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Inventor(s)	Jeong; Seong-wook et al.

Display apparatus and control methods thereof

Abstract

A display apparatus includes a communication interface configured to communicate with another display apparatus, a display configured to display contents being shared with the other display apparatus and a video call user interface (UI) for a video call with a user of the other display apparatus, and a processor, in response to at least one of a gesture and a voice of the user included in video call data received from the other display apparatus satisfying a predetermined condition, configured to control the display to change a size of the video call UI displayed on the display.

Inventors: Jeong; Seong-wook (Seoul, KR), Lee; Sung-hye (Seoul, KR), Jang; Sung-hyun (Seoul, KR), Lee; Kwan-min (Seoul, KR), Lee; Sang-hee (Seoul, KR)

Applicant: SAMSUNG ELECTRONICS CO., LTD. (Suwon-si, KR)

Family ID: 1000008748065

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

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS (1) This application is a continuation of U.S. application Ser. No. 17/706,680, filed on Mar. 29, 2022, which is a continuation of U.S. application Ser. No. 17/107,386, filed on Nov. 30, 2020, now U.S. Pat. No. 11,323,658, issued on May 3, 2022, which is a continuation of U.S. application Ser. No. 16/664,482, filed on Oct. 25, 2019, now U.S. Pat. No. 10,887,546, issued on Jan. 5, 2021, which is a continuation of U.S. application Ser. No. 16/029,127, filed on Jul. 6, 2018, now U.S. Pat. No. 10,511,804, issued on Dec. 17, 2019, which is a continuation of U.S. application Ser. No. 15/394,026, filed on Dec. 29, 2016, now U.S. Pat. No. 10,044,977, issued on Aug. 7, 2018, which claims priority to Korean Patent Application No. 10-2016-0001629, filed on Jan. 6, 2016, in the Korean Intellectual Property Office, the disclosures of which are incorporated by reference herein in their entireties.

BACKGROUND
1. Field
(1) Apparatuses and methods consistent with exemplary embodiments relate to a display apparatus and a control method thereof, and more particularly, to a display apparatus which performs a video call with another display apparatus and a control method thereof.
2. Description of the Related Art
(2) Due to development of electronic technology, various types of electronic devices are widely used in various fields. Particularly, a display device that may share contents with another display device on a real time basis and perform a video call at the same time has been developed.
(3) However, due to restriction in a display area, when a video call user interface (UI) is displayed to be large, it may prevent a user's watching contents. On the other hand, if a video call UI is displayed to be small, meaning of video call is discolored.
(4) Accordingly, there is a use for detecting utilization of video call function and changing a video call UI flexibly while not hindering watching of contents.
SUMMARY
(5) One or more exemplary embodiments provide an apparatus which change a size of a video call UI according to a behavior of a counterpart of a video call and a control method thereof.
(6) According to an aspect of an exemplary embodiment, there is provided a display apparatus including a communication interface configured to communicate with another display apparatus; a display configured to display contents that are shared with the other display apparatus, together with a video call user interface (UI) for a video call with a user of the other display apparatus; and a processor configured to, in response to determining that at least one from among a gesture of the user and a voice of the user included in video call data received from the other display apparatus satisfies a predetermined condition, control the display to change a size of the video call UI displayed on the display.
(7) The processor may be further configured to, in response to the at least one from among the

gesture and the voice of the user included in the video call data received from the other display apparatus being recognized for longer than a predetermined time, gradually enlarge the size of the video call UI displayed on the display.

(8) The processor may be further configured to, in response to a level of the voice of the user included in the video call data received from the other display apparatus being greater than a predetermined amount, enlarge the size of the video call UI to a predetermined size displayed on the display.

(9) The processor may be further configured to, in response to the level of the voice of the user being greater than a volume of the contents, enlarge the video call UI displayed on the display to the predetermined size.

(10) The processor may be further configured to, in response to the voice of the user not being recognized for a predetermined time while the video call UI displayed on the display is enlarged to the predetermined size, return the video call UI displayed on the display to a size prior to being enlarged.

(11) The processor may be further configured to, in response to the at least one from among the gesture and the voice of the user being recognized from voice call data received from the other display apparatus, control the display to provide a predetermined visual feedback at an edge of the video call UI displayed on the display, and in response to the at least one from among the recognized gesture and the recognized voice of the user satisfying a predetermined condition, change the size of the video call UI displayed on the display.

(12) The processor may be further configured to, in response to the gesture and the voice of the user of the other display apparatus not being recognized from video call data received from the other display apparatus, replace the video call data displayed in the video call UI with a predetermined image.

(13) The processor may be further configured to, in response to the at least one from among the gesture and the voice of the user included in video call data received from the other display apparatus not being recognized for longer than a predetermined time, gradually reduce the size of the video call UI displayed on the display.

(14) The processor may be further configured to receive privacy level information of the user of the other display apparatus from the other display apparatus, and change the size of the video call UI displayed on the display based on the received privacy level information.

(15) The processor may be further configured to: in response to at least one from among the gesture and the voice of the user satisfying a predetermined condition, determine a privacy level of the user of the other display apparatus from the privacy level information; and if the privacy level of the user is less than a predetermined level, change the size of the video call UI displayed on the display, and if the privacy level is greater than or equal to the predetermined level, maintain the size of the video call UI displayed on the display.

(16) According to an aspect of another exemplary embodiment, there is provided a control method of a display apparatus, the control method including: displaying contents that are shared with another display apparatus, together with a video call user interface (UI) for a video call with a user of the other display apparatus; and in response to determining that at least one from among a gesture and a voice of the user included in video call data received from the other display apparatus satisfies a predetermined condition, changing a size of the video call UI displayed on a display.

