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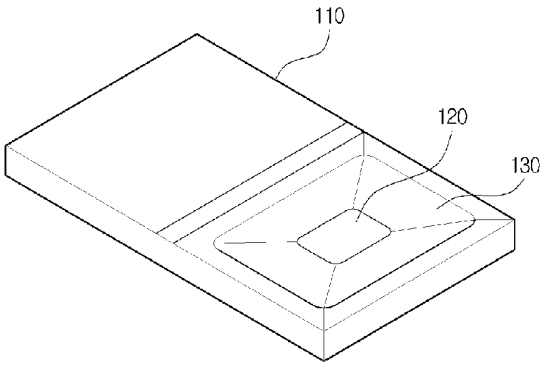
(54) Title: ELECTRONIC DEVICE FOR INPUTTING USER COMMAND 3-DIMENSIONALLY AND METHOD EMPLOYING THE SAME



(57) Abstract: An electronic device for 3-dimensionally inputting a user command and a method employing the same are provided. The electronic device includes a touch pad sensing a 3-dimensional interface and a controller controlling a GUI (graphical user interface) in response to the 3-dimensional interface sensed by the touch pad. Thus, a user command can be 3-dimensionally input so as to harmonize a 3-dimensional varying method of a 3-dimensional GUI with a 3-dimensional input manipulation of a user.

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Description

ELECTRONIC DEVICE FOR INPUTTING USER COMMAND 3-DIMENSIONALLY AND METHOD EMPLOYING THE SAME

Technical Field

[1] The present invention relates to an electronic device. More particularly, the present invention relates to an electronic device for inputting a user command 3-dimensionally.

Background Art

[2] A user interface (UI) is generally referred to as a mechanism through which an electronic device and a user can interact. In other words, the UI is a mechanism through which the user can transmit a command to the electronic device. A physical user interface (PUI) and a graphical user interface (GUI) are representative examples of the UI.

[3] The PUI refers to a mechanism through which a user command is input in a physical method using a keyboard, a manipulation button, or the like, and the GUI refers to a member through which an icon or a menu displayed on a display is selected to input a user command.

[4] Even when the user command is input using the GUI, the PUI is still required. This is because movement and selection commands are input through only the PUI in the GUI through which the user moves a pointer (cursor) with reference to a menu, a list, an icon, or the like displayed on a display and selects an item on which the pointer is positioned.

Disclosure of Invention

Technical Problem

[5] 3-dimensional GUIs have been developed to provide the convenience of manipulations of electronic devices and high visual effects to users and are commonly used in games and the like.

[6] Unfortunately, as described above, although a GUI provided to a user can be 3-dimensionalized, the input manipulation of the user through a PUI remains 2-dimensionally performed.

Technical Solution

[7] Accordingly, the present general inventive concept has been made to solve the above-mentioned and/or problems, and an aspect of the present general inventive concept is to provide an electronic device for inputting a user command 3-dimensionally and harmonizing a 3-dimensional varying method of a 3-dimensinal GUI with a 3-dimensional input manipulation of a user.

[8] According to an aspect of the present invention, there is provided an electronic

device including: a touch pad sensing a 3-dimensional interface; and a controller controlling a GUI (graphical user interface) in response to the 3-dimensional interface sensed by the touch pad.

[9] The touch pad may sense interfaces on a first, a second, and a third axes input by a user, and the controller may decipher the interfaces on the first, second, and third axes sensed by the touch pad as a first, a second, and a third user commands, respectively, and control the GUI based on the deciphered results.

[10] The first user command may be a user command related to a fourth axis direction on a GUI picture, the second user command may be a user command related to a fifth axis direction on the GUI picture, and the third user command may be a user command related to a sixth axis direction on the GUI picture.

[11] The interface on the first axis may be sensed in one of upper and lower areas of the touch pad, the interface on the second axis may be sensed in one of left and right areas of the touch pad, and the interface on the third axis may be sensed in one of the upper, lower, left, and right areas of the touch pad.

[12] The touch pad may include outer and inner parts forming a predetermined slope.

[13] The touch pad may have a ring shape, a circular shape, a square ring shape, a square shape, a C shape, or an L shape.

[14] The touch pad senses a point touched by the user, and the controller deciphers a type of a user command based on the touched point sensed by the touch pad.

[15] The electronic device may include a touchable point displaying information as to a user command input through a touch of the touchable point.

[16] The electronic device may include a touchable point displaying information as to a user command input through a touch of the touchable point around the touchable point.

[17] The electronic device may further include a main display positioned outside the touch pad and displaying information as to a user command input through a touch of a touchable point.

[18] A position of the information as to the user command on the main display may visually correspond to a position of a touchable point on the touch pad touched to input the user command.

[19] The electronic device may further include an auxiliary display displaying information as to a user command.

[20] The information as to the user command may be displayed at a point on the auxiliary display adjacent to a point on a touch pad touched to input the user command.

[21] The electronic device may further include a manipulation button positioned inside the touch pad and sensing an input of a user. The controller may decipher the input of the user sensed by the manipulation button as a predetermined user command.

[22] The manipulation button may include at least one button sensing pressing

performed by a user.

[23] The electronic device may further include an auxiliary display positioned inside the touch pad, displaying information as to a user command that can be input, and inputting a user command displayed through a touch.

[24] The electronic device may further include an emitter including at least one light emitting device provided in the touch pad.

[25] The controller may control the light emitting device to emit light corresponding to a 3-dimensional interface sensed by the touch pad.

[26] The touch pad may sense interfaces in a first, a second, and a third directions input by a user, and the controller may control the light emitting device to emit light so that the light moves along the first, second, and third directions of the interfaces sensed by the touch pad.

[27] The touch pad may sense interfaces on first, second, and third axes input by a user, and the controller controls the light emitting device to vary a brightness of light in response to the interfaces on the first, second, and third axes sensed by the touch pad.

[28] The touch pad may sense a point touched by a user, and the controller may control the light emitting device to emit light at at least one of the touched point sensed by the touch pad and around the touched point.

[29] The controller may control the light emitting device to vary a light emission degree with a strength of a touch of the user.

[30] The controller may control the light emitting device to emit light corresponding to an operation state of the electronic device

[31] The light emitting device may display information indicating areas in which a user is able to input interfaces on a first, a second, and a third axes, in each of the areas.

[32] The electronic device may further include a main display positioned outside the touch pad and displaying information as to a user command input through a touch of a touchable point. A color of the information as to the user command displayed on the main display may be equal to a color of a touchable point displayed by the light emitting device.

[33] The controller may control a size of an image to be displayed to vary the size of the image in response to the 3-dimensional interface sensed by the touch pad.

[34] The controller may control a number of images to be displayed to vary the number of images in response to the 3-dimensional interface sensed by the touch pad.

