



US 20100149120A1

(19) **United States**(12) **Patent Application Publication**
LEE et al.(10) **Pub. No.: US 2010/0149120 A1**(43) **Pub. Date: Jun. 17, 2010**(54) **MAIN IMAGE PROCESSING APPARATUS,
SUB IMAGE PROCESSING APPARATUS AND
CONTROL METHOD THEREOF**(30) **Foreign Application Priority Data**

Dec. 11, 2008 (KR) 10-2008-0125783

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SZILAGYI, London (GB)**Publication Classification**(51) **Int. Cl.**
G06F 3/041 (2006.01)(52) **U.S. Cl. 345/173**(57) **ABSTRACT**

Disclosed are a main image processing apparatus, a sub image processing apparatus and a control method thereof. The control method of the sub image processing apparatus includes receiving a user's touch input through the sub image processing apparatus; determining which contents correspond to a touched area where the touch input occurs; sensing change in location of the touch input; and transmitting a control command for the contents to the main image processing apparatus in response to the sensed change in the location of the touch input. With this, it is more convenient for a user to control the main image processing apparatus through the sub image processing apparatus supporting the touch input.

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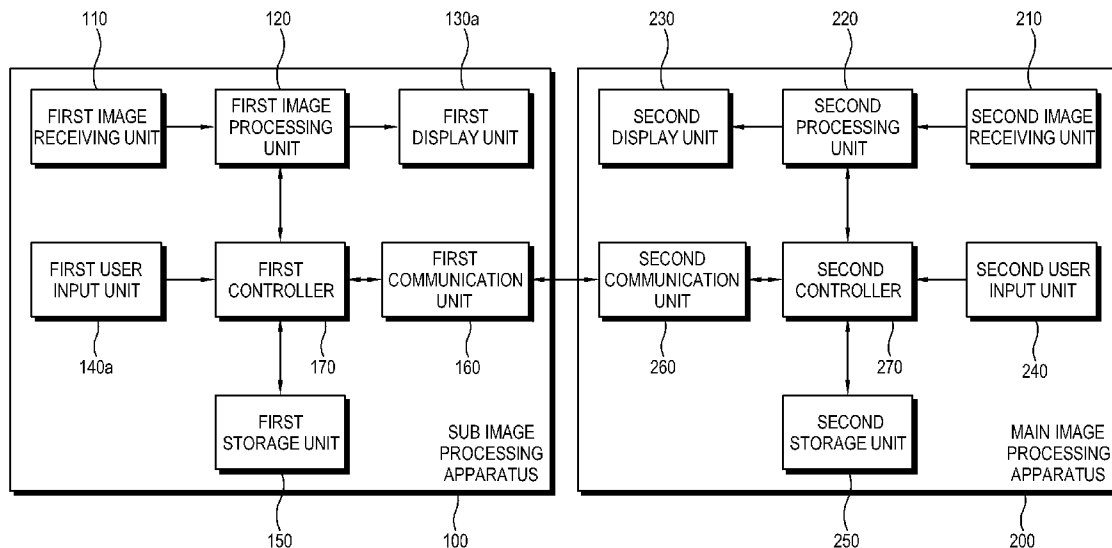
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FIG. 1A