(17) The changing the size of the video call UI displayed on the display may include, in response to the at least one from among the gesture and the voice of the user included in the video call data received from the other display apparatus being recognized for longer than a predetermined time, gradually enlarging the size of the video call UI displayed on the display.

(18) The changing the size of the video call UI displayed on the display may include, in response to a level of the voice of the user included in the video call data received from the other display apparatus being greater than a predetermined size, enlarging the size of the video call UI displayed

on the display to a predetermined size.

(19) The changing the size of the video call UI displayed on the display may include, in response to the level of the user voice being greater than a volume of the contents, enlarging the video call UI displayed on the display to the predetermined size.

(20) The changing the size of the video call UI on the display may include, in response to the voice of the user not being recognized for a predetermined time while the video call UI is enlarged to the predetermined size, returning the video call UI displayed on the display to a size prior to being enlarged.

(21) The changing the size of the video call UI displayed on the display may include, in response to the at least one from among the gesture and the voice of the user being recognized from video call data received from the other display apparatus, providing a predetermined visual feedback at an edge of the video call UI, and in response to the at least one from among the recognized gesture and the recognized voice of the user satisfying a predetermined condition, changing a size of the video call UI displayed on the display.

(22) The changing the size of the video call UI displayed on the display may include, in response to the gesture and the voice of the user not being recognized from video call data received from the other display apparatus, replacing the video call data displayed in the video call UI with a predetermined image.

(23) The changing the size of the video call UI displayed on the display may include, in response to the at least one from among the gesture and the voice of the user included in video call data received from the other display apparatus not being recognized for longer than a predetermined time, gradually reducing the size of the video call UI displayed on the display.

(24) The changing the size of the video call UI on the display may include receiving, from the other display apparatus, privacy level information of the user of the other display apparatus, changing the size of the video call UI displayed on the display based on the received privacy level information.

(25) The changing the size of the video call UI on the display may include, in response to at least one from among the gesture and the voice of the user satisfying a predetermined condition, when privacy level of the user is less than a predetermined level, changing the size of the displayed video call UI, and when privacy level is greater than or equal to the predetermined level, maintaining the size of the video call UI displayed on the display.

(26) According to an aspect of another exemplary embodiment, there is provided an apparatus including: a communication interface configured to communicate with another apparatus; a processor configured to: control a display to display contents that are shared with the other apparatus, together with a video call user interface (UI) for a video call with a user of the other apparatus; and in response to determining that at least one from among a gesture of the user and a voice of the user of the other apparatus satisfies a predetermined condition, control the display to change a size of the displayed video call UI.

(27) The processor may be further configured to, in response to the at least one from among the gesture and the voice of the user of the other apparatus being recognized for longer than a predetermined time, gradually enlarge the size of the displayed video call UI.

(28) The processor may be further configured to, in response to a volume level of the voice of the user of the other apparatus being greater than a predetermined amount, enlarge the size of the displayed video call UI to a predetermined size.

(29) The processor may be further configured to, in response to the at least one from among the gesture and the voice of the user being recognized from voice call data received from the other apparatus, control the display to provide a predetermined visual feedback at an edge of the displayed video call UI, and in response to the at least one from among the recognized gesture and the recognized voice of the user satisfying a predetermined condition, change the size of the displayed video call UI.

(30) The processor may be further configured to receive privacy level information of the user of the

other apparatus, and change the size of displayed the video call UI based on the received privacy level information.

(31) According to one or more exemplary embodiments, a display device may change a size of a video call UI according to a behavior a user at the other end of a video call and attract attentions of a user of a video call.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) The above and/or other aspects and features will be more apparent from the following description when taken in conjunction with the accompanying drawings, in which:

(2) FIG. **1** is a diagram illustrating a video call system, according to an exemplary embodiment;

(3) FIGS. **2**A and **2**B are diagrams illustrating a configuration of a display apparatus, according to an exemplary embodiment;

(4) FIG. **3** is a diagram illustrating a method for changing size of a video call UI, according to an exemplary embodiment;

(5) FIGS. **4**A to **4**C are diagrams illustrating an example of an operation according to a user voice;

(6) FIGS. **5**A and **5**B are diagrams illustrating an example of a method for providing a visual feedback to a video call UI;

(7) FIG. **6** is a diagram illustrating an operation in a case in which a user is not recognized, according to an exemplary embodiment;

(8) FIG. **7** is a diagram illustrating an operation to reduce a video call UI, according to an exemplary embodiment;

(9) FIG. **8** is a flowchart illustrating an operation according to a privacy level, according to an exemplary embodiment;

(10) FIG. **9** is a flowchart to describe an operation according to a privacy level, according to another exemplary embodiment of the present disclosure; and

(11) FIG. **10** is a flowchart illustrating a control method of a display apparatus, according to an exemplary embodiment.

DETAILED DESCRIPTION

(12) Exemplary embodiments are described below in detail with reference to the accompanying drawings. The same or similar components may be designated by the same or similar reference numerals, although they are illustrated in different drawings. Detailed descriptions of constructions or processes known in the art may be omitted to avoid obscuring the subject matter of the present disclosure.

(13) Relational terms such as first and second, and the like, may be used to distinguish one entity from another, without necessarily implying any actual relationship or order between such entities.

(14) The terms used herein are provided to describe exemplary embodiments and are not intended to limit the scope of the present disclosure. A singular term includes a plural form unless clearly defined otherwise. The terms "include" and "configured to", as used herein, are used to indicate that there are features, numbers, steps, operations, elements, parts or a combination thereof, and these terms should not exclude the possibility of a combination or an addition of one or more features, numbers, steps, operations, elements, parts, or a combination thereof.