[35] If a plurality of windows performing different tasks may be disposed in a multilayer structure, the controller may control a predetermined window to move to another layer so as to display the predetermined window on the another layer in response to the 3-dimensional interface sensed by the touch pad.

[36] The controller may control an upper menu or a lower menu of a predetermined

menu item to display the upper or lower menu in response to the 3-dimensional interface sensed by the touch pad.

[37] The controller may control an execution picture of a menu item indicated by a pointer to display the execution picture inside the pointer in response to the 3-dimensional interface sensed by the touch pad.

[38] According to another aspect of the present invention, there is provided an UI (user interface) method including: sensing a 3-dimensional interface; and controlling a GUI in response to the sensed 3-dimensional interface.

[39] Interfaces on a first, a second, and a third axes input by a user may be sensed, the interfaces on the first, second, and third axes may be respectively deciphered as first, second, and third user commands, and the GUI may be controlled based on the deciphered results.

[40] The first user command may be a user command related to a fourth axis direction on a GUI picture, the second user command may be a user command related to a fifth axis direction on the GUI picture, and the third user command may be a user command related to a sixth axis direction on the GUI picture.

[41] According to another aspect of the present invention, there is provided an electronic device including: an input unit sensing at least one of interfaces in first, second, and third directions; and a controller controlling a GUI in response to the interfaces sensed by the input unit.

[42] According to another aspect of the present invention, there is provided an UI method including: sensing at least one of interfaces in first, second, and third directions; and controlling a GUI in response to the sensed interfaces.

[43] According to another aspect of the present invention, there is provided an electronic device including: an input unit sensing a 3-dimensional interface; and a controller controlling contents displayed on a display in response to the 3-dimensional interface sensed by the input unit.

[44] According to another aspect of the present invention, there is provided an UI method including: sensing a 3-dimensional interface; and controlling displayed contents in response to the sensed 3-dimensional interface.

[45] According to another aspect of the present invention, there is provided an input unit including: a touch pad sensing a 3-dimensional interface input by a user. The 3-dimensional interface sensed by the touch pad may be transmitted to a device controlling an electronic device.

[46] According to another aspect of the present invention, there is provided an electronic device including: an input unit sensing interfaces in first and second directions; and a controller controlling contents displayed on a display in response to the interfaces sensed by the input unit.

[47] According to another aspect of the present invention, there is provided an electronic device including: an input unit sensing an interface input by a user; and a controller deciphering a type of a user command in response to the interface sensed by the input unit.

[48] According to another aspect of the present invention, there is provided an electronic device including: an input unit comprising at least two areas sensing an interface input by a user. A type of the interface sensed by the at least two areas of the input unit may be determined depending on a direction along which an image is displayed on a display.

Advantageous Effects

[49] As described above, in an electronic device for 3-dimensionally inputting a user command according to the present invention, a 3-dimensional varying method of a 3-dimensional GUI can harmonize with a 3-dimensional input manipulation of a user. Thus, the user can further intuitively input the user command through a GUI of the electronic device so as to further easily manipulate the electronic device. Also, the user can feel a solidity during an input manipulation as well as in terms of visual sense so as to further enjoy entertainment during the use of the electronic device.

Brief Description of the Drawings

[50] FIG. 1 is a perspective view of an external appearance of an electronic device for inputting a user command 3-dimensionally according to an embodiment of the present invention;

[51] FIGS. 2 and 3 are views illustrating shapes of a 3-dimensional touch pad shown in FIG. 1;

[52] FIGS. 4 and 5 are views illustrating an area on a 3-dimensional touch pad that may be rubbed;

[53] FIG. 6 is a view illustrating a rubbing guide;

[54] FIG. 7 is a view illustrating a 3-dimensional touch pad having a touchable point at which a user command-guide is visually displayed;

[55] FIG. 8 is a view illustrating a 3-dimensional touch pad displaying a touch guide in a touchable point using a light emitting function;

[56] FIG. 9 is a view illustrating shapes of a 3-dimensional touch pad;

[57] FIG. 10 is a view illustrating a 3-dimensional touch pad positioned at a corner of an electric device;

[58] FIG. 11 is a view illustrating manipulation buttons positioned inside a 3-dimensional touch pad;

[59] FIG. 12 is a view illustrating an auxiliary liquid crystal display (LCD) positioned inside a 3-dimensional touch pad;

[60] FIG. 13 is a view illustrating an auxiliary LCD on which a user command guide is displayed;

[61] FIG. 14 is a view illustrating examples of electronic devices realized by selectively providing main LCDs, manipulation buttons, 3-dimensional touch pads, and auxiliary LCDs and disposing them using various methods;

[62] FIG. 15 is a view illustrating an MP3 player suitable to be used in a lengthwise direction;

[63] FIGS. 16A and 16B are views illustrating MP3 players suitable to be used in a widthwise direction;

[64] FIG. 17 is a view illustrating a digital multimedia broadcast (DMB) player;

[65] FIG. 18 is a view illustrating a digital camera;

[66] FIG. 19 is a view illustrating remote controllers;

[67] FIG. 20 and 21 are views illustrating manipulation announcement light emitting for rubbing input manipulations of a user through a 3-dimensinal touch pad;

[68] FIG. 22 is a block diagram of an electronic device for inputting a user command 3-dimensionally according to an embodiment of the present invention;

[69] FIG. 23 is a view illustrating a disposition state of touch sensors inside a 3-dimensional touch sensor unit;

[70] FIG. 24 is a flowchart of a method of changing a 3-dimensional GUI according to a 3-dimensionally input user command according to an embodiment of the present invention; and

[71] FIGS. 25 through 43 are views illustrating methods of sensing and deciphering 3-dimensional rubbings of a user to generate and/or display 3-dimensional GUIs matching with user commands.

Best Mode for Carrying Out the Invention

[72] Exemplary embodiments of the present invention will be described in detail with reference to the annexed drawings. In the drawings, the same elements are denoted by the same reference numerals throughout the drawings. In the following description, detailed descriptions of known functions and configurations incorporated herein have been omitted for conciseness and clarity.

[73] FIG. 1 is a perspective view of an external appearance of an electronic device for inputting a user command 3-dimensionally according to an embodiment of the present invention. As shown in FIG. 1, the electronic device includes a main LCD 110, a manipulation button 120, and a 3-dimensional touch pad 130.

[74] The main LCD 110 is a display displaying contents such as images and texts and a 3-dimensional GUI.