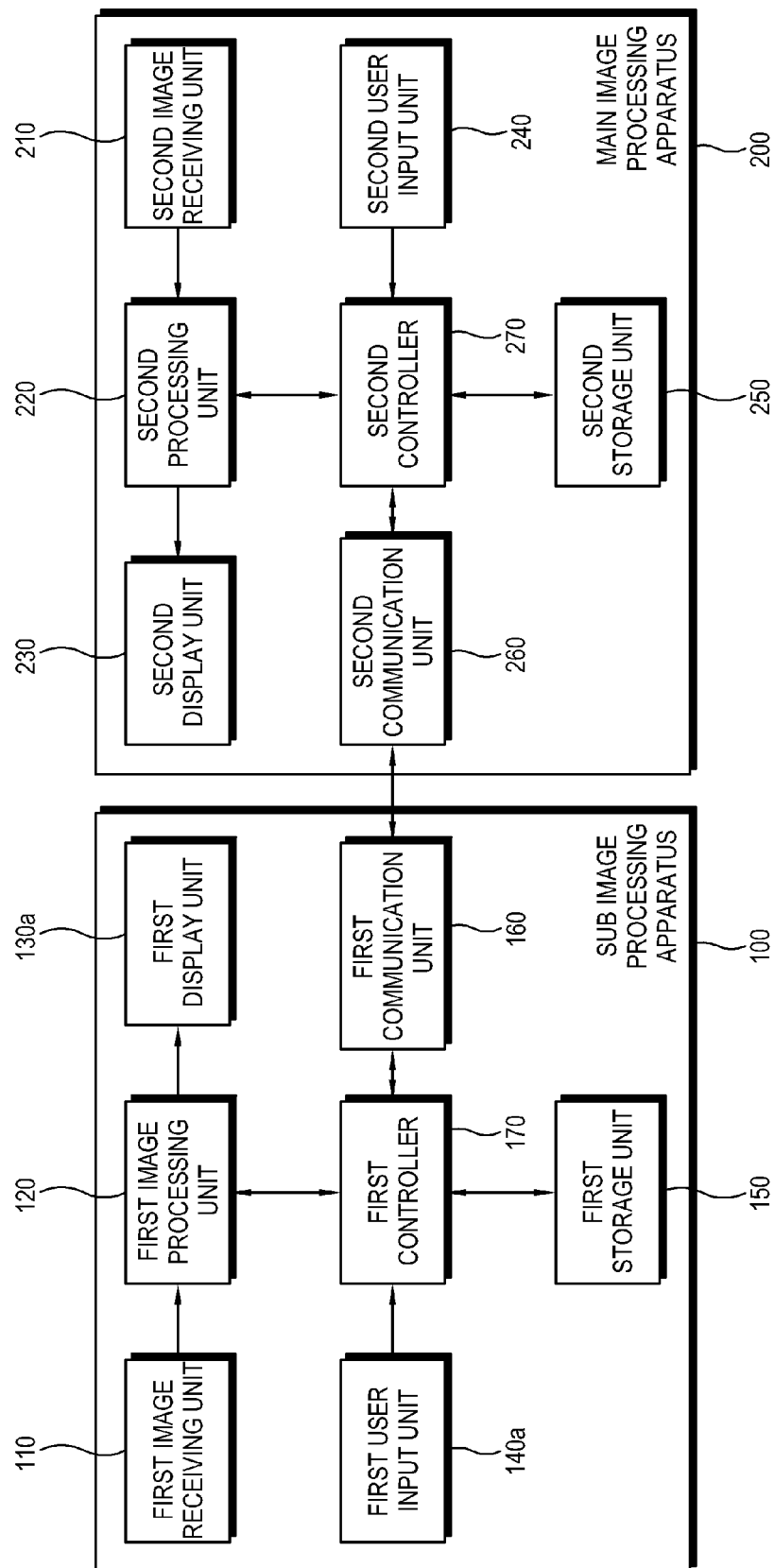


FIG. 1B

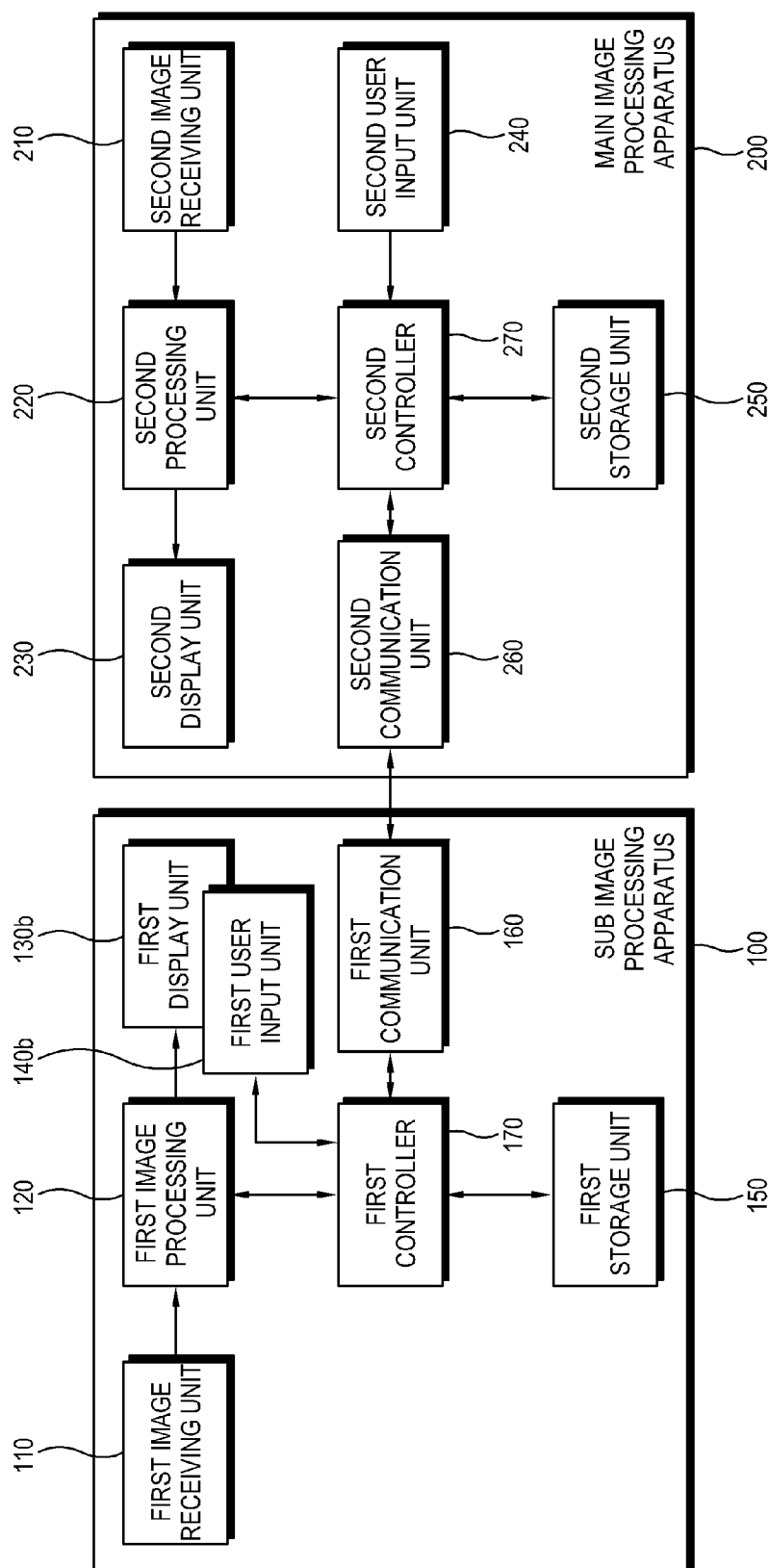


FIG. 2

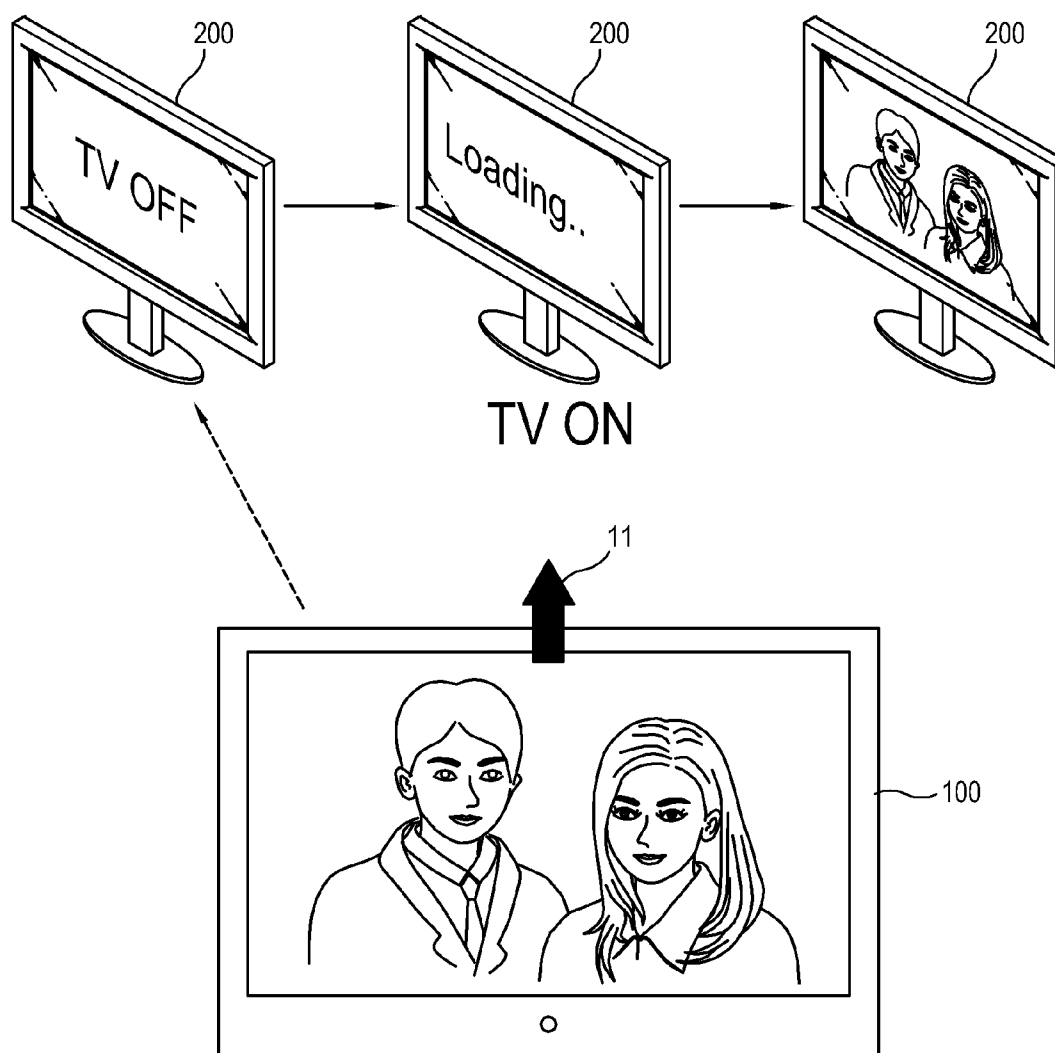


FIG. 3

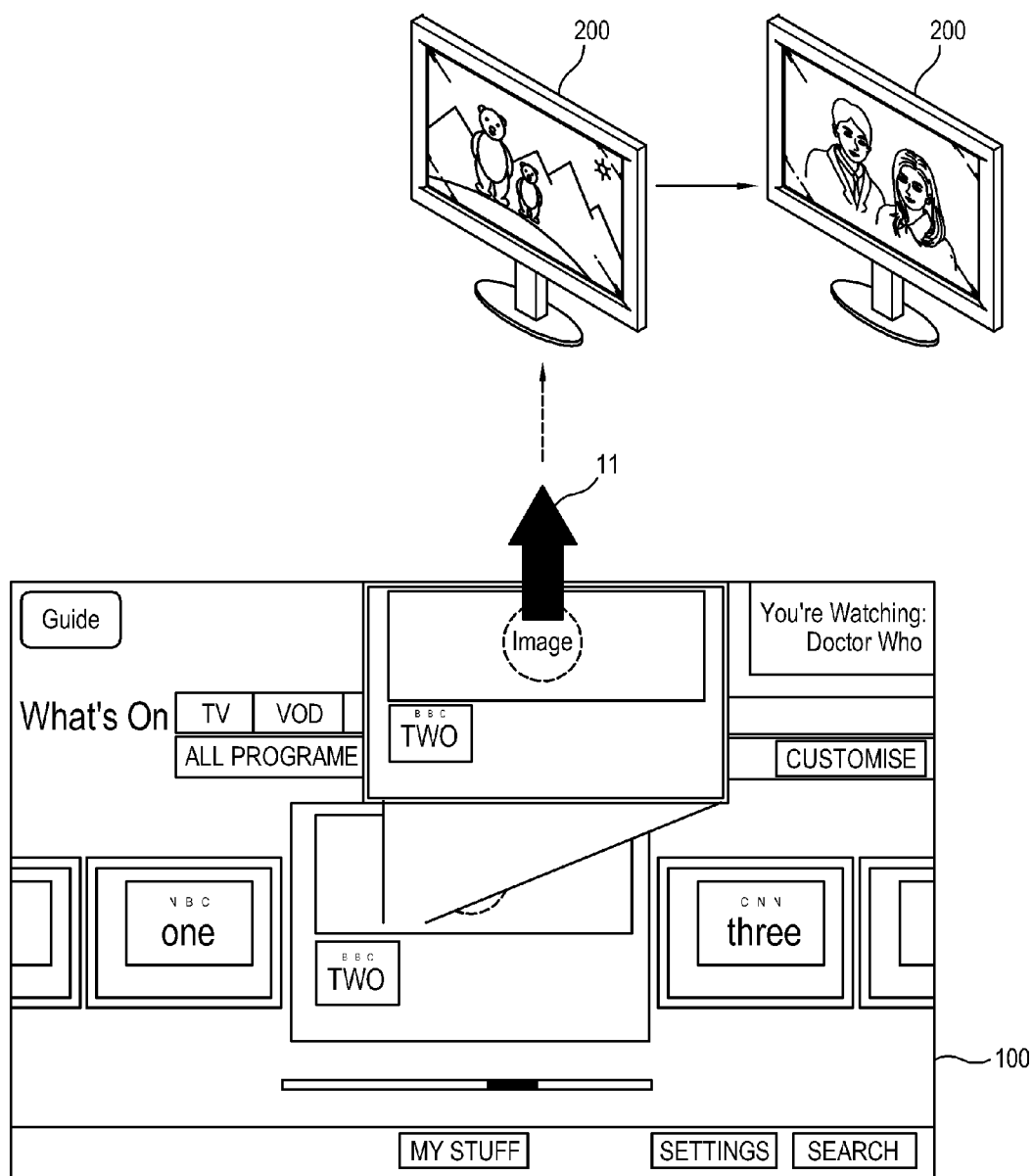