(15) As described herein, a module or a unit may perform at least one function or operation, and may be realized as hardware, software, or a combination thereof. In addition, a plurality of modules or units may be integrated into at least one module and may be realized as at least one process, except for modules or units that should be realized in hardware. When one element is referred to as being "connected to" another element, the elements may be directly connected or a third element may be connected in between. When an element is referred to as being "directly connected to"

another element, the elements are directly connected without a third element connected in between.

(16) Herein, the expression "configured to" can be used interchangeably with, for example, "suitable for", "having the capacity to", "designed to", "adapted to", "made to", or "capable of". The expression "configured to" does not necessarily mean "specifically designed to" in a hardware sense. Instead, under some circumstances, "a device configured to" may indicate that such a device can perform an operation along with another device or part. For example, the expression "a processor configured to perform A, B, and C" may indicate an exclusive processor (e.g., an embedded processor) to perform the corresponding operation, or a generic-purpose processor (e.g., a central processing unit (CPU) or application processor (AP)) that can perform the corresponding operations by executing one or more software programs stored in the memory device.

(17) Technical terms used herein are to be used for the purpose of describing exemplary embodiments, and are not intended to limit the scope. In addition, the technical terms used herein are to be interpreted as is understood in the present disclosure by those of ordinary skill in the art, unless they are specifically defined by other means. Further, when technical terms do not accurately represent the features of the present disclosure, they may be replaced with meanings determined by one of ordinary skill in the art. In addition, the terms used herein, which are defined as provided in advance, or which are to be interpreted according to the context before and after, are not to be construed as having a meaning in an excessively reduced manner.

(18) Expressions such as "at least one of," when preceding a list of elements, modify the entire list of elements and do not modify the individual elements of the list.

(19) Below, one or more exemplary embodiments will be described in greater detail with reference to the drawings.

(20) FIG. **1** illustrates a video call system **1000** according to an exemplary embodiment. As illustrated in FIG. **1**, the video call system **1000** includes a display apparatus **100** and a different display apparatus **200**.

(21) The display apparatus **100** can be embodied as various types of devices having display functions such as a monitor, TV, and kiosk. The display apparatus **100** may be embodied as a stationary type apparatus.

(22) The display apparatus **100** may communicate with the different display apparatus **200**. The display apparatus **100** may transmit and receive video data and audio data to perform a video call with the different display apparatus **200**. Video data may be video data captured by the different display apparatus **200**, and audio data may be audio data input to the different display apparatus **200**.

(23) The display apparatus **100** may share contents, in addition to conducting a video call with the different display apparatus **200**. For example, the display apparatus **100** may transmit movie content to the different display apparatus **200** and reproduce it on a real time basis.

(24) To share contents, the display apparatus **100** may transmit contents to the different display apparatus **200**. The display apparatus **100** may receive contents to share from the different display apparatus **200**. The display apparatus **100** and the different display apparatus **200** may receive the same contents from a server, etc., and display the contents on a real-time basis.

(25) The display apparatus **100**, while displaying contents which are being shared with the different display apparatus **200** on a real-time basis, may conduct a video call. In this case, the display apparatus **100** may display a video call UI on one side of a display area.

(26) In particular, the display apparatus **100**, when at least one of a user gesture and a voice included in the video call data received from the different display apparatus **200** satisfies a preset condition (e.g., predetermined condition), may change a size of a video call UI and display the UI.

(27) For example, when an operation such as shaking arms of a user of the different display apparatus **200** is sensed, the display apparatus **100** may magnify size of the video call UI and display it.

(28) The different display apparatus **200** may be embodied as various types of apparatuses having

display function such as a monitor, TV, and kiosk. In particular, the different display apparatus **200** may be an apparatus which is the same as the display apparatus **100**, and perform the same function as the display apparatus **100** and thus, detailed description will be omitted.

(29) FIGS. **2**A and **2**B are block diagrams illustrating features of the display apparatus **100** according to an exemplary embodiment.

(30) As illustrated in FIG. **2**A, a display apparatus **100** includes a communication interface **110**, a display **120**, and a processor **130**.

(31) The communication interface **110** may communicate with the different display apparatus **200**. The communication interface **110** may transmit and receive contents which are being shared with the different display apparatus **200** on a real-time basis, and transmit and receive data relating to video call.

(32) The communication interface **110** may perform unidirectional or bidirectional communication with the different display apparatus **200**. The communication interface **110** may perform unidirectional communication to transmit, to the different display apparatus **200**, the shared contents on a real time basis, or receive, from the different display apparatus **200**, the content. The communication interface **110** may perform bidirectional communication while transceiving video call data with the different display apparatus **200**.

(33) The display **120** may display contents being shared on a real time basis with the different display apparatus **200** by control of the processor **130** and video call UI with a user of the different display apparatus **200**. For example, the display **120** may display the content being shared on a real-time basis on an entire display area and display a video call UI on an area of a display to be overlapped.

(34) In addition, the display **120** may be embodied as a liquid crystal display (LCD) panel or an organic light emitting diode (OLED) display, but is not limited thereto. The display **120** can be embodied as a flexible display and a transparent display according to some cases.

(35) The processor **130** controls overall operation of the display apparatus **100**.

(36) The processor **130**, when at least one of gesture and voice included in video call data received from the different display apparatus **200** satisfies a preset condition, may control the display **120** to change a size of a video call UI and display the UI.

(37) The processor **130**, when at least one of gesture and voice of a user included in video call data received from the different display apparatus **200** is recognized for more than a preset time (e.g., predetermined time), may control to gradually magnify the video call UI and display it.