[75] The 3-dimensinal GUI is a GUI 3-dimensionally displayed and varying on a

3-dimensional space. In detail, the 3-dimensional GUI means a GUI through which a 3-dimentional GUI picture or content displayed on the 3-dimensional GUI picture moves along an X-axis, a Y-axis, a Z-axis or a combination axis of the X-axis, the Y-axis and the Z-axis or vary it with its movement along the X-axis, the Y-axis, the Z-axis or the combination axis. The content displayed on the 3-dimensional GUI picture may be an icon, a menu, a list, a pointer (cursor), an image, and so on. Also, the variation with the movement of the contents displayed on the 3-dimensional GUI picture includes variations in sizes of the contents and variations in the contents.

[76] The manipulation button 120 is a PUI through which a user can input a user command through a touch. The manipulation button 120 is mainly used to select or execute an item indicated by a pointer (cursor) displayed on the 3-dimensional GUI.

[77] The 3-dimensional touch pad 130 is a PUI through which the user can 3-dimensionally input a user command with reference to the 3-dimensional GUI displayed on the main LCD 110. In other words, the 3-dimensional touch pad 130 is used to 3-dimensionally input the user command to 3-dimensionally vary the 3-dimensional GUI on the 3-dimensional space. In detail, the 3-dimensional touch pad 130 is used to input the user command to move the 3-dimentional GUI picture or the contents displayed on the 3-dimensional GUI picture along the X-axis, the Y-axis, the Z-axis or the combination axis of the X-axis, the Y-axis and the Z-axis or vary it with its movement of the X-axis, the Y-axis, the Z-axis, or the combination axis.

[78] A shape of the 3-dimensional touch pad 130 will now be described in detail.

[79] FIG. 2A illustrates only the 3-dimensional touch pad 130 shown in FIG. 1, and FIG. 2B is a cross-sectional view taken along line A-A' of FIG. 2A. As shown in FIGS. 2A and 2B, an external portion of the 3-dimensional touch pad 130 is higher than an internal portion of the 3-dimensionla touch pad 130. In other words, the 3-dimensional touch pad 130 has a slope descending at a predetermined angle **d** from the external portion toward the internal portion.

[80] The predetermined angle **d** of the descending slope of the 3-dimensionla touch pad 130 may be arbitrarily determined in consideration of a thickness of an electronic device to be realized. In other words, if the electronic device is allowed to be thickened, the predetermined angle **d** of the descending slope may be great. If the electronic device is to be thinned, the predetermined angle **d** of the descending slope may be small. If the electronic device is to be very thinly manufactured, the predetermined angle **d** of the descending slope may be "0°," i.e., the 3-dimensionla touch pad 130 may be flatly realized.

[81] In other words, the 3-dimensional touch pad 130 may be realized in a concave shape as shown in FIG. 3A or may be realized in a flat shape as shown in FIG. 3B.

[82] In addition, as shown in FIG. 3C, the 3-dimensional touch pad 130 may have a flat

shape when an electronic device is powered off but may be modified into a concave shape when the electronic device is powered on.

[83] The 3-dimensional touch pad 130 may be modified from a flat shape into a concave shape only when a user command can or is needed to be 3-dimensionally input. In this case, a user may intuitively perceive that the user command can or is needed to be 3-dimensionally input.

[84] Although not shown in FIGS. 3A through 3C, the 3-dimensional touch pad 130 may be realized in a convex shape.

[85] A method of 3-dimensionally inputting a user command from a user through the 3-dimensional touch pad 130 will now be described. 3-dimensionally inputting the user command means that the user 3-dimensionally rubs the 3-dimensional touch pad 130 to input the user command.

[86] In detail, the user may rub the 3-dimensional touch pad 130 along three different axes, i.e., along an X-axis, a Y-axis, or a Z-axis as shown in FIG. 2A. As shown in FIG. 2A, the Z-axis is not orthogonal to the X-axis and the Y-axis and thus may not be regarded as a Z-axis coinciding with a mathematical meaning but is referred to as a Z-axis for convenience in the present embodiment.

[87] Rubbing on the X-axis includes rubbings in left and right directions on the 3-dimensional touch pad 130. The rubbing in the left direction denotes rubbing in a left direction in an upper or lower area of the 3-dimensional touch pad 130 as shown in FIG. 4A. Hereinafter, the rubbing in the left direction will be referred to as left-rubbing for convenience.

[88] The rubbing in the right direction denotes rubbing in a right direction in the upper or lower area on the 3-dimensional touch pad 130 as shown in FIG. 4A. Hereinafter, the rubbing in the right direction will be referred to as right-rubbing for convenience.

[89] Left-rubbing and/or right-rubbings are performed to input a user command to move a 3-dimensinal GUI picture or contents displayed on the 3-dimensional GUI picture to the left and/or right (on an X-axis) or vary it or them with its movement or their movements to the left and/or right.

[90] Rubbing on the Y-axis includes rubbings in up and down directions on the 3-dimensional touch pad 130. The rubbing in the up direction denotes rubbing in an up direction in a left or right area on the 3-dimensinal touch pad 130 as shown in FIG. 4B. Hereinafter, the rubbing in the up direction will be referred to as up-rubbing for convenience.

[91] The rubbing in the down direction denotes rubbing in a down direction in the left or right area on the 3-dimensional touch pad 130 as shown in FIG. 4B. Hereinafter, the rubbing in the down direction will be referred to as down-rubbing for convenience.

[92] Up-rubbing and/or down-rubbings are performed to input a user command to move

a 3-dimensinal GUI picture or contents displayed on the 3-dimensional GUI picture up and/or down (on a Y-axis) or vary it or them with its movement or their movements up and/or down.

[93] Rubbing on the Z-axis includes rubbings inward and outward directions on the 3-dimensional touch pad 130.

[94] The rubbing in the inward direction denotes rubbing in an inward direction on the 3-dimensional touch pad 130 as shown in FIG. 4C. Hereinafter, the rubbing in the inward direction will be referred to as in-rubbing.

[95] The rubbing in the outward direction denotes rubbing in an outward direction on the 3-dimensional touch pad 130 as shown in FIG. 4C. Hereinafter, the rubbing in the outward direction will be referred to as out-rubbing.

[96] As shown in FIG. 4C, positions of the 3-dimensional touch pad 130 in which in-rubbing and out-rubbing can be input are not limited. In other words, in-rubbing and out-rubbing may be input in any position of the 3-dimensional touch pad 130.

[97] In other words, the in-rubbing and the out-rubbing may be input in the upper and lower areas on the 3-dimensional touch pad 130 in which left-rubbing and right-rubbing are input or in the left and right areas on the 3-dimensional touch pad 130 in which up-rubbing and down-rubbing are input. Although rubbings are input to an identical area on the 3-dimensional touch pad 130, the rubbings are input in different directions. Thus, the inputting of the rubbings in the identical area does not matter.