FIG. 4A

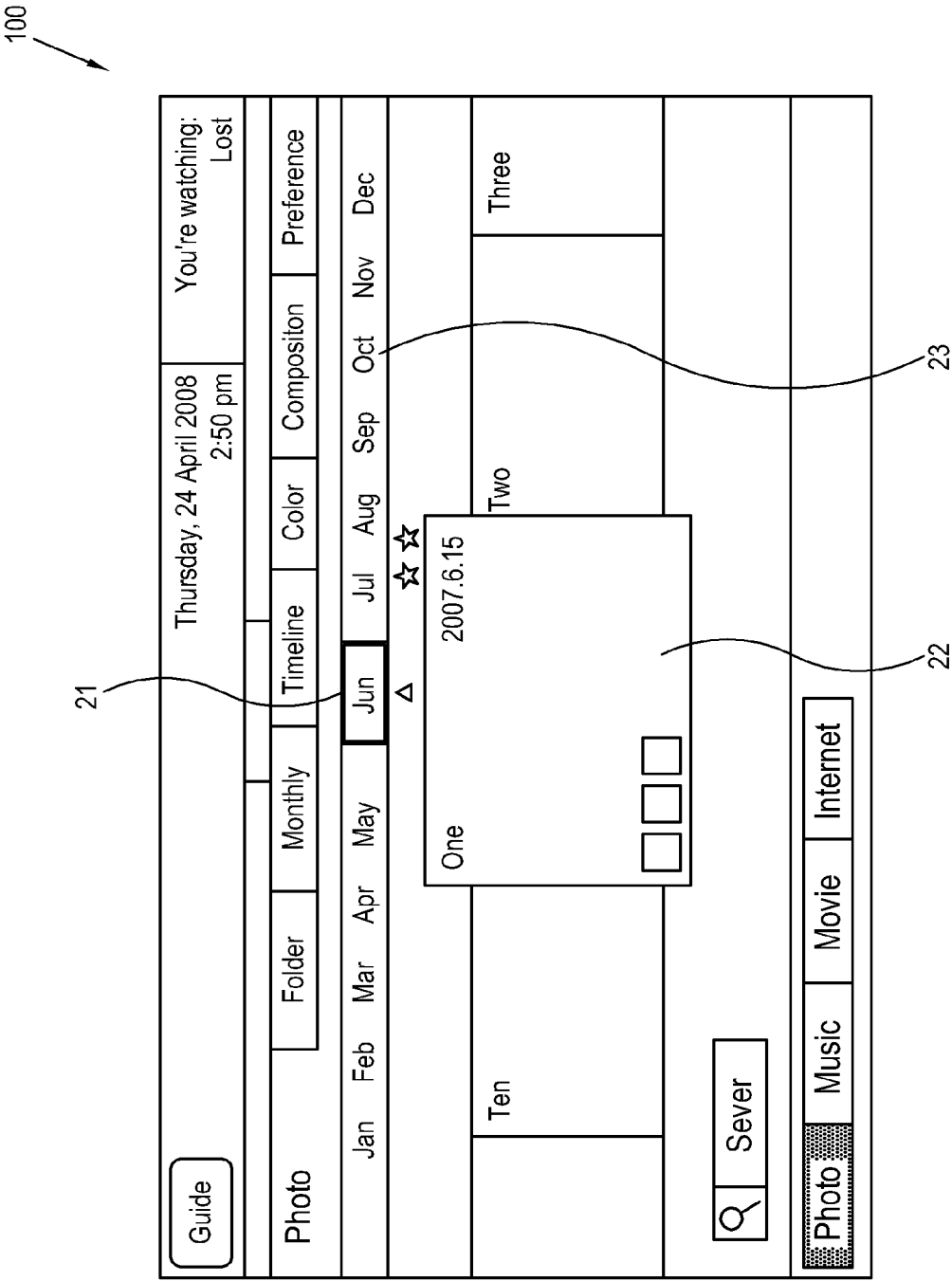


FIG. 4B

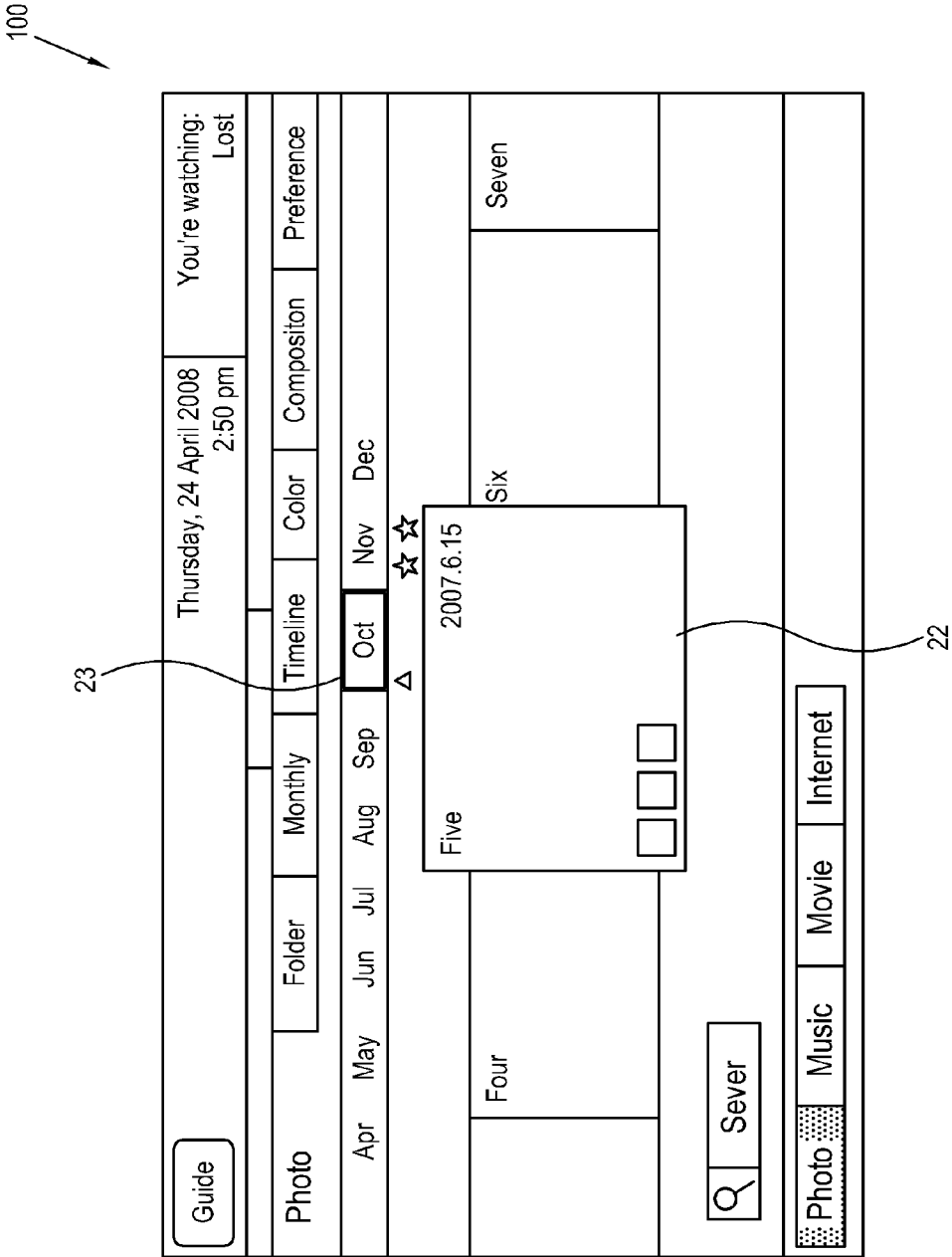


FIG. 5A

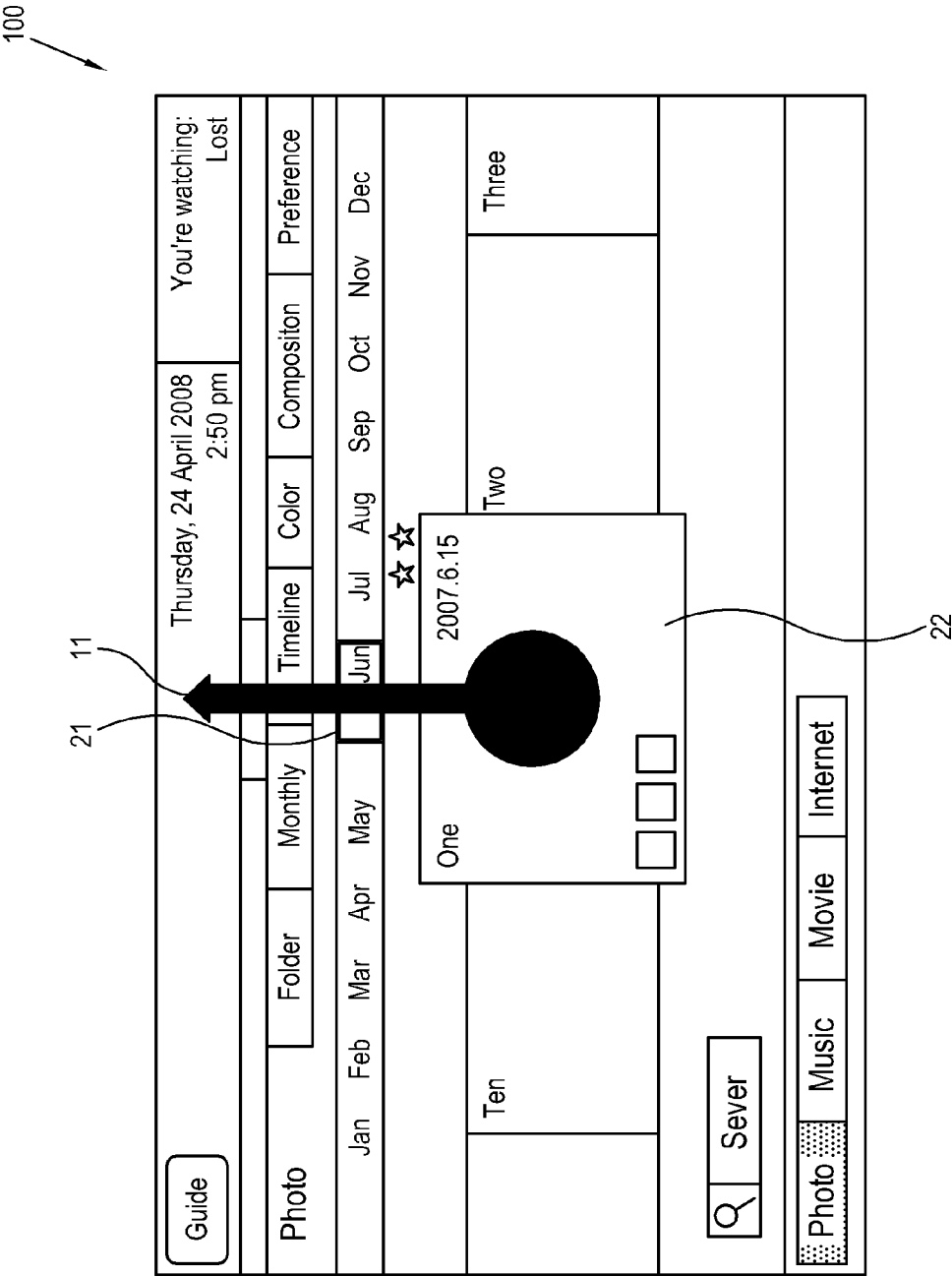


FIG. 5B

