with the position of the TV **810**, a guide may be displayed on a display screen in the vicinity of the displayed image of TV **810** to increase the recognition rate of the external electronic device **410**, and allow the user to accurately orient the first electronic device **101** towards the TV **810** during control of the TV **810** through the control application, after registration is complete.
(121) Referring to (b) of FIG. **8**A, according to certain embodiments, the user **420** may switch a camera mode to register the air conditioner **410** in the control application. In the embodiment of (b) of FIG. **8**A, the user **420** may switch the camera mode of the electronic device **101** from a rear camera mode to a front camera mode by touching and swiping the display module **170**. According to certain embodiments, when the user **420** touches a separate camera mode switch icon, the first electronic device **101** may switch the camera mode. According to certain embodiments, the first electronic device **101** may switch the camera mode by detecting a voice or a gaze movement of the user **420**, using the sensor module (e.g., the sensor module **176** of FIG. **1**) of the first electronic device **101**.
(122) Referring to (c) of FIG. **8**A, according to certain embodiments, when the camera mode is switched, a scene captured through the front camera of the first electronic device **101** may be displayed on the display module **170** (e.g., as per a selfie mode). In (c) of FIG. **8**A, the air conditioner **410** located behind the user **420** may be displayed on the display module **170**. Since the second electronic device **430** and the TV **810** are located in front of the user **420**, they may not be displayed on the display module **170** while the front camera of the first electronic device **101** is activated and the rear camera is deactivated.
(123) According to certain embodiments, the first electronic device **101** may simultaneously drive the front camera and the rear camera, and thus simultaneously display the second electronic device **430** and the TV **810** recognized through the rear camera of the first electronic device **101** and the air conditioner **410** recognized through the front camera on the display module **170**.
(124) According to an embodiment, when the user **420** wants to register the air conditioner **410** in the control application, the user **420** may touch the air conditioner **410** displayed on the display module **170** and position the air conditioner **410**.
(125) According to certain embodiments, the first electronic device **101** may calculate the distance and angle between the first electronic device **101** and the second electronic device **430** through

communication with the second electronic device **430**. According to certain embodiments, the first electronic device **101** may calculate the distance between the air conditioner **410** and the first electronic device **101** based on the distance and angle between the first electronic device **101** and the second electronic device **430**. According to certain embodiments of the disclosure, the first electronic device **101** may calculate the distance between the first electronic device **101** and the air conditioner **410** based on the distance and angle between the first electronic device **101** and the second electronic device **430**, and the distance from the rear wall on which the external electronic device **410** is located to the second electronic device **430**.

(126) According to certain embodiments, the distance from the rear wall where the air conditioner **410** is located to the second electronic device **430** may be determined by placing the first electronic device **101** on the rear wall and calculating the distance between the second electronic device **430** and the first electronic device **430**.

(127) According to certain embodiments, the distance from the rear wall where the air conditioner **410** is located to the second electronic device **430** may be obtained using a focal length or a depth sensor of the second camera module **282**.

(128) According to certain embodiments, the distance from the rear wall where the air conditioner **410** is located to the second electronic device **430** may be obtained through a user input.

(129) According to certain embodiments, the first electronic device **101** may measure the distance from the rear wall to the first electronic device **101** through a communication connection with another external electronic device (not shown) having a communication function enabling measurement of a direction and a distance, and obtain the distance from the rear wall to the second electronic device **430** based on the measured distance.

(130) According to certain embodiments, the first electronic device **101** may calculate the position of the air conditioner **410** based on the distance between the first electronic device **101** and the air conditioner **410**. According to certain embodiments, the first electronic device **101** may register the air conditioner **410** in the control application by storing the calculated position of the air conditioner **410** in the memory of the first electronic device **101** (e.g., the memory **130** of FIG. **1**) or an external server (e.g., the server **108** of FIG. **1**).