(38) The processor **130**, when user voice included in video call data received from the different display apparatus **200** is greater than or equal to a preset size (e.g., predetermined size), may control to magnify video call UI to a preset size and display the UI.

(39) The processor **130**, when a user voice is greater than or equal to contents volume, may control to magnify video call UI to a preset size and display the UI.

(40) The processor **130**, while the video call UI is magnified to a preset size, when a user voice is not recognized for a preset time, may control to return the magnified video call UI to a size immediately before being magnified and display the UI.

(41) In addition, the processor **130**, when at least one of gesture and voice of a user is recognized from video call data received from the different display apparatus **200**, may control to provide preset visual feedback to an edge of the video call UI, and when at least one of the recognized user gesture and voice satisfies a preset condition, change size of the video call UI and display the UI.

(42) In addition, the processor **130**, when gesture and voice of a user is not recognized from video call data received from the different display apparatus **200**, may control to replace video call data displayed on the video call UI to a preset image and display.

(43) The processor **130**, when at least one of a gesture and a voice included in video call data received from the different display apparatus **200** is not recognized for more than preset time, may control to gradually reduce video call UI and display the UI.

(44) The processor **130** may control to receive from the different display apparatus **200** user privacy level information, and based on the received privacy level information, change size of the video call UI and display the UI.

(45) Here, the processor **130**, when at least one of a user gesture and a voice satisfies a preset condition, when privacy level of a user is less than preset level, may control to change size of video call UI and display the UI, and when the level is greater than or equal to preset level, control not to change size of the video call UI.

(46) FIG. **2B** is a block diagram illustrating an example of the display apparatus **100**. Referring to FIG. **2B**, the display apparatus **100** includes the communication interface **110**, the display **120**, the processor **130**, a user interface **140**, a storage **150**, an audio processor **160**, a video processor **170**, a speaker **180**, a button **181**, a camera **182**, and a microphone **183**. The elements that are overlapped with the elements of FIG. **2A** will not be further described.

(47) The communication interface **110** may include a Wi-Fi Chip **111**, a Bluetooth Chip **112**, a wireless communication chip **113**, and a near field communication (NFC) chip **114**.

(48) The processor **130** controls overall operations of the display apparatus **100** using various programs stored in the storage **150**.

(49) The processor **130** may include RAM **131**, ROM **132**, main CPU **133**, graphic processor **134**, first to nth interface **135-1˜135-**n, and bus **136**.

(50) The RAM **131**, ROM **132**, main CPU **133**, graphic processor **134**, the first to nth interface **135-1˜135-**n, etc. can be interconnected through the bus **136**.

(51) The first to nth interface **135-1** to **135-**n are connected with aforementioned elements. One of the interfaces can be a network interface that is connected with an external device through network.

(52) The main CPU **133**, by accessing the storage **150**, performs booting using O/S stored in the storage **150**. Using various programs stored in the storage **150**, various operations are performed.

(53) The ROM **132** stores a command set for system booting therein. When a turn-on command is input and power is supplied, the main CPU **133** copies O/S stored in the storage **150** according to a command stored in the ROM **132** to the RAM **131**, and booths system by executing the O/S. When booting is completed, the main CPU **133** copies various application programs stored in the storage **150** to the RAM **131**, and executes various operations by executing an application program copied to the RAM **131**.

(54) The graphic processor **134**, using a calculator and a renderer, generates a screen including various objects such as an icon, an image, and text. The calculator, based on the received control command, calculates attribute values such as a coordinate value where each object is to be displayed according to layout of a screen, shape, size, and color. The renderer generates a screen of various layouts including objects based on attribute values calculated from calculator. The screen generated from the renderer is displayed within a display area of the display **120**.

(55) The above-described operations of the processor **130** can be performed by a program stored in the storage **150**.

(56) The storage **150** stores various data such as an operation system (O/S) software module for operating the display apparatus **100**, video data analysis module, audio data analysis module, video call module, and contents sharing module.

(57) In this case, the processor **130**, based on information stored in the storage **150**, may display contents being shared on a real time basis with the different display apparatus **200** and video call UI.

(58) A user interface **140** receives various user interactions. Here, the user interface **140** can be embodied as various types according to exemplary embodiments of the display apparatus **100**. When the display apparatus **100** is embodied as a digital TV, the user interface **140** can be embodied as a remote controller receiving unit which receives a remote control signal from a remote control device, a camera which detects user motion, and a microphone which receives user voice. In addition, when the display apparatus **100** is embodied as a touch-based electronic

apparatus, the user interface **140** may be embodied as a touch screen which has mutual layer structure with a touch pad. In this case, the user interface **140** may be used as the above-described display **120**.

(59) A touch sensor may be embodied as capacitive or resistive. The capacitive sensor indicates a sensor which calculates a touch coordinate by sensing electricity which is transferred to a human body, when a part of a user's body is touched with a surface of a display, using dialect coated on the display surface. Resistive touch sensor includes two electrode plates provided in the display apparatus **100**, and when a user touches the surface, upper and lower plates of a touched point are in contact with each other, sensing flow of current. In addition, infrared light sensing method, surface ultrasonic wave transfer method, integral tension measurement method, piezo effect method can be used for sensing touch interaction.

(60) The audio processor **160** is an element to process audio data. The audio processor **160** may perform various processing such as decoding, amplification, and noise filtering of audio data.

(61) The video processor **170** is an element which performs video data processing. The video processor **170** may perform various image processing such as decoding, scaling, noise filtering of video data, frame rate conversion, and resolution conversion.

(62) The speaker **180** is an element to output various alarm sounds or voice messages as well as various audio data processed by the audio processor **160**.