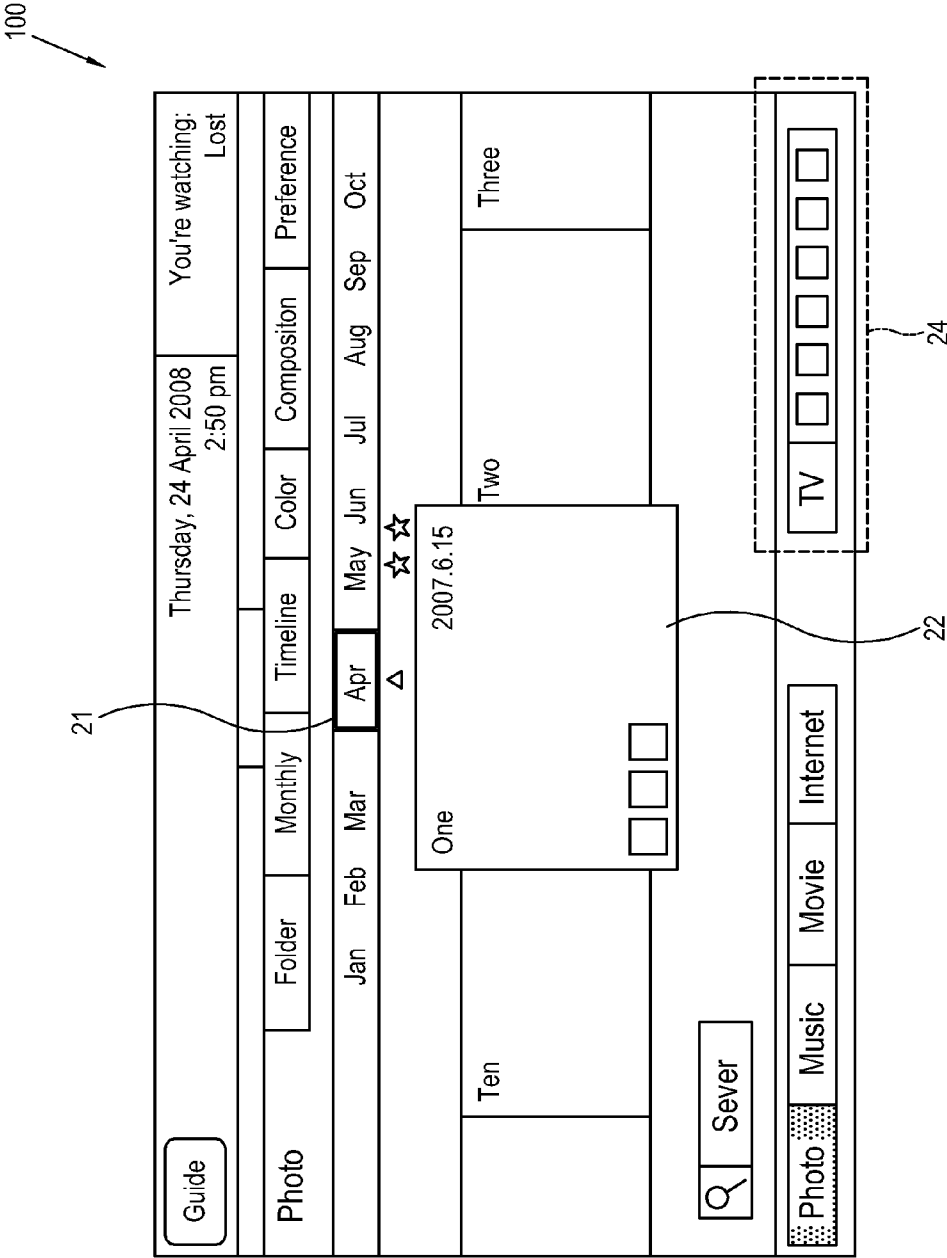


FIG. 5C

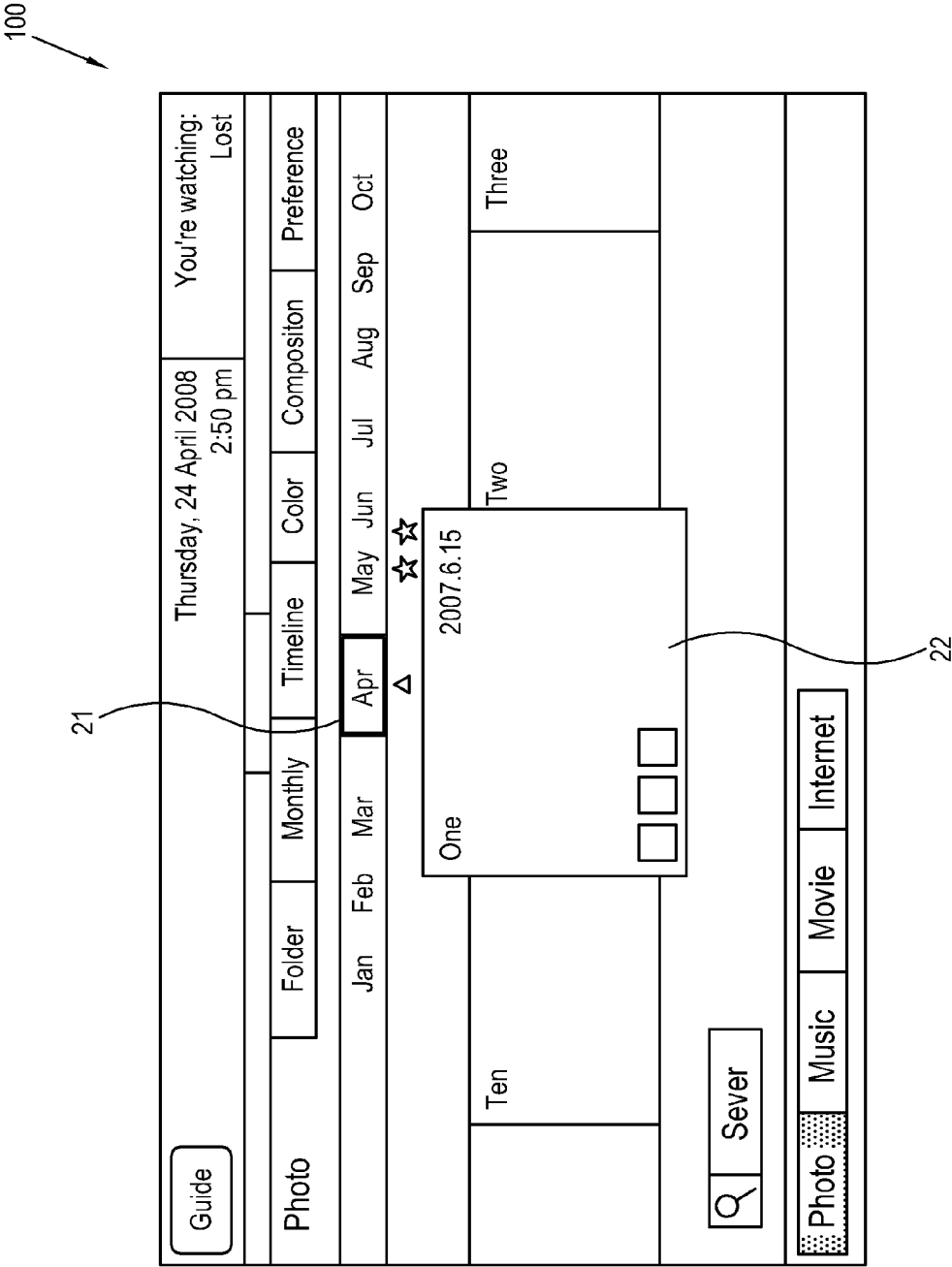


FIG. 6A

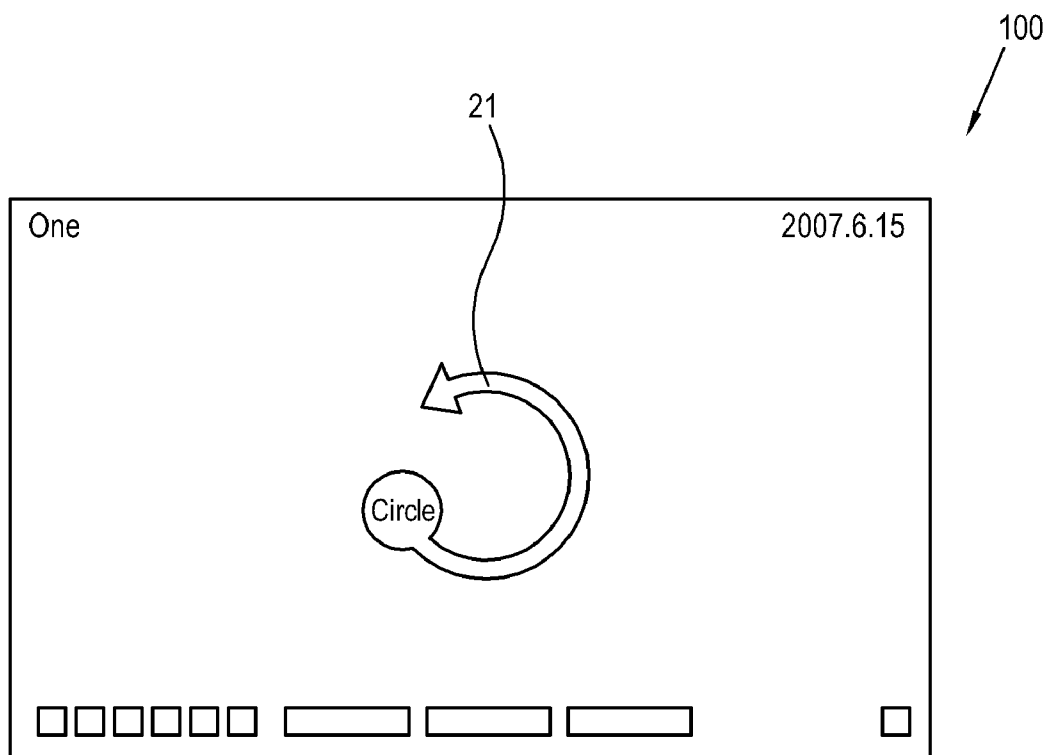


FIG. 6B

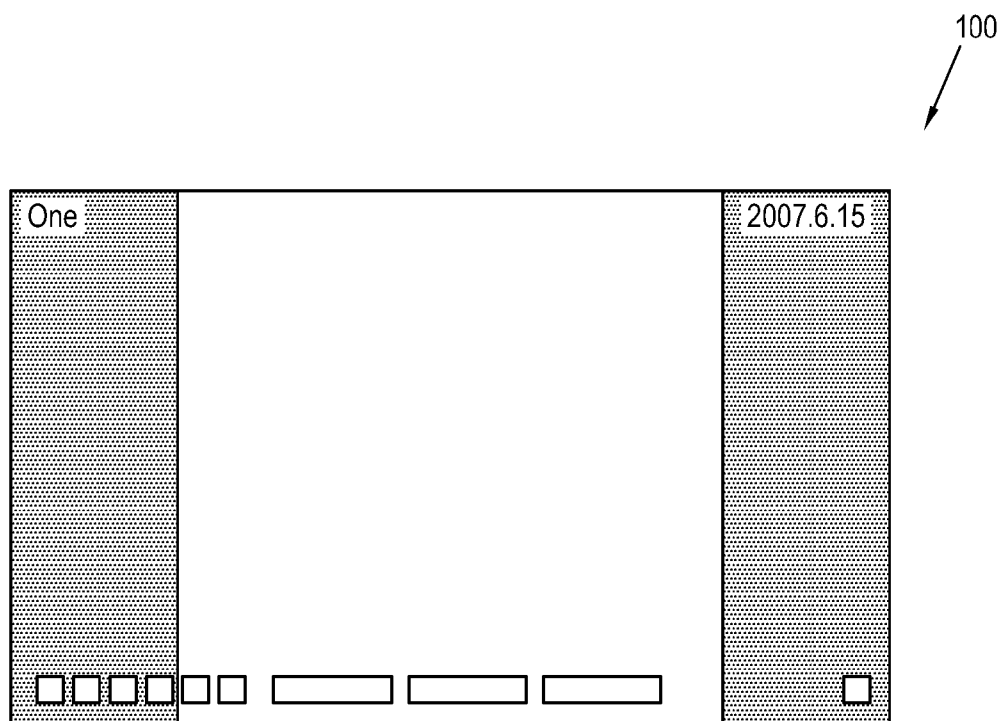


FIG. 7A