(131) According to certain embodiments, as the first electronic device **101** stores a picture of the air conditioner **410** together with the position of the air conditioner **410**, a guideline **811** may be displayed in the vicinity of the air conditioner **410** on a display screen to increase the recognition rate of the external electronic device **410** and allow the user to accurately direct the first electronic device **101** toward the air conditioner **410** during control of the air conditioner **410** through the control application after the registration.

(132) FIG. **9** is a diagram illustrating a UI of a control application to control an external electronic device by an electronic device according to certain embodiments.

(133) Referring to (a) of FIG. **9**A, according to certain embodiments, when the user executes the control application of the electronic device **101**, the first electronic device **101** may simultaneously operate the front camera and the rear camera of the first electronic device **101** according to a default setting of the control application, and accordingly, external electronic devices **920** recognized through the rear camera and external electronic devices **930** recognized through the front camera may be displayed on a display screen **910**. As illustrated in (a) of FIG. **9**, according to certain embodiments, the external electronic devices **920** recognized through the rear camera may be disposed in an upper part of the display screen **910**, and the external electronic devices **930** recognized through the front camera may be disposed in a lower part of the display screen **910**. According to certain embodiments, the external electronic devices **920** recognized through the rear camera may be located in the lower part of the display screen **910**, and the external electronic devices **930** recognized through the front camera may be disposed in the upper part of the display screen **910**.

(134) According to an embodiment, when the user selects a first external electronic device **940**

(e.g., a TV) from among the external electronic devices **920** located in front of the first electronic device **101**, a UI **950** for controlling the selected first external electronic device **940** may be displayed on the display screen **910**. In (a) of FIG. **9**, the TV is selected, and accordingly, a channel control button and a volume control button may be displayed on the UI **950** to control the TV. According to an embodiment, a guideline for distinguishing the first external electronic device **940** selected by the user may be displayed.

(135) Referring to (b) of FIG. **9**, according to certain embodiments, when the user selects a second external electronic device **941** (e.g., an electric blind) from among the external electronic devices **930** located behind the first electronic device **101**, a UI **951** for controlling the selected second external electronic device **941** may be displayed on the display screen **910**. In (b) of FIG. **9**, the electric blind is selected, and accordingly, a vertical control button for controlling the electric blind may be displayed on the UI **951**. According to an embodiment, a guideline for distinguishing the second external electronic device **942** selected by the user may be displayed.

(136) Those skilled in the art will understand that certain embodiments described herein may be organically applied to each other within an applicable range. For example, those skilled in the art will understand that at least some operations of an embodiment described herein may be skipped, and that at least some operations of an embodiment and at least some operations of another embodiment may be applied in a close relationship.

(137) According to certain embodiments, an electronic device (e.g., the electronic device **101** of FIGS. **1** and **2**) may include a communication module (e.g., the communication module **190** of FIGS. **1** and **2**); a first camera (e.g., the camera module **180** of FIGS. **1** and **2**) disposed on a first surface of a housing; a second camera (e.g., the camera module **180** of FIGS. **1** and **2**) (e.g., the first camera module **281** of FIG. **2**) disposed on a second surface of the housing opposite to the first surface; and at least one processor (e.g., the processor **120** of FIGS. **1** and **2**) electrically coupled to the communication module, the first camera, and the second camera. The at least one processor may be configured to execute an application for registering and controlling at least one first external electronic device (e.g., the external electronic device **410** of FIG. **4**), based on a user input, establish a communication connection with a second external electronic device, (e.g., the second electronic device **430** of FIG. **4**) using the communication module, obtain at least one of an angle or a distance between the second external electronic device and the electronic device, obtain a distance between the electronic device and the at least one first external electronic device, based on the at least one of the angle or the distance between the second external electronic device and the electronic device, and obtain a position of the at least one first external electronic device, based on the distance between the electronic device and the at least one first external electronic device.