(63) The button **181** may be various types of buttons such as a mechanical button, touch pad, and wheel formed on a random area such as a front portion, side portion and rear portion of outer part of the main body of the display apparatus **100**.

(64) The camera **182** is an element to photograph a still image or a moving image according to control of a user. The camera **182** can be embodied as plural cameras such as a front camera and a rear camera.

(65) The microphone **183** is an element to receive user voice and/or other sound and convert them to audio data.

(66) Below, one or more exemplary embodiments are described.

(67) FIG. **3** is a drawing illustrating a method for changing a video call UI according to an exemplary embodiment.

(68) As illustrated in FIG. **3**, the processor **130**, in response to at least one of a user gesture and voice included in video call data received from the different display apparatus **200** satisfying a preset condition, may control the display **120** to change size of video call UI and display. For example, the processor **130**, when user voice included in the received video call data is greater than or equal to preset size, may magnify size of the video call UI.

(69) Here, the processor **130** may extract a gesture and a voice of a user included in video call data received from the different display apparatus **200**. For example, the processor **130** may ignore horn or TV sound included in video call data and extract only user voice. The processor **130** may ignore a gesture of another person other than a user from among video included in video call data and extract user gesture only.

(70) Exemplary embodiments are not limiting, and the processor **130** might not extract gesture and voice of a user, and change size of video call UI and display the UI based on at least one of a gesture and sound in video data.

(71) In particular, the processor **130**, when at least one of user gesture and voice included in video call data received from the different display apparatus **200** is recognized for more than preset time, may gradually magnify video call UI and display the UI. For example, the processor **130**, user voice included in the received video call data is maintained at size more than preset size for more than 10 seconds, size of video call UI can be magnified.

(72) In this case, the processor **130** may ignore silence for a short time during a preset time. For example, the processor **130**, when a user voice is recognized for three seconds and is not recognized for one second afterward, if the user voice is recognized again, it can be determined that

user voice is continued.

(73) The processor **130** may gradually expand and display the video call UI. For example, the processor **130**, while displaying the first video call UI **310**, when a preset condition is satisfied, the size of the video call UI can be magnified to the second video call UI **320**, and the third video call UI **330**. The processor **130** may gradually expand the video call UI and display the UI.

(74) The processor **130** may determine size of the video call UI, based on at least one of gesture and voice of a user included in video call data received from the different display apparatus **200**. For example, the processor **130** may determine size of the video call UI based on size of user voice. The processor **130** may determine size of the video call UI based on duration of user voice. The processor **130** may determine size of the video call UI based on at least one of size and resolution of the display **120**.

(75) In FIG. **3**, it is illustrated that the video call UI is displayed as a round shape on a right lower end, but exemplary embodiments are not limited thereto. For example, the processor **130** may move a position of the video call UI to another area according to a user manipulation and change a shape to rectangular shape.

(76) In addition, the processor **130** may overlay the video call UI on the content shared on a real-time basis and display the UI. The processor **130** may change transparency of the video call UI and display the UI.

(77) The processor **130** may display that the video call UI takes a specific area. For example, the processor **130** may reduce a display area of the content being shared on a real time basis as much as an area where the video call UI is displayed and display the area.

(78) The processor **130** may change size of the video call UI and a shape thereof. For example, the processor **130** may magnify size of the video call UI and change color of an edge of the video call UI or shape of the video call UI.

(79) FIGS. **4**A to **4**C are views to illustrate an example of an operation according to a user voice.

(80) As illustrated in FIG. **4**A, the processor **130**, when user voice included in the video call data received from the different display apparatus **200** is greater than a preset size, may magnify the video call UI to a preset size and display.

(81) Here, the preset size to which the video call UI is magnified can be determined by a user. The processor **130**, based on at least one of size and resolution of the display **120**, may determine a preset size to which the video call UI is magnified.

(82) FIG. **4**A illustrates an example of the video call UI **410** which is magnified to a preset size, but it is not limited thereto. For example, the processor **130** may display the video call UI on an entire area, or display at a different size and a different shape.

(83) As illustrated in FIG. **4**B, the processor **130**, when user voice is greater than volume of the content, may magnify the video call UI to a preset size and display. For example, the processor **130**, by comparing the sound size **420** which is being shared on a real time basis with size **430** of voice included in the video call data, when size of the voice **430** is greater than size **420** of the sound, may magnify the video call UI to a preset size and display.

(84) Here, the processor **130** may extract a user voice included in video call data and determine size thereof. For example, the processor **130** may ignore a horn sound and a TV sound included in video call data and extract user voice only, and compare it with size of sound of the content.

(85) As illustrated in FIG. **4**C, the processor **130**, while the video call UI is magnified to a preset size, when user voice is not recognized for preset time, may return the video call UI to a size before being magnified and display. For example, the processor **130**, while the video call UI is magnified to a preset size, when a user voice is not recognized, contents which are being shared are determined to be more important display element, and the video call UI can be reduced to the second video call UI **440** to a size immediately before being magnified from the first video call UI **410**. The processor **130** may reduce the video call UI to a different size instead of the size immediately before being magnified.

(86) Here, preset time can be set by a user, or can be a time that is set when manufacturing the display apparatus **100**.

(87) FIGS. **5**A and **5**B are views illustrating an example of a method for providing visual feedback to the video call UI. The processor **130**, when at least one of a user gesture and a voice is recognized from video call data received from the different display apparatus **200**, may provide preset visual feedback to edge of the video call UI, and when at least one of the recognized user gesture and voice satisfies a preset condition, may change size of the video call UI and display.