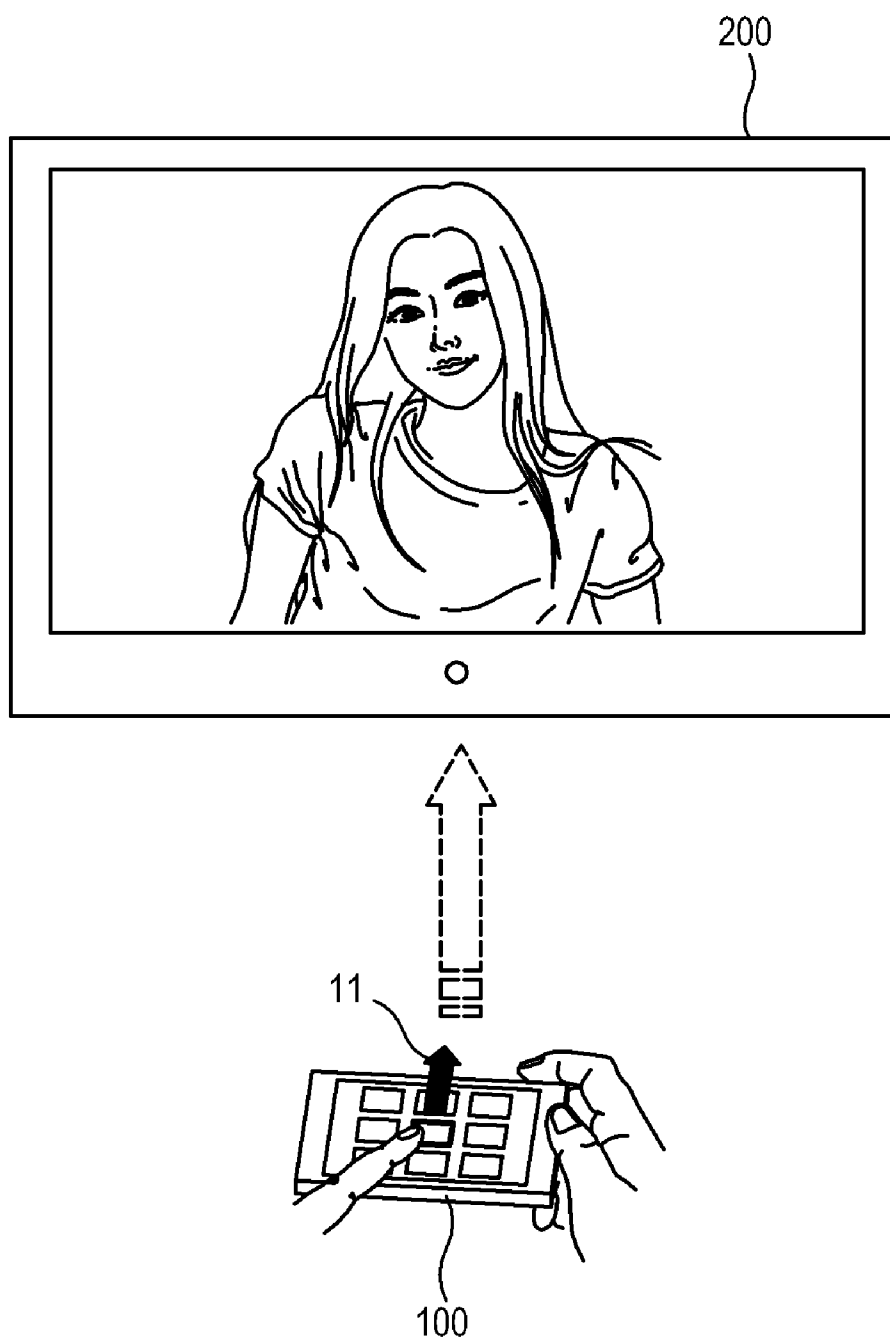


FIG. 7B

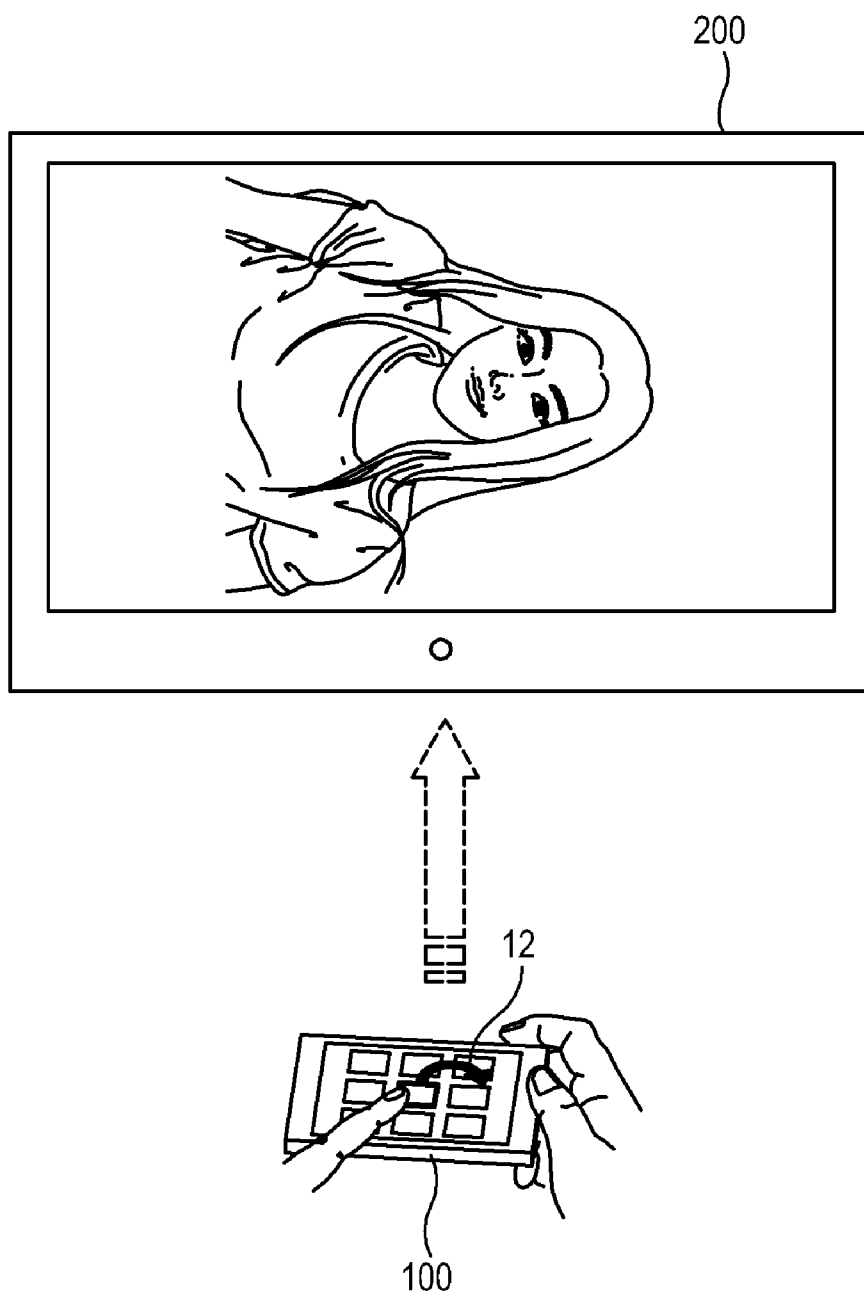


FIG. 8

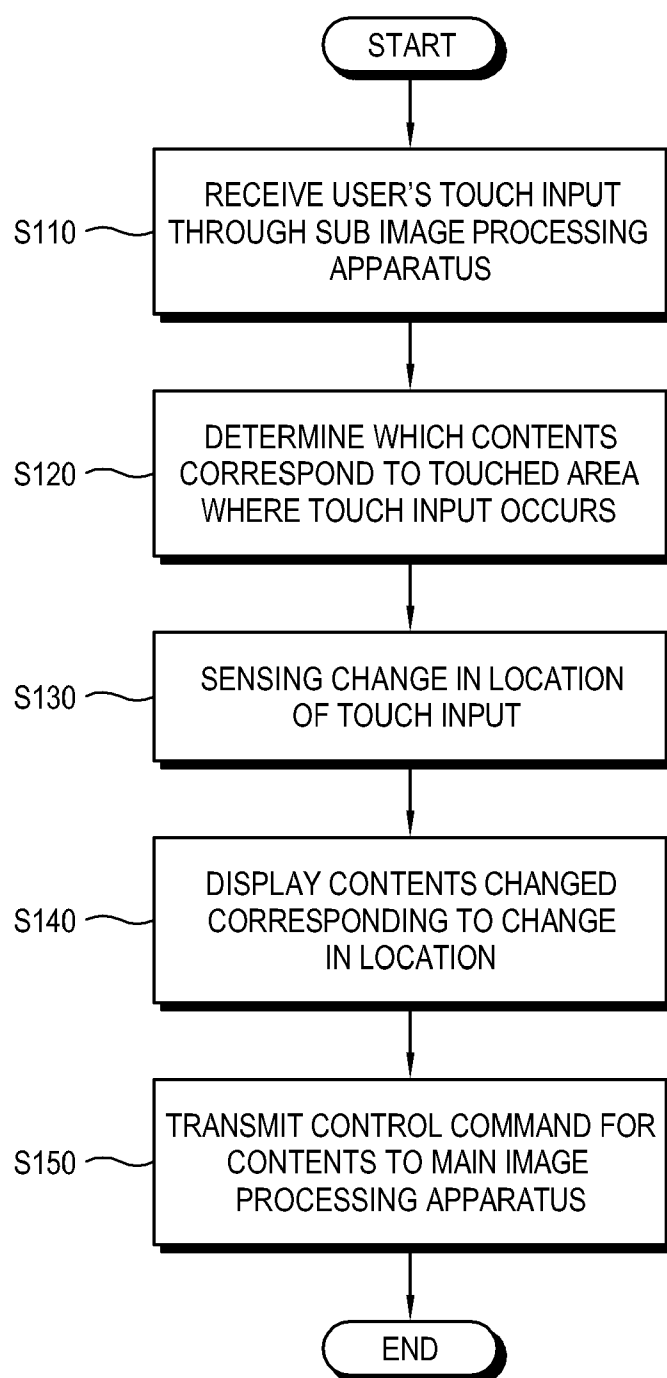
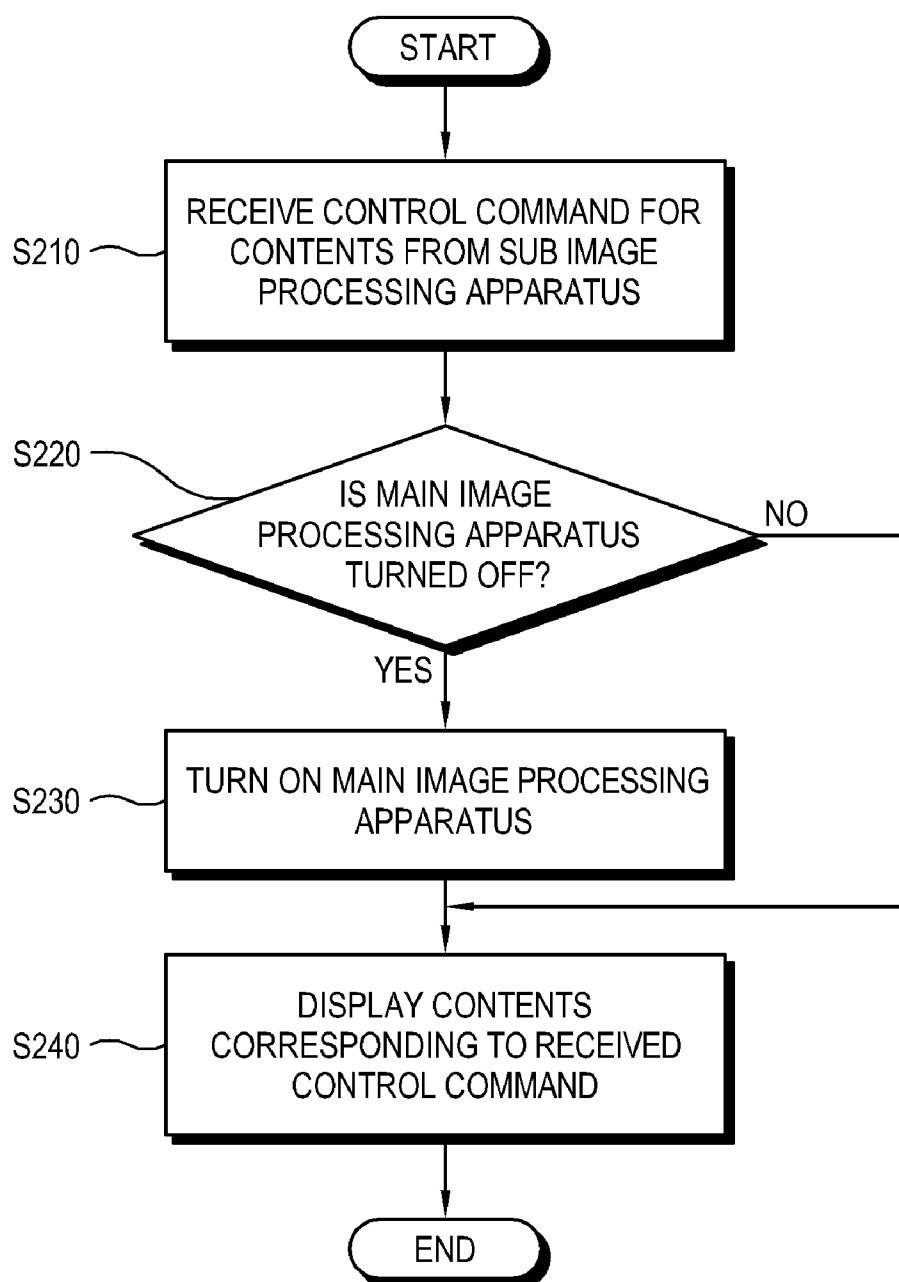