[98] In addition, the in-rubbing and the out-rubbing may be input in a left upper area in which the left and right areas intersect, a left lower area in which the left and lower areas intersect, a right upper area in which the right and upper areas intersect, or a right lower area in which the right and lower areas intersect.

[99] As described above, the 3-dimensional touch pad 130 has the concave shape in which the external portion is higher than the internal portion. Thus, in-rubbing from an outward direction toward an inward direction may be regarded as rubbing from a high point toward a lower point on the 3-dimensional touch pad 130. Also, out-rubbing from an inward direction toward an outward direction may be regarded as rubbing from the lower point toward the high point on the 3-dimensional touch pad 130.

[100] Thus, when in-rubbing is input, a user feels a finger going inward or downward. When out-rubbing is input, the user feels the finger going outward or upward.

[101] In-rubbing and/or out-rubbing are performed to input a user command to move a 3-dimensinal GUI picture or contents displayed on the 3-dimensional GUI picture inward and/or outward (on a Z-axis) or vary it or them with its movement or their movements inward and/or outward.

[102] In detail, the in-rubbing is performed to input a user command for moving a menu indicated by a pointer (cursor) toward a lower menu of items, moving toward detailed

information as to a list item of items of a list indicated by the pointer (cursor), zooming a displayed image and moving a window on a highest layer toward a lowest layer in a case of a disposition of a plurality of windows performing different tasks in a multilayer structure.

[103] Also, a user command that may be input through out-rubbing is symmetric to a user command that may be input through in-rubbing. In other words, out-rubbing is performed to input a user command for moving from a lower menu toward an upper menu, moving from detailed information toward a list, zooming out a displayed image and moving a second highest layer to a highest layer in a case of a disposition of a plurality of windows performing different tasks in a multilayer structure.

[104] As shown in FIG. 4B, up-rubbing and/or down-rubbing may input in two areas, i.e., the left and right areas on the 3-dimensional touch pad 130. Thus, a user may selectively use an area in which up-rubbing and/or down-rubbing can be conveniently input. In other words, a left-handed user may input up-rubbing and/or down-rubbing through the left area on the 3-dimensional touch pad 130, while a right-handed user may input up-rubbing and/or down-rubbing through the right area on the 3-dimensional touch pad 130. As a result, convenience of a user may be increased.

[105] Types of rubbings that may be input through areas on the 3-dimensional touch pad 130 are not fixed but may vary. In detail, an area on the 3-dimensional touch pad 130 in which left-rubbing and/or right-rubbing may be input may be interchanged with an area on the 3-dimensional touch pad 130 in which up-rubbing and/or down-rubbing may be input.

[106] In more detail, a case where a rubbing inputting area is changed with a use direction of an electronic device may be suggested. In other words, in a case where an electronic device is used in a lengthwise direction as shown in FIG. 5A, an area indicated by a bi-directional arrow is an area in which up-rubbing and/or down-rubbing may be input. In a case where the electronic device is used in a widthwise direction as shown in FIG. 5B, an area indicated by a bi-directional arrow is an area in which up-rubbing and/or down-rubbing may be input.

[107] Accordingly, an area of the 3-dimentional touch pad 130 in which up-rubbing and/or down-rubbing can be input varies with a user direction of an electronic device. As a result, the convenience of a user can be increased.

[108] In other words, although rubbings are input in an identical area, types of the rubbings may be different according to use directions of an electronic device. Here, the use directions of the electronic device may be directions along which an image is displayed on the main LCD 110.

[109] The 3-dimensional touch pad 130 as a kind of PUI for 3-dimensionally inputting a user command has been described in detail. The 3-dimensional touch pad 130 may be

understood as an input member sensing a 3-dimensional interface as a 3-dimensional input manipulation of a user. The 3-dimensional touch pad 130 may also be understood as an input member sensing interfaces on three axes input by a user. In addition, the 3-dimensional touch pad 130 may also be understood as an input member sensing interfaces in three directions input by a user.

[110] Even in a case where the 3-dimensional touch pad 130 is realized in a flat shape, the user may input the interfaces in the three directions and the 3-dimensional touch pad 130 may sense the interfaces.

[111] The 3-dimensional touch pad 130 emits light besides 3-dimensionaly receiving a user command. Light emitting of the 3-dimensional touch pad 130 will now be described in detail.

[112] The 3-dimensionla touch pad 130 may use such a light emitting function to display a rubbing guide in an area (hereinafter referred to as a rubbing-possible area) on the 3-dimensional touch pad 130 in which rubbing may be input, in relation to a 3-dimensional GUI currently displayed on the main LCD 100.

[113] A rubbing guide is information indicating a type of rubbing that may be input in a rubbing-possible area displaying the rubbing guide. Thus, a user can check a rubbing-possible area and a type of rubbing that may be input in the rubbing-possible area through a rubbing guide.

[114] A main LCD 110 of an electronic device shown in FIG. 6A will now be described. A current user **U** may input only up-rubbing and/or down-rubbing performed to move a pointer (cursor) positioned on a menu item up and/or down. Thus, up and/or down bi-directional arrows are shown as a rubbing guide in a left area on a 3-dimensional touch pad 130.

[115] The up and/or down bi-directional arrows as the rubbing guide are shown in the left area on the 3-dimensional touch pad 130 in FIG. 6A but are not limited to this. Thus, up and/or down bi-directional arrows as a rubbing guide may be shown in a right area on the 3-dimensional touch pad 130 that is another up and/or down-rubbing-possible area.

[116] A main LCD 110 of an electronic device shown in FIG. 6B will now be described. A current user **U** may input up-rubbing and/or down-rubbing for moving a displayed map up and/or down, left-rubbing and/or right-rubbing for moving a displayed map to the left and/or right, or in-rubbing and/or out-rubbing for zooming in and/or out a displayed map.

[117] Thus, up and/or down bi-directional arrows as a up-rubbing and/or down-rubbing guide are displayed in a left area on a 3-dimensional touch pad 130, left and/or right bi-directional arrows as a left-rubbing and/or right-rubbing guide are displayed in an upper area on the 3-dimensional touch pad 130, inward and/or outward bi-directional

arrows as an in-rubbing and/or out-rubbing guide are displayed in a right lower area on the 3-dimensional touch pad 130.

[118] As shown in FIG. 6B, rubbing guides may be further displayed in other rubbing-possible areas in which rubbings may be input.

[119] There have been described the 3-dimensional touch pad 130 for 3-dimensionally inputting a user command through 3-dimensional rubbing, a method of 3-dimensionally rubbing the 3-dimensional touch pad 130 to 3-dimensionally input a user command, and a method of displaying a rubbing guide in a rubbing-possible area using a light emitting function.

[120] The 3-dimensional touch pad 130 may be touched by a user besides being 3-dimensionally rubbed by the user. This will be described below in detail.