(88) As illustrated in FIG. **5**A, the processor **130**, when a user gesture and a voice of a user are not recognized, may minimize a size of the video call UI and display. In addition, the processor **130**, when user's gesture is recognized, may provide visual feedback to change a color of an edge of the video call UI or flicker. The processor **130** may provide visual feedback to change a color of the edge of the video call UI or flicker the UI. Accordingly, the processor **130** may attract a viewpoint of the user of the display apparatus **100** who views contents which are being shared on a real time basis.

(89) Alternatively, as illustrated in FIG. **5**B, the processor **130**, when a user gesture and a voice are not recognized, may minimize a size of the video call UI and display the UI. In addition, the processor **130**, when the user voice is recognized, may provide visual feedback to change a color of an edge of the video call UI or flicker the UI. The processor **130** may provide visual feedback to change a color of an edge of the video call UI and flicker the UI. Accordingly, the processor **130** may attract a viewpoint of the user of the display apparatus **100** who views contents which are being shared on a real time basis.

(90) The processor **130** may provide visual feedback to the video call UI only when both a user gesture and a voice are recognized.

(91) The processor **130** may provide visual feedback to the video call UI only when a gesture or a voice of a user is preset gesture or voice. For example, the processor **130**, when the user voice is a name of a user of the display apparatus **100**, may provide visual feedback to the video call UI. The processor **130** may provide visual feedback to the video call UI when a user gazes at a camera provided on the different display apparatus **200**.

(92) The processor **130**, when at least one of a gesture and a voice of the recognized user satisfies a preset condition, may change a size the video call UI and display the UI. For example, the processor **130**, while color of the edge of the video call UI is changed, when the user voice is maintained for more than preset time, may change a size of the video call UI and display the UI.

(93) FIG. **6** is a view to illustrate an operation of a case in which a user is not recognized according to an exemplary embodiment.

(94) As illustrated in FIG. **6**, the processor **130**, when a user video and voice are not recognized from video call data received from the different display apparatus **200**, may substitute video call data displayed on the video call UI with a preset image and display.

(95) For example, the processor **130**, while a first call UI **610** including a user and nearby devices is being displayed, when a user is out of the view of the camera provided on the different display apparatus **200**, for a preset time, a second video call UI **620** including a video captured by the camera provided on the different display apparatus **200** can be displayed. In addition, the processor **130**, when preset time elapses, may display a third video call UI **630** including a preset image instead of a video photographed by the camera provided on the different display apparatus **200**.

(96) However, exemplary embodiments are not limited thereto, and the processor **130**, when a user is out of view of the camera provided on the different display apparatus **200** without elapsing of preset time, may display the third video call UI **630** including a preset image.

(97) The processor **130**, based on a preset gesture or a voice of a user instead of a user's video, may display the third video call UI **630** including a preset image. For example, the processor **130** may display the third video call UI **630** including a preset image according a gesture to hold right hand.

(98) The processor **130**, when a gesture and a voice of a user are not recognized for more than

preset time, may display the third video call UI **630** including a preset image. For example, the processor **130**, when a gesture and a voice of a user are not recognized for more than 10 seconds, may display the third video call UI **630** including a preset image.

(99) Here, the preset image may be a basic image provided from a video call application, or an image set by a user. The processor **130** may display an image immediately before being out of an angle of the camera provided on the different display apparatus **200** instead of a preset image.

(100) FIG. **7** is a view illustrating an operation to reduce the video call UI according to an exemplary embodiment.

(101) As illustrated in FIG. **7**, the processor **130**, when at least one of the gesture and the voice of a user included in the video call data received from the different display apparatus **200** is not recognized for more than preset time, may gradually reduce the video call UI **710** and display the reduced video call UI **720**.

(102) For example, the processor **130**, when a user included in the video call data received from the different display apparatus **200** does not show a large movement and does not speak, may gradually reduce the video call UI and display the reduce video call UI. That is, the processor **130**, even when there is a user within an angle of the camera provided on the different display apparatus **200**, may gradually reduce the video call UI and display the reduced video UI.

(103) Exemplary embodiments are not limited thereto and the processor **130** may gradually reduce the video call UI.

(104) The processor **130**, even when a user is not recognized within an angle of the camera provided on the different display apparatus **200**, may gradually reduce the video call UI and display the UI.

(105) As illustrated in FIG. **6**, the processor **130**, while the video call UI including a preset image is displayed, when a preset time elapses, may gradually reduce the video call UI and display the UI.

(106) The processor **130** may reduce the video call UI and then may not display the video call UI. In this case, the processor **130** may ignore video data included in the video call data received from the different display apparatus **200** and output audio data only. The processor **130** may transmit a signal requesting audio data only to the different display apparatus **200**, and receive audio data only from the different display apparatus **200**.

(107) The processor **130**, while performing a call with a user while the video call UI is not displayed, when a gesture or a voice of a user is recognized, may display the video call UI again. In this case, the processor **130** may receive video data and audio data from the different display apparatus **200**.

(108) The processor **130**, while performing a call with a user when the video call UI is not displayed, if a user's voice is recognized again, may display the video call UI again. In this case, the processor **130** may receive audio data only from the different display apparatus **200**.

(109) The processor **130** may receive from a different display apparatus **200** a signal to display the video call UI, and display the video call UI again. In this case, the different display apparatus **200** may recognize user gesture or voice and transmit a signal to display the video call UI again to the display apparatus **100**.

(110) The processor **130**, when a user gesture or voice is a preset gesture or voice, may display the video call UI again. For example, the processor **130** may display the video call UI again by recognizing an utterance of a user, such as "video call on."

(111) FIG. **8** is a flowchart to describe an operation according to privacy level according to an exemplary embodiment.