FIG. 9



MAIN IMAGE PROCESSING APPARATUS, SUB IMAGE PROCESSING APPARATUS AND CONTROL METHOD THEREOF

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority from Korean Patent Application No. 10-2008-0125783, filed on Dec. 11, 2008 in the Korean Intellectual Property Office, the disclosure of which is incorporated herein by reference.

BACKGROUND OF INVENTION

[0002] 1. Field of Invention

[0003] Apparatuses and methods consistent with the present invention relate to a main image processing apparatus, a sub image processing apparatus and a control method thereof, and more particularly, to a main image processing apparatus, a sub image processing apparatus and a control method thereof, in which the sub image processing apparatus is used in transmitting a control command to the main image processing apparatus.

[0004] 2. Description of the Related Art

[0005] An image processing apparatus receives a video signal from a broadcasting station or a video signal from an external device such as a digital versatile disc (DVD) player or the like, and processes it to be displayed as an image. The image processing apparatus processes not only the broadcasting signal from the broadcasting station but also various contents such as a game application, a still image (photograph), and a moving picture of digital data.

[0006] Recently, a demand for a dual image processing system has been on the rise, in which the dual image processing system includes two or more image processing apparatuses and displays contents in various methods according to a user's request.

[0007] However, a general dual image processing system receives various control commands from a user through a user input unit provided in the image processing apparatus or an external input device provided separately.

[0008] Thus, there is a growing need for a dual image processing system in which one image processing apparatus can be used to transmit a control command to another image processing apparatus.

SUMMARY OF THE INVENTION

[0009] The foregoing and/or other aspects of the present invention can be achieved by providing a control method of a sub image processing apparatus connectable with a main image processing apparatus, the control method including: receiving a user's touch input through the sub image processing apparatus; determining which contents correspond to a touched area where the touch input occurs; sensing change in location of the touch input; and transmitting a control command for the contents to the main image processing apparatus in response to the sensed change in the location of the touch input.

[0010] The control method of the sub image processing apparatus may further include displaying the contents changed corresponding to the sensed change in the location of the touch input.

[0011] The control method of the sub image processing apparatus may further include transmitting information about the contents to the main image processing apparatus if a

flicking input in which the touch input moves by a predetermined distance or more in a predetermined direction is sensed in the sensing the change in the location of the touch input.

[0012] The transmitting the control command to the main image processing apparatus includes transmitting the control command that makes the contents displayed in the main image processing apparatus be rotated at a predetermined angle and in a predetermined direction if a circle input in which the touch input rotates at the angle and in the direction is sensed in the sensing the change in the location of the touch input.

[0013] The transmitting the control command to the main image processing apparatus may include transmitting a channel-switching command for the contents.

[0014] The control method of the sub image processing apparatus may further include displaying a control panel for the contents. Here, the control method of the sub image processing apparatus may further include closing the displayed control panel if receiving information about a power-off state of the main image processing apparatus.

[0015] The control method of the sub image processing apparatus may further include: receiving information about a power-off state of the main image processing apparatus; and transmitting a power-on command to the main image processing apparatus.

[0016] The control method of the sub image processing apparatus may further include animating at least one of the menu item selected corresponding to the touch input and the contents corresponding to the menu item.

[0017] Another aspect of the present invention is to provide a control method of a main image processing apparatus connectable with a sub image processing apparatus, the control method including: receiving a control command for contents from the sub image processing apparatus; and displaying the contents changed on the basis of the received control command.

[0018] The displaying the contents changed depending on the control command may include switching a channel to correspond to the contents.

[0019] The control method of the main image processing apparatus according to claim 10, further including turning on the main image processing apparatus if the image processing apparatus is being turned off.

[0020] The control command may include information about rotation at a predetermined angle and in a predetermined direction with regard to the contents, and the displaying the contents changed depending on the control command includes displaying the contents rotated at the angle and in the direction.

[0021] Still another aspect of the present invention is to provide a sub image processing apparatus connectable with a main image processing apparatus, the sub image processing apparatus including: a communication unit which communicates with the main image processing apparatus; an image processing unit which processes contents; a display unit which displays the processed contents; a user input unit which receives a user's touch input; and a controller which determines which contents correspond to a touched area where the touch input occurs, sensing change in location of the touch input, and controlling the communication unit to transmit a control command for the contents to the main image processing apparatus in response to the sensed change in the location of the touch input.

[0022] The display unit may display the contents changed corresponding to the sensed change in the location of the touch input.

[0023] The controller may control the communication unit to transmit information about the contents to the main image processing apparatus if a flicking input in which the touch input moves by a predetermined distance or more in a predetermined direction is sensed.

[0024] The controller may control the communication unit to transmit the control command that makes the contents displayed in the main image processing apparatus be rotated at a predetermined angle and in a predetermined direction if a circle input in which the touch input rotates at the angle and in the direction is sensed. Further, the controller may control the display unit to close a control panel for the contents if receiving information about a power-off state of the main image processing apparatus.

[0025] The controller may control the communication unit to transmit a power-on command to the main image processing apparatus if receiving information about a power-off state of the main image processing apparatus.

[0026] Yet another aspect of the present invention is to provide a main image processing apparatus connectable with a sub image processing apparatus, the main image processing apparatus including: a communication unit which communicates with the sub image processing apparatus; an image processing unit which processes contents; a display unit which displays the processed contents; and a controller which receives a control command for the contents from the sub image processing apparatus, and controls the image processing unit to display the contents changed on the basis of the received control command.

[0027] The controller may turn on the main image processing apparatus when the main image processing apparatus is being turned off, and control the image processing unit to display the contents.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] The above and/or other aspects of the present invention will become apparent and more readily appreciated from the following description of the exemplary embodiments, taken in conjunction with the accompanying drawings, in which:

[0029] FIGS. 1A and 1B are block diagrams of dual image processing systems according to exemplary embodiments of the present invention;

[0030] FIGS. 2 and 3 illustrate control of a main image processing apparatus as a user touches a sub image processing apparatus for input;

[0031] FIGS. 4A to 6B shows control screens displayed on the sub image processing apparatus according to an exemplary embodiment of the present invention;

[0032] FIGS. 7A and 7B illustrate control of the main image processing apparatus on the basis of touch input according to an exemplary embodiment of the present invention;

[0033] FIG. 8 is a flowchart of a control method of a sub image processing apparatus according to an exemplary embodiment of the present invention; and

[0034] FIG. 9 is a flowchart of a control method of a main image processing apparatus according to an exemplary embodiment of the present invention.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS OF THE INVENTION

[0035] Below, exemplary embodiments of the present invention will be described in detail with reference to accompanying drawings.

[0036] FIG. 1A is a block diagram of a dual image processing system 10 according to an exemplary embodiment of the present invention. The dual image processing system 10 includes a sub image processing apparatus 100, and a main image processing apparatus 200 that receives a control command from the sub image processing apparatus 100.

[0037] In this exemplary embodiment, the sub image processing apparatus 100 is a portable media player capable of processing an image about various contents such as a still image (photograph), a moving picture, music, etc., and the main image processing apparatus 200 may be achieved by a digital television (TV), a set-top box, etc. The sub image processing apparatus 100 transmits a control command to the main image processing apparatus 200 in order to control operation of the main image processing apparatus 200.

[0038] As shown in FIG. 1A, the sub image processing apparatus 100 includes a first image receiving unit 110, a first image processing unit 120, a first display unit 130a, a first user input unit 140a, a first storage unit 150, a first communication unit 160, and a first controller 170.

[0039] The first image receiving unit 110 receives a video signal from a broadcasting station or from an external device such as a DVD player or the like. The first image receiving unit 110 includes an antenna, a tuner, etc. to receive a broadcasting signal. Meanwhile, the sub image processing apparatus 100 according to this embodiment may receive a video signal from the outside via a network.

[0040] The first image processing unit 120 processes the video signal received by the first image receiving unit 110 into a signal having a format displayable in the first display unit 130a.

[0041] The first display unit 130a displays contents processed by the first image processing unit 120. The first display unit 130a may change and display the contents corresponding to change in location of touch input on the first user input unit 140.

[0042] The first display unit 130a includes a display panel (not shown) where the contents are displayed, and a panel driver (not shown) to drive the video signal output from the first image processing unit 120 to be displayed on the display panel. In this exemplary embodiment, the display panel (not shown) may include a liquid crystal display (LCD) panel or a plasma display panel (PDP) by way of example.

[0043] The first user input unit 140a may be a control panel, which includes at least one button and is provided in the sub image processing apparatus 100, as a user interface (UI) to receive a user's instruction. The control panel may include specific keys such as a menu key, an arrow key, etc. The first controller 170 determines that a user gives instructions when a button of the control panel is pressed.

[0044] In another exemplary embodiment, as a first user input unit 140b, the first user input unit 140a may further include a touch panel (hereinafter, it will be also referred to as a "touch pad" or "touch screen") which is in the first display unit 130b and receives a user's touch input (FIG. 1B). The

touch panel may include a graphic user interface (GUI) presented by executing a predetermined application and displayed on the first display unit **130b** as a touch area enabling a user's touch input.

[0045] Here, the touch input is an input based on a touch of a user, which not only includes a touch, a tap or the like, but also includes at least one of tap and hold, drag and drop, flicking and circle as a directional gesture input. Below, the touch input will be explained in more detail with exemplary embodiments to be described.