[121] The user may touch a specific point of the 3-dimensional touch pad 130 to input a specific user command. In other words, the 3-dimensionla touch pad 130 includes a plurality of points (hereinafter referred to as touchable points) that may be touched to input user commands, and the user commands input through the touches of the user are differently designated in each touchable point.

[122] In an electronic device shown in FIG. 7, a 3-dimensional touch pad 130 includes four touchable points. Also, a guide (hereinafter referred to as a user command guide) to a user command input through a touch is visually displayed in each of the touchable points. Thus, a user may perceive the touchable points on the 3-dimensional touch pad 130 and types of user commands input through the touchable points. The user command guide may be displayed using various inscribing methods such as printings, depressed engravings, and the like.

[123] In detail, the 3-dimensional touch pad 130 of the electronic device shown in FIG. 7 includes a left upper touchable point for inputting a user command "back," a left lower touchable point for inputting a user command "|◀◀," a right upper touchable point for inputting a user command "Menu," and a right lower touchable point for inputting a user command "▶▶|." Also, corresponding user command guides are visually displayed in the left upper touchable point, the left lower touchable point, the right upper touchable point, and the right lower touchable point.

[124] The user command guides may be displayed around the 3-dimensional touch pad 130 not on the 3-dimensional touch pad 130. For example, in the electronic device shown in FIG. 1, a user command guide is displayed at the outer edge of the electronic device positioned outside the 3-dimensional touch pad 130. Also, in this case, the user command guide that may be input through a touchable point is displayed correctly next to the touchable point.

[125] As described above, a user command that may be input through a touch of a touchable point may be relatively frequently used so as to provide convenience to the

user.

[126] A user command guide may be displayed on the main LCD 110 of the electronic device not on or around the 3-dimensional touch pad 130. In this case, a position of the main LCD 110 in which the user command guide is displayed may visually correspond to a position of a touchable point of the 3-dimensional touch pad 130 touched to input a user command.

[127] Also, in this case, the 3-dimensional touch pad 130 may display a touch guide in the touchable point thereon using a light emitting function. The touch guide is information indicating the touchable point on the 3-dimensional touch pad 130 through emitting of light. Thus, a user may perceive a position of the touchable point on the 3-dimensional touch pad 130 through the touch guide.

[128] In other words, as shown in FIG. 8A, user command guides are displayed on a main LCD 110 and touch guides are displayed in touchable points on a 3-dimensional touch pad 130. Positions of the user command guides on the main LCD 110 visually correspond to positions of the touchable points of the 3-dimensional touch pad 130 touched to input the user commands.

[129] Referring to FIG. 8A, a position of a user command "menu" displayed on the main LCD 110 visually corresponds to a position of a left upper touchable point on the 3-dimensional touch pad 130 touched to input the user command "menu." Also, a position of a user command "set" displayed on the main LCD 110 visually corresponds to a position of an intermediate upper touchable point on the 3-dimensional touch pad 130 touched to input the user command "set."

[130] If the upper touchable point is touched by a user **U** as shown in FIG. 8A, the user command "menu" is input.

[131] Referring to FIG. 8B, touch guides are displayed at a left upper touchable point, an intermediate touchable point, a right upper touchable point, a left intermediate touchable point, a right intermediate touchable point, and a left lower touchable point on the 3-dimensional touch pad 130 respectively touched to input user commands "Mp3," "Movie," "Photo," "Text," "Dic.," and "Game."

[132] Also, positions of touchable points on the 3-dimensional touch pad 130 visually correspond to positions of user command guides to user commands displayed on the main LCD 110, the user command guides being input by touching the touchable points. If the left lower touchable point is touched by a user **U** as shown in FIG. 8B, the user command "Game" is input.

[133] The positions of the user command guides on the main LCD 110 may visually correspond to the positions of the touchable points on the 3-dimensional touch pad 130, the touchable points being touched to input the user commands, and colors of the user command guides are equal to those of touch guides so as to help a user with the

easy perception.

[134] It has been described that the 3-dimensional touch pad 130 has a square ring shape. However, the 3-dimensional touch pad 130 may not have the square ring shape but may have any shape. The 3-dimensional touch pad 130 may have a square ring shape as shown in FIG. 9A, a ring shape shown in FIG. 9B, or an L shape shown in FIG. 9C.

[135] Although not shown in FIGS. 9A through 9C, the 3-dimensional touch pad 130 may have a circular shape, a square shape, a C shape, or any other shape.

[136] In a case where the 3-dimensional touch pad 130 has an L shape, the 3-dimensional touch pad 130 may be positioned at a corner of an electronic device as shown in FIG. 10. In this case, the 3-dimensional touch pad 130 may be realized so as to form a slope descending from the electronic device toward the outside, i.e., toward directions **d1**, **d2** , and **d3**.

[137] In a case where the 3-dimensionla touch pad 130 has the square ring shape as shown in FIG. 1 or a ring shape, the manipulation button 120 may be provided inside the 3-dimensional touch pad 130. A user may press the manipulation button 120 to input a specific user command.

[138] The manipulation button 120 may be well found and easily manipulated by the user and thus realized to input frequently used user commands.

[139] Also, the manipulation button 120 is positioned inside the 3-dimensional touch pad 130 and thus may be used to input user commands related to user commands input through the 3-dimensional touch pad 130. For example, the 3-dimension touch pad 130 is used to input a user command to move a pointer (cursor) on a menu or a list displayed on a 3-dimensional GUI displayed on the main LCD 110. Thus, the manipulation button 120 is used to input a user command to select or execute menu and/or list items of items of a menu and/or a list indicated by the pointer (cursor).

[140] One manipulation button 120 may be provided as shown in FIG. 11A, and a plurality of manipulation buttons 120-1, 120-2, 120-3, 120-4, and 120-5 may be provided as shown in FIG. 11B. In other words, a number of manipulation buttons positioned inside the 3-dimensional touch pad 130 is not limited but may vary.

[141] Not the manipulation button 120 but an auxiliary LCD 140 may be provided inside the 3-dimensional touch pad 130 as shown in FIG. 12. In this case, user command guides may be displayed on the auxiliary LCD 140 as shown in FIG. 13. However, the 3-dimensional touch pad 130 may have a ring shape not a square ring shape as shown in FIG. 13 and include an auxiliary LCD 140 having a circular shape.

[142] Thus, a user **U** may input a desired user command through the 3-dimensional touch pad 130 with reference to a user command guide displayed on the auxiliary LCD 140. In detail, the user **U** may touch a touchable point positioned around (rightly next to) the user command guide displayed on the auxiliary LCD 140 to input the user command.