(138) According to certain embodiments, the at least one processor may be configured, when a menu for registering the at least one first external electronic device in the application is selected by the user input, to recognize the at least one first external electronic device by driving the first camera, obtain a distance between the electronic device and the at least one external electronic device based on the at least one of the angle or the distance between the second external electronic device and the electronic device and a distance between the electronic device and a rear wall on which the at least one first external electronic device is located and located in a direction in which the first camera faces, and obtain the position of the at least one first external electronic device based on the distance between the electronic device and the at least one first external electronic device, and store the obtained position of the at least one first external electronic device.

(139) According to certain embodiments, the at least one processor may be configured to calculate the distance between the electronic device and the rear wall, based on a distance between the electronic device located on the rear wall and the second external electronic device.

(140) According to certain embodiments, the at least one processor may be configured to establish a communication connection with a third external electronic device located on the rear wall and communicable using the communication module, obtain a distance between the third external

electronic device and the electronic device, and calculate the distance between the electronic device and the rear wall on which the at least one external electronic device is located, based on the distance between the electronic device and the second external electronic device and the distance between the third external electronic device and the electronic device.
(141) According to certain embodiments, the at least one processor may be configured to calculate the distance between the electronic device and the rear wall, based on a focal length or a depth sensor of the first camera.
(142) According to certain embodiments, the at least one processor may be configured to obtain the distance between the electronic device and the rear wall, based on a user input.
(143) According to certain embodiments, the at least one processor may be configured, when a menu for controlling the at least one first external electronic device in the application is selected by the user input, to obtain a position of the at least one first external electronic device, based on the position of the at least one first external electronic device and the distance between the electronic device and the at least one first external electronic device and display a user interface for controlling the at least one first external electronic device on a display of the electronic device.
(144) According to certain embodiments, the at least one processor may be configured to discontinue driving of the second camera and drive the first camera based on the user input received during the driving of the second camera, or simultaneously drive the second camera and the first camera based on the user input received during the driving of the second camera.
(145) According to certain embodiments, the at least one processor may be configured to store the position of the at least one first external electronic device in a memory of the electronic device or an external server.
(146) According to certain embodiments, the communication module may support a UWB scheme.
(147) According to certain embodiments, a method of operating an electronic device (e.g., the electronic device **101** of FIGS. **1** and **2**) may include executing an application for registering and controlling at least one first external electronic device (e.g., the external electronic device **410** of FIG. **4**), based on a user input, establishing a communication connection with a second external electronic device (e.g., the second electronic device **430** of FIG. **4**) communicable with the electronic device, using a communication module (e.g., the communication module **190** of FIGS. **1** and **2**) of the electronic device, obtaining at least one of an angle or a distance between the second external electronic device and the electronic device, recognizing the at least one first external electronic device located in a direction allowing capturing by a first camera (e.g., the camera module **180** of FIGS. **1** and **2**) (e.g., the second camera module **282** of FIG. **2**) disposed on a first surface of a housing of the electronic device by driving the first camera, obtaining a distance between the electronic device and the at least one first external electronic device, based on the at least one of the angle or the distance between the second external electronic device and the electronic device, and obtaining a position of the at least one first external electronic device, based on the distance between the electronic device and the at least one first external electronic device.
(148) According to certain embodiments, the method may further include, when a menu for registering the at least one first external electronic device in the application is selected by the user input, obtaining the distance between the electronic device and the at least one external electronic device based on the at least one of the angle or the distance between the second external electronic device and the electronic device, and obtaining a distance between the electronic device and a rear wall on which the at least one first external electronic device is located and located in a direction in which the first camera faces, and the position of the at least one first external electronic device based on the distance between the electronic device and the at least one first external electronic device, and storing the obtained distance.
(149) According to certain embodiments, obtaining the distance between the electronic device and the at least one external electronic device may include calculating the distance between the electronic device and the rear wall, based on a distance between the electronic device located on