[0046] Further, the first user input unit **140a**, **140b** displays a plurality of menu items **21** (refer to FIG. 5A), and a menu navigation displayed in an area of the first display unit **130a**, **130b**. The first display unit **130a**, **130b** includes a view zone **22** (refer to FIG. 5A) to display thumbnail contents corresponding to a menu item **21** selected in the menu navigation, in which the view zone **22** may receive the touch input of a user.

[0047] Meanwhile, the first user input unit **140a**, **140b** receives a user's instruction for controlling the main image processing apparatus **200**. Specifically, the first user input unit **140a**, **140b** includes a TV control panel **24** (refer to FIG. 5B) presented to control the contents displayed on the main image processing apparatus **200** and displayed on the first display unit **140a**, **140b**. If the touch input is received through the TV control panel **24**, the first controller **170** controls the first communication unit **160** to transmit a control command corresponding to the touch input to the main image processing apparatus **200**.

[0048] The first storage unit **150** stores the contents received from the outside. Here, an image stored in the first storage unit **150** may include not only a broadcasting signal transmitted from the broadcasting station and received by the first image receiving unit **110**, but also contents such as a game application, a still image (photograph), and a moving picture of digital data received from various external sources such as a DVD player, an MP3 player, a digital camera, etc.

[0049] The first storage unit **150** may include an internal storage medium such as a flash memory, an erasable programmable read only memory (EPROM) and a hard disk drive (HDD), or a portable storage medium such as a universal serial bus (USB) memory and a memory card (a memory stick, a compact flash card, and a multi-media card (MMC)).

[0050] The first communication unit **160** performs wire/wireless communication with the outside according to a predetermined communication protocol. Specifically, the first communication unit **160** transmits a control command corresponding to the touch input of a user to the main image processing apparatus **200**, and transmits the contents stored in the first storage unit **150** to the main image processing apparatus **200**. Further, the first communication unit **160** may receive the contents from the main image processing apparatus **200**.

[0051] Here, the control command is a signal for giving various commands of a user such as power on/off of the main image processing apparatus **200**, switch of a channel, synchronization between the sub image processing apparatus **100** and the main image processing apparatus **200**, adjustment of screen and volume, and recording reservation, etc.

[0052] Further, the first communication unit **160** may communicate with not only the main image processing apparatus **200** but also various connectable external apparatuses to transmit and receive the contents.

[0053] The first communication unit **160** may include a wired/wireless communication module connectable with the outside locally or through a network based on a predetermined protocol, a USB port connectable with a portable storage medium such as a USB memory, etc.

[0054] The first controller **170** performs general control of the sub image processing apparatus **100**. In more detail, if a user touches the first user input unit **140a**, **140b** for input, the first controller **170** determines contents corresponding to a touched area and controls the first communication unit **160** to transmit a control command about the determined contents to the main image processing apparatus **200**.

[0055] Here, the control command may be given as a control command that makes the same contents as displayed on the first display unit **130a**, **130b** be displayed on a second display unit **230** of the main image processing apparatus **200**.

[0056] In more detail, the first controller **170** determines the contents corresponding to the touched area where the touch input is performed, and, if sensing a location change of the touch input by a touch input having directionality (e.g., flicking), transmits the control command about the contents to the main image processing apparatus **200** in response to the sensed location change. Here, the touched area may include the view zone **22** where the contents are displayed.

[0057] Further, the transmitted control command may include a power-on command for the main image processing apparatus **200** in the state that the main image processing apparatus **200** has been turned off. For example, the first controller **170** transmits the power-on command to the main image processing apparatus **200** when receiving information about the power-off state of the main image processing apparatus **200** in the state that the touch input is given for transmitting the contents displayed on the first display unit **130a**, **130b** to the main image processing apparatus **200**. Then, the first controller **170** controls the first communication unit **160** to transmit the contents displayed on the first display unit **130a**, **130b** to the main image processing apparatus **200**, and transmit the control command for displaying the transmitted contents to be displayed on the second display unit **230** of the main image processing apparatus **200**.

[0058] Further, the first controller **170** may control the first communication unit **160** to transmit a channel-shifting command for the determined contents.

[0059] The first controller **170** may be achieved by a relevant software program, and a processor such as a microcomputer, a central processing unit (CPU), or the like to load and execute this program.

[0060] Meanwhile, as shown in FIGS. 1A and 1B, the main image processing apparatus **200** according to an exemplary embodiment of the present invention may include a second image receiving unit **210**, a second image processing unit **220**, a second display unit **230**, a second user input unit **240**, a second storage unit **250**, a second communication unit **260**, and a second controller **270**.

[0061] The second image receiving unit **210** receives a video signal from a broadcasting station or from an external device such as a DVD player or the like. The second image receiving unit **210** includes an antenna, a tuner, etc. to receive a broadcasting signal.

[0062] The second image processing unit **220** processes the video signal received by the second image receiving unit **210** into a signal having a format displayable in the second display unit **230**.

[0063] The second display unit **230** displays contents processed by the second image processing unit **220**.

[0064] The second display unit **230** includes a display panel (not shown) where the contents are displayed, and a panel driver (not shown) to drive the video signal output from the second image processing unit **220** to be displayed on the display panel. In this embodiment, the display panel (not shown) may include a liquid crystal display (LCD) panel or a plasma display panel (PDP) by way of example.

[0065] The second user input unit **240** may be achieved by a control panel, which includes at least one button and is provided in the main image processing apparatus **200**, as a user interface (UI) to receive a user's instruction. The control panel may include specific keys such as a menu key, an arrow key, etc. The second controller **270** determines that a user gives instructions when a button of the control panel is pressed.

[0066] Further, the second user input unit **240** may further include a graphic user interface (GUI) presented by executing a predetermined application and displayed on the second display unit **230** as a touch area enabling a user's touch input.

[0067] The second storage unit **250** stores the contents received from the outside. Here, an image stored in the second storage unit **250** may include not only a broadcasting signal transmitted from the broadcasting station and received by the second image receiving unit **210**, but also an image received from the sub image processing apparatus **100** through the second communication unit **260** and contents such as a game application, a still image (photograph), and a moving picture of digital data received from various external sources such as a DVD player, an MP3 player, a digital camera, etc.

[0068] The second storage unit **250** may include an internal storage medium such as a flash memory, an erasable programmable read only memory (EPROM) and a hard disk drive (HDD), or a portable storage medium such as a universal serial bus (USB) memory and a memory card (a memory stick, a compact flash card, and a multi-media card (MMC)).

[0069] The second communication unit **260** performs wire/wireless communication with the outside according to a predetermined communication protocol. Specifically, the second communication unit **260** receives a control command from the sub image processing apparatus **100**.

[0070] Further, the second communication unit may receive contents from the sub image processing apparatus **100**. Here, the sub image processing apparatus **100** may decode (or trans-code) the contents to have a predetermined format before transmitting the contents, and transmit it to the main image processing apparatus **200**.

[0071] Here, the control command is a signal for giving various commands of a user such as power on/off of the main image processing apparatus **200**, switch of a channel, synchronization between the sub image processing apparatus **100** and the main image processing apparatus **200**, adjustment of screen and volume, and recording reservation, etc.

[0072] Further, the second communication unit **260** may communicate with not only the sub image processing apparatus **100** but also various connectable external apparatuses to transmit and receive the contents.

[0073] The second communication unit **260** may include a wired/wireless communication module connectable with the outside locally or through a network based on a predetermined protocol, a USB port connectable with a portable storage medium such as a USB memory, etc.

[0074] The second controller **270** performs general control of the main image processing apparatus **200**. In more detail, if receiving a control command from the sub image processing apparatus **100** through the second communication unit **260**, the second controller **270** controls the second image processing unit **220** to control the contents displayed on the second display unit **230** in response to the received control command.

[0075] Here, the received control command may be given as a control command that makes the same contents as displayed on the first display unit **130a**, **130b** of the sub image processing apparatus **100** be displayed on the second display unit **230**.

[0076] Further, the second controller **270** may turn on the main image processing apparatus **200** and control the second image processing unit **220** to display the contents corresponding to the relevant control command, when receiving the control command in the state that the main image processing apparatus **200** has been turned off.

[0077] The second controller **270** may be achieved by a relevant software program, and a processor such as a micro-computer, a central processing unit (CPU), or the like to load and execute this program.

[0078] Below, exemplary embodiments of controlling the main image processing apparatus **200** through the sub image processing apparatus **100** will be described in more detail with reference to accompanying drawings.

[0079] FIGS. 2 and 3 illustrate control of the main image processing apparatus **200** as a user touches the sub image processing apparatus **100** for input.

[0080] As shown in FIG. 2, the sub image processing apparatus **100** may receive a flicking input **11** as the touch input while displaying predetermined contents. In this embodiment, the flicking input **11** means a touch input based on tap & hold where a finger or the like (e.g., a stylus) moves in a predetermined direction (e.g., toward the main image processing apparatus **200** or an upward direction of the touch screen) and by a predetermined distance or more in a predetermined direction while being in contact with a touching area corresponding to the predetermined contents.

[0081] When receiving the flicking input **11** toward the main image processing apparatus **200** for the contents displayed on the first display unit **130a**, **130b**, the first controller **170** transmits the control command to the main image processing apparatus **200** so that the same contents as displayed on the first display unit **130a**, **130b** can be displayed on the second display unit **230**. To this end, the sub image processing apparatus **100** may transmit information about relevant contents to the main image processing apparatus **200**. The main image processing apparatus **200** displays the relevant contents on the second display unit **230** on the basis of the information about the received contents.

[0082] If the main image processing apparatus **200** has been turned off as shown in FIG. 2, the first controller **170** receives information about the power-off state of the main image processing apparatus **200** and transmits a power-on command to the main image processing apparatus **200** on the basis of the received information about the power-off state. The second controller **270** turns on the main image processing apparatus **200** on the basis of the received power-on command, and controls the second image processing unit **220** so that the same contents as displayed on the first display unit **130a**, **130b** can be displayed on the second display unit **230** on the basis of the control command corresponding to the flicking input **11**. In an exemplary embodiment, the main

image processing apparatus 200 in a “power-off” state may not be entirely “off” in that the image processing apparatus 200 may be in a low power consumption setting so that it can receive and process a power-on command.

[0083] As shown in FIG. 3, if the contents displayed on the first display unit 130a, 130b of the sub image processing apparatus 100 include channel information, the first controller 170 may control the first communication unit 160 to transmit a channel-switching command to the main image processing apparatus 200. Thus, the main image processing apparatus 200 displays contents corresponding to a channel changed by the received channel-switching command. Here, if the channel-switching command is received while the main image processing apparatus 200 has been turned off, the second controller 270 receives the power-on command from the sub image processing apparatus 100 and turns on the main image processing apparatus 200 in response to the power-on command, thereby controlling the second image processing unit 220 to display contents corresponding to the channel-switching command.