[143] Here, a touch guide may be displayed at the touchable point on the 3-dimensional touch pad 130 through emitting of light as shown in FIG. 13. In addition, the user command guide displayed on the auxiliary LCD 140 may have the same color as the touch guide so as to help the user U with the easy perception.

[144] If the user touches a touchable point positioned in a right upper portion on the 3-dimensional touch pad 130 as shown in FIG. 13, a user command "▶‖" is input.

[145] Also, a rubbing guide as described above may be displayed on the auxiliary LCD 140.

[146] The auxiliary LCD 140 provided inside the 3-dimensiona touch pad 130 may be a touchable LCD not a LCD for a display. If the auxiliary LCD 140 is the touchable LCD, a user command may be input using only the auxiliary LCD 140 excluding the 3-dimensional touch pad 130.

[147] Both the manipulation button 120 and the auxiliary LCD 140 may be provided inside the 3-dimensional touch pad 130. The 3-dimensional touch pad 130 may be void. This may be selectively determined depending on the necessity of a manipulation of an electronic device.

[148] Based on the above-described contents, electronic devices selectively including main LCDs 110, manipulation buttons 120, 3-dimensional touch pads 130, and auxiliary LCDs 140 and disposed using various methods are shown in FIG. 14.

[149] As shown in FIG. 14, parts marked with a dark color correspond to the 3-dimensional touch pads 130, and parts marked with LCDs outside the 3-dimensional touch pads 130 correspond to the main LCDs 110. Also, parts marked with a light color inside the 3-dimensional touch pads 130 correspond to the manipulation buttons 120, parts marked with LCDs inside the 3-dimensional touch pads 130 correspond to auxiliary LCDs 140 for displays, and parts marked with a dark color inside the 3-dimensional touch pads 130 correspond to touchable auxiliary LCDs 140.

[150] The electronic devices shown in FIG. 14 are only examples of electronic devices that may be realized based on the above-described contents. Thus, electronic devices having different shapes from the electronic devices shown in FIG. 14 may be suggested.

[151] Such electronic devices will now be described in more detail with reference to FIGS. 15 through 19.

[152] FIG. 15 is a view illustrating an MP3 player suitable to be used in a lengthwise direction, FIGS. 16A and 16B are views illustrating MP3 players suitable to be used in a widthwise direction. FIG. 17 is a view illustrating a DMB player, FIG. 18 is a view illustrating a digital camera, and FIGS. 19A and 19B are views illustrating remote controls.

[153] Manipulation announcement light emitting and state announcement light emitting

may be performed using the light emitting function of the 3-dimensional touch pad 130. The manipulation announcement light emitting is a light emitting operation for visually announcing that a user rubs or touches the 3-dimensional touch pad 130, and the state announcement light emitting is a light emitting operation for announcing a current operation state of an electronic device.

[154] Thus, the user may immediately perceive the manipulations input through the 3-dimensional touch pad 130 and the current operation state of the electronic device and be provided with a high visual effect.

[155] The manipulation announcement light emitting will now be described with detailed examples.

[156] Manipulation announcement light emitting for a rubbing input manipulation of a user through the 3-dimensional touch pad 130 will be taken as an example. For example, in a case where a user **U** inputs left-rubbing through a 3-dimensional touch pad 130 as shown in FIG. 20, the 3-dimensional touch pad 130 emits light so that the light seems like moving along a direction of the left-rubbing input by the user **U**.

[157] Manipulation announcement light emitting for a touch input manipulation of a user through the 3-dimensional touch pad 130 will be taken as an example. For example, in a case where a user touches touchable points of the 3-dimensional touch pad 130 as shown in FIG. 21A, the 3-dimensional touch pad 130 lightly emits light at the touchable points touched by the user and the surroundings.

[158] Manipulation announcement light emitting for a push (strong touch) input manipulation of a user through the 3-dimensional touch pad 130 will be taken as an example. For example, in a case where the user pushes a touchable point as shown in FIG. 21B, the 3-dimensional touch pad 130 emits deep light at the touchable point pushed by the user and the surrounding. This corresponds to manipulation announcement light emitting using a method of varying a light emission degree with the strength of a touch.

[159] Manipulation announcement light emitting for in-rubbing and/or out-rubbing input manipulations of a user through the 3-dimensional touch pad 130 will be taken as an example. For example, in a case where the user performs in-rubbing on the 3-dimensional touch pad 130 as shown in the left part of FIG. 21C, the 3-dimensional touch pad 130 emits light gradually deeply from the outside toward the inside so as to express an effect of going inward or an effect of going downward. This corresponds to a case where manipulation announcement light emitting for in-rubbing and/or out-rubbing input manipulations is provided to a user through variations in the brightness of emitted light.

[160] In a case where the user performs out-rubbing on the 3-dimensional touch pad 130 as shown in the right part of FIG. 21C, the 3-dimensional touch pad 130 emits light

gradually deeply from the inside toward the outside so as to express an effect of going outward or an effect of going upward.

[161] The manipulation announcement light emitting may be performed by the auxiliary LCD 140 besides the 3-dimensional touch pad 130. In other words, in a case where the user touches a touchable auxiliary LCD 140 as shown in FIG. 21D, the touchable auxiliary LCD 140 emits light at a point touched by the user and the surrounding.

[162] State announcement light emitting will now be described with detailed examples.

[163] State announcement light emitting for a conversion from a power-off state of an electronic device into a power-on state will be taken as an example. In this case, the 3-dimensional touch pad 130 may randomly vary a light emitting point to emit light.

[164] State announcement light emitting for a conversion into a holding state of the electronic device will be taken as an example. In this case, the 3-dimensional touch pad 130 may periodically emit and then extinct (flicker) light at specific light emitting points.

[165] State announcement light emitting for a conversion of the electronic device into a play state will be taken as an example. In this case, the 3-dimensional touch pad 130 emits light so that the light seems like rotating along a ring shape of the 3-dimensional touch pad 130.

[166] An internal structure of an electronic device will now be described in detail with reference to FIG. 22. FIG. 22 is a block diagram of an electronic device for 3-dimensionally inputting a user command according to an embodiment of the present invention.

[167] As shown in FIG. 22, the electronic device includes a PUI unit 210, a controller 260, a 3-dimensional GUI unit 270, and a main LCD 280. The PUI unit 210 includes a 3-dimensional touch pad 220 and a manipulation button 250, and the 3-dimensional touch pad 220 includes a 3-dimensional touch sensor unit 230 and a light emitter 240.

[168] The main LCD 280, the manipulation button 250, and the 3-dimensional touch pad 220 respectively correspond to the main LCD 110, the manipulation button 120, and the 3-dimensional touch pad 130 shown in FIG. 1.

[169] The 3-dimensional touch sensor unit 230 of the 3-dimensional touch pad 220 senses 3-dimensional rubbing and a touch of a user and transmits the sensed results to the controller 260 that will be described later.