(112) First, privacy level information is received from the different display apparatus **200**, in operation S**810**. The privacy level information is information set by a user. For example, the privacy level information may be information which is divided into top, middle, and low levels. However, exemplary embodiments are not limited thereto.

(113) The privacy level information may be information to set an operation method for a specific

case. For example, the privacy level information, when a user is not recognized, may display a preset image, and when a user is recognized, based on at least one of user gesture and voice, may include information regarding whether or not to change a size of the video call UI.

(114) The processor **130**, when the privacy level information is received, may determine whether a privacy level of a user is a preset level or more (S**820**). The processor **130**, when the privacy level of a user is less than a preset level, when at least one of a user gesture and voice satisfies a preset condition, changes a size of the video call UI (S**830**).

(115) In addition, the processor **130**, when the privacy level of a user is greater than a preset level, does not change a size of the video call UI (S**840**). That is, the processor **130**, even when a user gesture or voice is recognized, may not change a size of the video call UI.

(116) FIG. **8** illustrates that whether to change a size of the video call UI may be determined according to user privacy level information, but it is not limited thereto. For example, the processor **130** may determine whether to change color of an edge of the video call UI according to privacy level information of a user.

(117) FIG. **9** is a flowchart illustrating an operation according to privacy level according to another exemplary embodiment.

(118) Privacy level information of a user is received from the different display apparatus **200** (S**910**).

(119) The processor **130**, when privacy level information is received, determines whether a privacy level of a user is greater than preset level or not (S**920**). The processor **130**, when the privacy level of a user is less than preset level, displays a real time video of a user on the video call UI (S**930**). That is, the processor **130** may display a video photographed by the camera provided on the different display apparatus **200**.

(120) The processor **130**, when the privacy level of a user is greater than a preset level, displays a preset image on the video call UI (S**940**). In this case, the processor **130** may transmit a signal to request audio data only to the different display apparatus **200**. The processor **130** may transmit to the different display apparatus **200** a signal requesting a preset image.

(121) FIGS. **8** and **9** illustrate that a size of the video call UI or a display image of the video call UI is determined according to privacy level information. That is, the size of the video call UI and the display image of the video call UI can be determined separately.

(122) For example, the processor **130** may change a size of the video call UI according to privacy level information and display a photographed image on the video call UI, or display a preset image on the video call UI without changing a size of the video call UI. The processor **130**, even though a size of the video call UI is changed according to the privacy level information, may display a preset image on the video call UI. The processor **130** may display an image photographed by a user on the video call UI without changing a size of the video call UI.

(123) FIG. **10** is a flowchart illustrating a method for controlling a display device according to an exemplary embodiment.

(124) In operation S**1010**, contents which are being shared with a different display device and video call UI with a user of a different display device are displayed. In addition, when at least one of a user gesture and a voice included in the video call data received from a different display device satisfies a preset condition, a size of the video call UI is changed and displayed, in operation S**1020**.

(125) Here, changing a size the video call UI and displaying the UI, in operation S**1020**, when at least one of a user gesture and a voice included in video call data received from a different display device is recognized for more than preset time, may gradually expand the video call UI and display the UI.

(126) In addition, changing a size and displaying, in operation S**1020**, when a user voice included in the video call data received from a different display device is greater than a preset size, may magnify the video call UI to a preset size and display the UI.

(127) In particular, changing a size and displaying, in S**1020**, when a user voice is greater than volume of contents, may magnify the video call UI and display.

(128) In addition, changing a size and displaying, in S**1020**, while the video call UI is magnified to a preset size, when a user voice is not recognized for a preset time, may return magnified video call UI to a size immediately before being magnified and display.

(129) Changing a size and displaying, in S**1020**, when at least one of a user gesture and a voice is recognized from video call data received from a different display device, provide preset visual feedback to an edge of the video call UI, and when at least one of the recognized user gesture and voice satisfies a preset condition, change a size of the video call UI and display.

(130) In addition, changing a size and displaying, in S**1020**, when user gesture and voice are not recognized from video call data received from a different display device, may replace video call data displayed on the video call UI with a preset image and display.

(131) In addition, changing a size and displaying, in S**1020**, when at least one of user gesture and voice included in video call data received from a different display device is not recognized for more than a preset time, may gradually reduce the video call UI and display the video call UI.

(132) In addition, changing a size and displaying, in S**1020**, may receive privacy level information of a user from a different display device, change a size of the video call UI based on the received privacy level information, and display the UI.

(133) Changing a size and displaying, in S**1020**, when privacy level of a user is less than a preset level, if at least one of user gesture and voice satisfies a preset condition, change a size of the video call UI and display, and when it is greater than a preset level, may not change a size of the video call UI.

(134) According to one or more exemplary embodiments, a display device may change a size of the video call UI according to behavior of a counterparty to the video call and attract attention of a user of the video call.

(135) According to one or more exemplary embodiments, it has been described above that a size of the video call UI is changed based on at least one of a gesture and a voice of a different display device, but it is not limited thereto.

(136) For example, by reflecting interaction with a user of a display device, a size of the video call UI can be changed. In this case, even when at least one of a user gesture and a voice of a different display device satisfies a preset condition, a size of the video call UI may not be changed. The display device, according to at least one of a user gesture and a voice of a different display device, when a user of the display device operates, a size of the video call UI can be changed.

(137) A method for controlling a display device according to one or more exemplary embodiments can be embodied as a program code executable by a processor or a computer and stored in various non-transitory computer readable mediums to be provided to each server or device, so that it is executable by the processor of the server or device.