[0084] FIGS. 4A to 6B shows control screens displayed on the first display unit 130a, 130b of the sub image processing apparatus 100 according to an exemplary embodiment of the present invention.

[0085] As shown in FIG. 4A, on an area of the first display unit 130a, 130b are displayed the menu navigation including the plurality of menu items 21, and the view zone 22 where the thumbnail contents are displayed corresponding to the menu item 21 selected in the menu navigation. Here, the area where the menu item 21 selected in the menu navigation is displayed is a target zone.

[0086] In FIG. 4A if a user selects not the currently displayed contents but another menu item 23 through the touch input, the first display unit 130a, 130b displays the thumbnail contents corresponding to the selected menu item 23 on the view zone 22 as shown in FIG. 4B.

[0087] As shown in FIG. 5A, if there is the flicking input 11 from a user while the view zone 22 displays predetermined contents, the sub image processing apparatus 100 senses change in location due to the flicking input 11 and transmits a control command about the contents to the main image processing apparatus 200. Thus, the main image processing apparatus 200 displays the contents corresponding to the flicking input 11.

[0088] Here, the first display unit 130a, 130b may animate at least one of the menu item selected corresponding to the received touch input and the contents displayed on the view zone 22 corresponding to the menu item. For example, the animation in this exemplary embodiment may include the menu item or the contents being displayed while moving in sequence.

[0089] As shown in FIG. 5B, the first controller 170 may control the first display unit 130a, 130b to display the control panel 24 for controlling the contents displayed on the main image processing apparatus 200. A user may give a control command for the contents to the main image processing apparatus 200 through the control panel 24.

[0090] If the main image processing apparatus 200 is turned off, the sub image processing apparatus 100 receives the information about the power-off state of the main image processing apparatus 200 and closes the control panel 24 as shown in FIG. 5C.

[0091] Meanwhile, the sub image processing apparatus 100 may display the contents of the view zone 22 in a full screen display as shown in FIG. 6A.

[0092] As shown in FIG. 6A, the sub image processing apparatus 100 may receive a circle input 12 as the touch input for the contents. Here, the circle input 12 means a touch input based on rotation at a predetermined angle and in a predetermined direction. When sensing the circle input 12, the first controller 170 controls the first image processing unit 120 to rotate the contents by the angle and direction of the received circle input 12 as shown in FIG. 6B and display the rotated contents on the first display unit 130a, 130b. Further, the first controller 170 controls the first communication unit 160 to transmit a control command for rotating the contents displayed on the main image processing apparatus 200 by the received angle and direction.

[0093] FIGS. 7A and 7B illustrate control of the main image processing apparatus 200 on the basis of touch input according to an exemplary embodiment of the present invention.

[0094] As shown in FIG. 7A, if the sub image processing apparatus 100 senses a user's flicking input that moves by a predetermined distance or more in a direction toward the main image processing apparatus 200, the main image processing apparatus 200 receives the control command corresponding to the flicking input and displays the contents changed according to the control command. In an exemplary embodiment, the user's flicking input is toward a physical location of the main image processing apparatus 200.

[0095] As shown in FIG. 7B, if the sub image processing apparatus 100 senses a user's circle input that rotates by a predetermined angle and a predetermined direction, the main image processing apparatus 200 receives the control command corresponding to the circle input and displays the contents rotated by the sensed angle and direction.

[0096] In the foregoing exemplary embodiment, the touch input having the directionality is described with respect to the flicking input the circle input, but not limited thereto.

[0097] In the main and sub image processing apparatuses 200 and 100 with this configurations, the control methods thereof will be described below with reference to FIGS. 8 and 9.

[0098] FIG. 8 is a flowchart of the control method of the sub image processing apparatus 100 according to an exemplary embodiment of the present invention.

[0099] Referring to FIG. 8, at operation S110 the sub image processing apparatus 100 receives a user's touch input through the first user input unit 140a, 140b.

[0100] At operation S120, the first controller 170 determines which contents correspond to the touched area in response to the touch input.

[0101] As operation S130, the first controller 170 senses the change in location of the touch input received in the operation S110. Here, the sensed change in the location may include the flicking input in which the location of the touch input moves by a predetermined distance or more in a predetermined direction, or the circle input in which the location of the touch input rotates at a predetermined angle and in a predetermined direction.

[0102] At operation S140, the first controller 170 controls the first image processing unit 120 to change the contents determined in the operation S120 in response to the change of the location sensed in the operation S130, and display it on the first display unit 130a, 130b.

[0103] At operation S150, the first controller 170 controls the first communication unit 160 to send the main image processing apparatus 200 a control command for the contents in response to the change in the location sensed in the operation S130. Here, the control command may be given as a control command that makes the same contents as displayed in the operation S140 be displayed on the main image processing apparatus 200. Further, the control command in the operation S140 may include a channel-switching command, a power-on command for the main image processing apparatus 200, etc.

[0104] FIG. 9 is a flowchart of the control method of the main image processing apparatus 200 according to an exemplary embodiment of the present invention.

[0105] Referring to FIG. 9, at operation S210 the main image processing apparatus 200 receives the control command for the contents from the sub image processing apparatus 100.

[0106] Here, if the main image processing apparatus 200 has been turned off at operation S220, the main image processing apparatus 200 is turned on in response to the received control command at operation S230.

[0107] At operation S240, the main image processing apparatus displays the contents corresponding to the control command received in the operation S210. Here, the main image processing apparatus 200 displays the contents changed (e.g., rotated) on the basis of the received control command, or switched in the channel.

[0108] In the dual image processing system 10 according to the above described exemplary embodiments of the present invention, the main image processing apparatus 200 is controlled through the sub image processing apparatus 100 supporting the touch input, and thus it is more convenient for a user to use the dual image processing system 10.

[0109] In the foregoing embodiments, the sub image processing apparatus 100 is used for transmitting the control command to the main image processing apparatus 200, but not limited thereto. Alternatively, the main image processing apparatus 200 may be used for controlling the sub image processing apparatus 100, or the control command may be transmitted and received between the main and sub image processing apparatuses 200 and 100.

[0110] Although a few exemplary embodiments of the present invention have been shown and described, it will be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles and spirit of the invention, the scope of which is defined in the appended claims and their equivalents.

What is claimed is:

1. A control method of a sub image processing apparatus in communication with a main image processing apparatus, the control method comprising:

receiving a user touch input at the sub image processing apparatus;
determining which at least one of contents correspond to a touched area of the user touch input;
sensing a change in location of the user touch input; and
transmitting a control command for the at least one of contents to the main image processing apparatus in response to the sensed change in the location of the user touch input.

2. The control method of the sub image processing apparatus according to claim 1, further comprising displaying at

least one of the contents changed corresponding to the sensed change in the location of the user touch input.

3. The control method of the sub image processing apparatus according to claim 1, further comprising transmitting information about the at least one of the contents to the main image processing apparatus if the sensing the change in the location of the user touch input senses a flicking input in which the user touch input moves by a predetermined distance or more in a predetermined direction.

4. The control method of the sub image processing apparatus according to claim 1, wherein the transmitting the control command for the at least one of the contents to the main image processing apparatus comprises transmitting the control command that rotates the at least one of the contents displayed in the main image processing apparatus at a predetermined angle and in a predetermined direction, if the sensing the change in location of the user touch input senses a circle input in which the user touch input rotates at the predetermined angle and in the predetermined direction.

5. The control method of the sub image processing apparatus according to claim 1, wherein the transmitting the control command for the at least one of the contents to the main image processing apparatus comprises transmitting a channel-switching command for the at least one of the contents.

6. The control method of the sub image processing apparatus according to claim 1, further comprising displaying a control panel for the contents.

7. The control method of the sub image processing apparatus according to claim 6, further comprising closing the displayed control panel if receiving information about a power-off state of the main image processing apparatus.

8. The control method of the sub image processing apparatus according to claim 1, further comprising:

receiving information about a power-off state of the main image processing apparatus; and
transmitting a power-on command to the main image processing apparatus.

9. The control method of the sub image processing apparatus according to claim 1, further comprising animating at least one of a menu item selected corresponding to the user touch input and the contents corresponding to the at least one of the menu item.

10. A control method of a main image processing apparatus connectable with a sub image processing apparatus, the control method comprising:

receiving a control command for at least one of contents from the sub image processing apparatus; and
displaying the at least one of the contents changed based on the received control command.

11. The control method of the main image processing apparatus according to claim 10, wherein the displaying the at least one of the contents changed based on the control command comprises switching a channel to correspond to the at least one of the contents.

12. The control method of the main image processing apparatus according to claim 10, further comprising turning on the main image processing apparatus if the image processing apparatus is off

13. The control method of the main image processing apparatus according to claim 10, wherein the control command comprises information about rotation at a predetermined angle and in a predetermined direction for the at least one of the contents, and

the displaying the at least one of the contents changed based on the control command comprises displaying the at least one of the contents rotated at the predetermined angle and in the predetermined direction.

14. A sub image processing apparatus communicating with a main image processing apparatus, the sub image processing apparatus comprising:

- a communication unit which communicates with the main image processing apparatus;
- an image processing unit which processes contents;
- a display unit which displays the processed contents;
- a user input unit which receives a user touch input; and
- a controller which determines which at least one of contents corresponds to a touched area of the user touch input, senses a change in location of the user touch input, and controls the communication unit to transmit a control command for the at least one of the contents to the main image processing apparatus in response to the sensed change in the location of the user touch input.

15. The sub image processing apparatus according to claim **14**, wherein the display unit displays the at least one of the contents changed corresponding to the sensed change in the location of the user touch input.

16. The sub image processing apparatus according to claim **14**, wherein the controller controls the communication unit to transmit information about the at least one of the contents to the main image processing apparatus if a flicking input in which the user touch input moves by a predetermined distance or more in a predetermined direction is sensed.

17. The sub image processing apparatus according to claim **14**, wherein the controller controls the communication unit to transmit the control command that makes the at least one of

the contents displayed in the main image processing apparatus be rotated at a predetermined angle and in a predetermined direction if a circle input in which the user touch input rotates at the predetermined angle and in the predetermined direction is sensed.

18. The sub image processing apparatus according to claim **14**, wherein the controller controls the display unit to close a control panel for the contents if information about a power-off state of the main image processing apparatus is received.

19. The sub image processing apparatus according to claim **14**, wherein the controller controls the communication unit to transmit a power-on command to the main image processing apparatus if information about a power-off state of the main image processing apparatus is received.

20. A main image processing apparatus communicating with a sub image processing apparatus, the main image processing apparatus comprising:

- a communication unit which communicates with the sub image processing apparatus;
- an image processing unit which processes contents;
- a display unit which displays the processed contents; and
- a controller which receives a control command for at least one of the contents from the sub image processing apparatus, and controls the image processing unit to display the at least one of the contents changed based on the received control command.

21. The main image processing apparatus according to claim **20**, wherein the controller turns on the main image processing apparatus when the main image processing apparatus is off, and controls the image processing unit to display the at least one of the contents.

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