[170] As shown in FIG. 23, the 3-dimensional touch sensor unit 230 includes touch sensors 231 disposed in two rows. Here, the touch sensors 231 are disposed in the two rows in the 3-dimensional touch sensor unit 230 so as to sense in-rubbing and/or out-rubbing. The touch sensors 231 may be disposed in two or more rows.

[171] The light emitter 240 of the 3-dimensional touch pad 220 is positioned under the 3-dimensional touch sensor unit 230. The light emitter 240 includes a plurality of light

emitting diodes (LEDs). The light emitter 240 emits light under the control of the controller 260 so as to perform a light emitting function of the 3-dimensional touch pad 220.

[172] The manipulation button 250 senses touches of a user and transmits the sensed results to the controller 260.

[173] The 3-dimensional GUI unit 270 generates a 3-dimensional GUI. The main LCD 280 is a display displaying the 3-dimensional GUI generated by the 3-dimensional GUI unit 270.

[174] The controller 260 deciphers a user command with reference to the sensed results of the 3-dimensional touch sensor unit 230 and the sensed results of the manipulation button 250. The controller 260 also controls the 3-dimensional GUI unit 270 to generate the 3-dimensional GUI coinciding with the deciphered user command.

[175] The controller 260 may be understood as controlling contents displayed on the main LCD 280 according to the user command.

[176] The controller 260 also controls a light emitting operation of the light emitter 240 so as to display a rubbing guide and a touch guide. In addition, the controller 260 controls the light emitting operation of the light emitter 240 so as to perform manipulation announcement light emitting and state announcement light emitting.

[177] The controller 260 controls other elements (not shown) of the electronic device to execute the deciphered user command.

[178] Although not shown in FIG. 22, the electronic device according to the present embodiment may further include an auxiliary LCD. In this case, the auxiliary LCD may be an auxiliary LCD for a display or a touchable auxiliary LCD. Contents displayed on the auxiliary LCD are determined by the controller 260. Also, a result of sensing a touch of a user through the touchable auxiliary LCD is transmitted to the controller 260.

[179] A process of 3-dimensionally inputting a user command and changing a 3-dimensional GUI according to the input user command in the electronic device shown in FIG. 22 will now be described in detail with reference to FIG. 24. FIG. 24 is a flowchart of a method of changing a 3-dimensional GUI according to a 3-dimensionally input user command according to an embodiment of the present invention.

[180] In operation S310, the 3-dimensional GUI unit 270 generates a 3-dimensional GUI under the control of the controller 260, and the main LCD 280 displays the 3-dimensional GUI.

[181] In operation S320, the light emitter 240 displays a rubbing guide under the control of the controller 260.

[182] In operation S330, the 3-dimensional touch sensor unit 230 senses 3-dimensinal

rubbing of a user and transmits the sensed result to the controller 260.

[183] In operation S340, the controller 260 deciphers a user command through the sensed result. In operation S350, the light emitter 240 executes manipulation announcement light emitting under the control of the controller 260.

[184] In operation S360, the controller 260 controls the 3-dimensional GUI unit 270 to generate the 3-dimensional GUI coinciding with the deciphered user command so that the 3-dimensional GUI can be displayed on the main LCD 280.

[185] Thereafter, operations S320 through S360 are repeated.

[186] Operation S360 will now be described with a detailed example.

[187] A user command deciphered by the controller 260 when the 3-dimensional touch sensor unit 230 senses up-rubbing and/or down-rubbing, i.e., a user command that may be input through up-rubbing and/or down-rubbing, will be described with a detailed example.

[188] The up-rubbing and/or down-rubbing are used to input a user command to move a 3-dimensional GUI picture or contents displayed on the 3-dimensional GUI picture up and/or down (on a Y-axis) or vary it or them with its movement or their movement up and/or down.

[189] In a case where a GUI picture shown in FIG. 25 is displayed on the main LCD 280, up-rubbing and/or down-rubbing sensed by the 3-dimensional touch sensor unit 230 are used to input a user command to move a pointer (cursor) displayed on the GUI picture up and/or down (on a Y-axis).

[190] If a user continuously puts a finger on the 3-dimensional touch sensor unit 230 after the up-rubbing and/or down-rubbing, the pointer (cursor) may move at a high speed.

[191] The up-rubbing and/or down-rubbing may be used to input a user command to move the pointer (cursor) displayed on the GUI picture up and/or down (on the Y-axis) and move an item indicated by the moved pointer (cursor) to another position with zooming in the item.

[192] For example, in a case where a GUI picture shown in FIG. 26A is displayed on the main LCD 280, down-rubbing sensed by the 3-dimensional touch sensor unit 230 may be used to input to a user command to move a pointer (cursor) to a second list item as shown in FIG. 26B and move the second list item to the top with zooming in the second list item indicated by the moved pointer (cursor) as shown in FIG. 26C.

[193] Left-rubbing and/or right-rubbing are used to input a user command to move a 3-dimensional GUI picture or contents displayed on the 3-dimensional GUI picture to the left and/or right (on an X-axis) or vary it or them with its movement or their movements to the left and/or right.

[194] For example, in a case where a GUI picture displaying a list of a folder 2Album shown in FIG. 27A is displayed on the main LCD 280, right-rubbing sensed by the

3-dimensional touch sensor unit 230 may be used to input a user command to slowly (sequentially) move a pointer to a GUI picture displaying lists of a folder "3 Album" next to the folder "2 Album" as shown in FIGS. 27B, 27C, and 27D.

[195] As another example, in a case where a GUI picture displaying lists sorted according to "Date" shown in FIG. 28A is displayed on the main LCD 280, left-rubbing and/or right-rubbing sensed by the 3-dimensional touch sensor unit 230 may be used to input a user command to move a pointer to a GUI picture displaying lists sorted according to "Artist" as shown in FIG. 28B or a GUI picture displaying lists sorted according to "Album" as shown in FIG. 28C. In this case, the movements to the GUI pictures displaying the lists may be slowly (sequentially) realized.

[196] In-rubbing is used to input a user command for moving a menu indicated by a pointer (cursor) to a lower menu of items, moving to detailed information as to a list item of items of a list indicated by a pointer (cursor), zooming in a displayed image and moving a window on a highest layer to a lowest layer in a case of a disposition of a plurality of windows performing different tasks in a multilayer structure.

[197] A user command that may be input through out-rubbing is symmetric to a user command that may be input through in-rubbing. In other words, out-rubbing is used to input a user command for moving from a lower menu to an upper menu, moving from detailed information to a list, zooming out a displayed image and moving a second highest layer to a highest layer in a case of a disposition of a plurality of windows performing different tasks in a multilayer structure.