the rear wall and the second external electronic device.
(150) According to certain embodiments, the method may further include establishing a communication connection with a third external electronic device located on the rear wall and communicable using the communication module, obtaining a distance between the third external electronic device and the electronic device, and calculating the distance between the electronic device and the rear wall on which the at least one external electronic device is located, based on the distance between the electronic device and the second external electronic device and the distance between the third external electronic device and the electronic device.
(151) According to certain embodiments, obtaining the distance between the electronic device and the at least one external electronic device may include calculating the distance between the electronic device and the rear wall, based on a focal length or a depth sensor of the first camera.
(152) According to certain embodiments, obtaining the distance between the electronic device and the at least one external electronic device may include obtaining the distance between the electronic device and the rear wall based on a user input.
(153) According to certain embodiments, the method may further include, when a menu for controlling the at least one first external electronic device in the application is selected by the user input, obtaining a position of the at least one first external electronic device, based on the position of the at least one first external electronic device and the distance between the electronic device and the at least one first external electronic device, and displaying a user interface for controlling the at least one first external electronic device on a display of the electronic device.
(154) According to certain embodiments, the method may further include discontinuing driving of the second camera and driving the first camera based on the user input received during the driving of the second camera, or simultaneously driving the second camera and the first camera based on the user input received during the driving of the second camera.
(155) According to certain embodiments, the method may further include storing the position of the at least one first external electronic device in a memory of the electronic device or an external server.
(156) The electronic device according to certain embodiments 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.
(157) It should be appreciated that certain embodiments of the 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 any one of, or 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.
(158) As used in connection with certain embodiments of the disclosure, 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).

(159) Certain 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., the internal memory **136** or the 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 machine-readable storage medium 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.

(160) According to an embodiment, a method according to certain embodiments of the disclosure may be included and provided in a computer program product. The computer program product may be traded as a product between a seller and a buyer. 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., PlayStore™), or between two user devices (e.g., smart phones) 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.

(161) According to certain embodiments, each component (e.g., a module or a program) of the above-described components may include a single entity or multiple entities, and some of the multiple entities may be separately disposed in different components. According to certain 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 certain 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 certain 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.

Claims

1. An electronic device, comprising: memory storing instructions; a communication module; a first camera disposed on a first surface of a housing; and at least one processor electrically coupled to the communication module, the first camera, wherein instructions that, when executed by the at least one processor individually and/or collectively, cause the electronic device to: execute an application for registering and controlling at least one first external electronic device, based on a user input, establish a communication connection with a second external electronic device different from the at least one first external electronic device, using the communication module, obtain an angle and a distance between the second external electronic device and the electronic device, visually detect, via the first camera, the at least one first external electronic device located in a

field-of-view of the first camera; calculate an angle and a distance between the electronic device and the at least one first external electronic device, based on the obtained angle and the obtained distance between the second external electronic device and the electronic device and a distance from the electronic device to a wall on which the at least one first external electronic device is located, and determine a position of the at least one first external electronic device, based on the calculated angle and the calculated distance between the electronic device and the at least one first external electronic device.

2. The electronic device of claim 1, wherein the visual detection of the at least one first external electronic device is based on detecting a selection of a menu for registering the at least one first external electronic device in the application, and wherein the distance between the electronic device and the at least one first external electronic device is calculated further based on a distance between the electronic device and the wall on which the at least one first external electronic device is located, and wherein instructions that, when executed by the at least one processor individually and/or collectively, cause the electronic device to store calculated distance between the electronic device and the wall.

3. The electronic device of claim 2, wherein the distance between the electronic device and the wall is calculated based on the distance between the electronic device located on the wall and the second external electronic device.

4. The electronic device of claim 2, wherein instructions that, when executed by the at least one processor individually and/or collectively, cause the electronic device to: calculate a distance between the electronic device and a third external electronic device located on the wall through a communication connection established between the electronic device and the third external electronic device, and calculate the distance between the electronic device and the wall on which the at least one first external electronic device is located, based on the distance between the electronic device and the second external electronic device, and the distance between the third external electronic device and the electronic device.