(138) As an example, a non-transitory computer readable medium can be provided in which a program which sequentially executes the steps of displaying contents being shared with a different display device on a real-time basis and video call UI with a user of a different display device, receiving video call data from a different display device, and when at least one of user gesture and voice included in video call data satisfies a preset condition, changing a size of the video call UI and displaying the video call UI.

(139) The non-transitory computer-recordable medium is an apparatus-readable medium configured to semi-permanently store data. Specifically, the above-described various applications or programs may be stored in a non-transitory apparatus-readable medium such as a compact disc (CD), a digital versatile disc (DVD), a hard disc, a Blu-ray disc, a universal serial bus (USB), a memory card, or a read only memory (ROM), and then may be provided to a user terminal device.

(140) While exemplary embodiments have been shown and described with reference to the drawings, it will be understood by those having ordinary skill in the art that various changes in

form and detail may be made therein without departing from the spirit and scope, as defined by the appended claims.

Claims

1. A display apparatus, comprising: a communication interface configured to communicate with another display apparatus; a display; and a processor configured to: receive audio data of the another display apparatus from the another display apparatus through the communication interface; control the display to display a video call user interface (UI) corresponding to the audio data; determine whether a volume level corresponding to the audio data is greater than or equal to a predetermined level, and based on determining that the volume level is greater than or equal to the predetermined level, change a display size of the video call UI and display an edge of the video call UI in a predetermined color.

2. The display apparatus of claim 1, wherein the processor is further configured to: based on the determining that the volume level is greater than or equal to the predetermined level, gradually enlarge the display size of the video call UI.

3. The display apparatus of claim 2, wherein the processor is further configured to: based on determining that the volume level is less than the predetermined level, gradually reduce the display size of the video call UI.

4. The display apparatus of claim 1, wherein the processor is further configured to: enlarge the display size of the video call UI to a first size based on determining that the audio data is greater than or equal to a first volume threshold; and enlarge the display size of the video call UI to a second size based on determining that the audio data is greater than or equal to a second volume threshold, wherein the second volume threshold is greater than the first volume threshold, and wherein the second size is greater than the first size.

5. The display apparatus of claim 1, wherein the processor is further configured to: receive, from the another display apparatus through the communication interface, content shared with the another display apparatus; and control the display to display the content.

6. The display apparatus of claim 5, wherein the processor is further configured to: based on determining that the volume level is greater than or equal to a volume of the content, change the display size of the video call UI and display the edge of the video call UI in the predetermined color.

7. The display apparatus of claim 1, wherein the processor is further configured to: based on determining that the volume level is greater than or equal to the predetermined level for more than a predetermined length of time while the edge of the video call UI is displayed in the predetermined color, change the display size of the video call UI.

8. The display apparatus of claim 1, wherein the processor is further configured to: control the display to display a video captured by a camera of the another display apparatus in a portion of the video call UI.

9. The display apparatus of claim 8, wherein the processor is further configured to: control the display to display a predetermined image based on determining that a user of the another display apparatus is out of view of the camera of the another display apparatus.

10. The display apparatus of claim 9, wherein the processor is further configured to: control the display to ignore video data from the another display apparatus and output only the audio data from the another display apparatus based on determining that the user of the another display apparatus is out of the view of the camera for longer than a predetermined length of time.

11. The display apparatus of claim 1, wherein the processor is further configured to: based on determining that the volume level is greater than or equal to the predetermined level and that at least one gesture is recognized, change the display size of the video call UI and display the edge of the video call UI in the predetermined color.

12. A control method of a display apparatus, the control method comprising: receiving, from another display apparatus, audio data; displaying a video call user interface (UI) corresponding to the audio data; determining whether a volume level corresponding to the audio data is greater than or equal to a predetermined level, and based on determining that the volume level is greater than or equal to the predetermined level, changing a display size of the video call UI and displaying an edge of the video call UI in a predetermined color.

13. The control method of claim 12, further comprising: based on the determining that the volume level is greater than or equal to the predetermined level, gradually enlarging the display size of the video call UI.

14. The control method of claim 13, further comprising: based on determining that the volume level is less than the predetermined level, gradually reducing the display size of the video call UI.

15. The control method of claim 12, further comprising: enlarging the display size of the video call UI to a first size based on determining that the audio data is greater than or equal to a first volume threshold; and enlarging the display size of the video call UI to a second size based on determining that the audio data is greater than or equal to a second volume threshold, wherein the second volume threshold is greater than the first volume threshold, and wherein the second size is greater than the first size.

16. The control method of claim 12, further comprising: receiving, from the another display apparatus, content shared with the another display apparatus; and displaying the content.

17. The control method of claim 16, further comprising: based on determining that the volume level is greater than or equal to a volume of the content, changing the display size of the video call UI and displaying the edge of the video call UI in the predetermined color.

18. The control method of claim 12, further comprising: based on determining that the volume level is greater than or equal to the predetermined level for more than a predetermined length of time while the edge of the video call UI is displayed in the predetermined color, changing the display size of the video call UI.

19. The control method of claim 12, further comprising: displaying a video captured by a camera of the another display apparatus in a portion of the video call UI.

20. The control method of claim 19, further comprising: displaying a predetermined image based on determining that a user of the another display apparatus is out of view of the camera of the another display apparatus.

21. The control method of claim 20, further comprising: ignoring video data from the another display apparatus and outputting only the audio data from the another display apparatus based on determining that the user of the another display apparatus is out of the view of the camera for longer than a predetermined length of time.

22. The control method of claim 12, further comprising: based on determining that the volume level is greater than or equal to the predetermined level and that at least one gesture is recognized, changing the display size of the video call UI and displaying the edge of the video call UI in the predetermined color.