5. The electronic device of claim 2, wherein instructions that, when executed by the at least one processor individually and/or collectively, cause the electronic device to: calculate the distance between the electronic device and the wall, based on a focal length of the first camera, or using a depth sensor of the first camera.

6. The electronic device of claim 2, wherein instructions that, when executed by the at least one processor individually and/or collectively, cause the electronic device to: obtain the distance between the electronic device and the wall, based on the user input.

7. The electronic device of claim 2, further comprising a display, wherein the position of the at least one first external electronic device is calculated based on detecting a selection of a menu for controlling the at least one first external electronic device in the application, and wherein instructions that, when executed by the at least one processor individually and/or collectively, cause the electronic device to: in response to the selection of the menu, control the display to display a user interface for controlling the at least one first external electronic device.

8. The electronic device of claim 1, further comprising a second camera disposed on a second surface of the housing opposite to the first surface, wherein instructions that, when executed by the at least one processor individually and/or collectively, cause the electronic device to: when the user input is received while the second camera is activated, execute one of: terminating activation of the second camera and activating the first camera, or activating the first camera while maintaining activation of the second camera, so that both the first and second cameras are simultaneously activated.

9. The electronic device of claim 2, wherein instructions that, when executed by the at least one processor individually and/or collectively, cause the electronic device to: store the position of the at least one first external electronic device in a memory of the electronic device, or on an external server.

10. The electronic device of claim 1, wherein the communication module supports ultra-wideband (UWB) communication.
11. A method of operating an electronic device, the method comprising: executing, via at least one processor, an application for registering and controlling at least one first external electronic device, based on a user input, establishing a communication connection with a second external electronic device different from the at least one first external electronic device, via a communication module, obtaining an angle and a distance between the second external electronic device and the electronic device, visually detecting, via a first camera, the at least one first external electronic device located in a field-of-view of the first camera, and calculate an angle and a distance between the electronic device and the at least one first external electronic device, based on the obtained angle and the obtained distance between the second external electronic device and the electronic device and a distance from the electronic device to a wall on which the at least one first external electronic device is located, and determine a position of the at least one first external electronic device, based on the calculated angle and the calculated distance between the electronic device and the at least one first external electronic device.
12. The method of claim 11, wherein calculating a distance between the electronic device and the wall on which the at least one first external electronic device is located is based on detecting a selection of a menu for registering the at least one first external electronic device in the application, and the method further comprising: storing the calculated distance between the electronic device and the wall.
13. The method of claim 12, wherein the distance between the electronic device and the wall is calculated based on the distance between the electronic device located on the wall and the second external electronic device.
14. The method of claim 12, further comprising: calculate a distance between the electronic device and a third external electronic device located on the wall through a communication connection established between the electronic device and the third external electronic device, and calculating the distance between the electronic device and the wall on which the at least one first external electronic device is located, based on the distance between the electronic device and the second external electronic device, and the distance between the third external electronic device and the electronic device.
15. The method of claim 12, wherein the distance between the electronic device and the wall is calculated based on a focal length of the first camera, or using a depth sensor of the first camera.
16. The method of claim 12, wherein the distance between the electronic device and the wall is obtained based on the user input.
17. The method of claim 12, wherein the position of the at least one first external electronic device is calculated when a selection is received for a menu for controlling the at least one first external electronic device in the application, and wherein the method further comprises: in response to the selection of the menu, displaying, via a display, a user interface for controlling the at least one first external electronic device.
18. The method of claim 11, wherein the first camera is disposed on a first surface of a housing, the method further comprising: when the user input is received while a second camera disposed on a second surface of the housing opposite to the first surface is activated, executing one of: terminating activation of the second camera and activating the first camera, or activating the first camera while maintaining activation of the second camera, so that both the first and second cameras are simultaneously activated.
19. The method of claim 12, further comprising: storing the position of the at least one first external electronic device in a memory of the electronic device, or on an external server.
20. The method of claim 11, wherein the communication module supports ultra-wideband (UWB) communication.