[198] For example, in a case where an electronic device plays an MP3 file as shown in FIG. 29A, out-rubbing sensed by the 3-dimensional touch sensor unit 230 may be used to input a user command to move a pointer to a GUI picture displaying lists including items of MP3 files as shown in FIG. 29D.

[199] In a case where the GUI picture displaying the lists including the items of the MP3 files is displayed on the main LCD 280 as shown in FIG. 29D, out-rubbing sensed by the 3-dimensional touch sensor unit 230 may be used to input a user command to move a pointer to a GUI picture displaying items "MP3 Play," "Movie Play," of an upper menu of an MP3 file list as shown in FIG. 29F.

[200] In a case where the GUI picture as shown in FIG. 29F is displayed on the main LCD 280, right-rubbing sensed by the 3-dimensional touch sensor unit 230 may be used to input a user command to move a pointer (cursor) to the right as shown in FIG. 29B.

[201] In a case where the GUI picture as shown in FIG. 29B is displayed on the main LCD 280, in-rubbing sensed by the 3-dimensional touch sensor unit 230 may be used to input a user command to call a file list "Movie" subordinate to an item "Movie Play" indicated by a pointer (cursor) as shown in FIG. 29E.

[202] In a case where a GUI picture displaying the file list "Movie" as shown in FIG. 29E is displayed on the main LCD 280, in-rubbing sensed by the 3-dimensional touch sensor unit 230 may be used to input a user command to play a file "Movie" indicated by a pointer (cursor) as shown in FIG. 29G.

[203] In a case where the GUI picture as shown in FIG. 29D is displayed on the main LCD 280, down-rubbing sensed by the 3-dimensional touch sensor unit 230 may be used to input a user command to move a pointer (cursor) down as shown in FIG. 29C.

[204] In a case where a GUI picture displaying MP3 file lists is displayed on the main LCD 280 as shown in FIG. 29C, in-rubbing sensed by the 3-dimensional touch sensor unit 230 may be used to input a user command to play a MP3 file indicated by a pointer (cursor) as shown in FIG. 29A.

[205] As another example, in a case where a GUI picture displaying a map is displayed on the main LCD 280 as shown in FIG. 30A, in-rubbing sensed by the 3-dimensional touch sensor unit 230 may be used to input a user command to zoom in the map as shown in FIG. 30B.

[206] In a case where the GUI picture displaying the map is displayed on the main LCD 280 as shown in FIG. 30A, out-rubbing sensed by the 3-dimensional touch sensor unit 230 may be used to input a user command to zoom out the map.

[207] As another example, in a case where a GUI picture displaying a plurality of thumbnail images is displayed on the main LCD 280 as shown in FIG. 31A, in-rubbing sensed by the 3-dimensional touch sensor unit 230 may be used to input a user command to zoom in the thumbnail images instead of reducing a number of thumbnail images displayed on the GUI picture as shown in FIGS. FIGS. 31B, 31C, and 31D.

[208] In a case where a GUI picture displaying an image is displayed on the main LCD 280 as shown in FIG. 31D, in-rubbing sensed by the 3-dimensional touch sensor unit 230 may be used to input a user command to zoom in the image as shown in FIG. 31E.

[209] In a case where a GUI picture displaying a plurality of thumbnail images is displayed on the main LCD 280, out-rubbing sensed by the 3-dimensional touch sensor unit 230 may be used to input a user command to zoom out the thumbnail images instead of increasing a number of thumbnail images displayed on the GUI picture.

[210] As another example, in a case where a 3-dimensional GUI picture displaying a plurality of windows performing different tasks in a multilayer structure is displayed on the main LCD 280 as shown in FIGS. 32A and 32B, in-rubbing sensed by the 3-dimensional touch sensor unit 230 may be used to input a user command to move a window on a highest layer to a lowest layer. Also, out-rubbing may be used to input a user command to move a window on a second highest layer to the highest layer. Here, the movements of the windows may be slowly (sequentially) may be realized.

[211] As another example, in a case where a 3-dimensional GUI picture displaying

different menus in a multilayer structure is displayed on the main LCD 280 as shown in FIGS. 32C and 32D, in-rubbing sensed by the 3-dimensional touch sensor unit 230 may be used to input a user command to move a menu on a highest layer to a lowest layer. Also, out-rubbing may be used to input a user command to move a menu on a second highest layer to the highest layer. Here, the menus may be slowly (sequentially) moved.

[212] FIGS. 33A through 33C illustrate menus in which item information is written inside circles. The largest circle in each of the menus shown in FIGS. 33A through 33C operates as a pointer. "Now Playing" written in circles positioned in the center as shown in FIGS. 33B and 33C denote user commands that may be input by touching the manipulation button 120 positioned inside the 3-dimensional touch pad 130.

[213] In menus as shown in FIGS. 33A through 33C, circles may become larger as shown in FIGS. 34A through 34C when an electronic device is powered on so as to provide a higher visual effect to a user.

[214] In a case where a 3-dimensional GUI picture displaying menus as shown in FIG. 35A is displayed on the main LCD 280, in-rubbing sensed by the 3-dimensional touch sensor unit 230 may be used to input a user command to display a circular pointer with its slow zooming in and a lower menu of a menu item indicated by the circular pointer inside the circular pointer as shown in FIGS. 35B, 35C, and 35D.

[215] As another example, in a case where a 3-dimensional GUI picture displaying a menu as shown in FIG. 36A is displayed on the main LCD 280, in-rubbing sensed by the 3-dimensional touch sensor unit 230 may be used to input a user command to display a circular pointer with its slow zooming in and an execution picture of a menu item indicated by the circular pointer inside the zooming pointer as shown in FIGS. 36B through 36F.

[216] As another example, in a case where a 3-dimensional GUI picture 3-dimensionally displaying different menus is displayed on the main LCD 280 as shown in FIGS 37A and 37B, in-rubbing sensed by the 3-dimensional touch sensor unit 230 may be used to input a user command to move a closest menu (positioned at the top of the 3-dimensional GUI picture) to a remotest position (a lowest position on the 3-dimensional GUI picture).

[217] Also, out-rubbing may be used to input a user command to move a second closest menu to a closest position. Here, menus may be slowly (sequentially) moved.

[218] As another example, in a case where a GUI picture displaying a list is displayed on the main LCD 280 as shown in FIG. 38A, in-rubbing sensed by the 3-dimenisonal touch sensor unit 230 may be used to input a user command to call a GUI picture displaying detailed information (album information, lyrics information, and so on) as to a list item indicated by a pointer (cursor) as shown in FIGS. 38B and 38C.

[219] In a case where a GUI picture as shown in FIG. 38B or 38C is displayed on the main LCD 280, out-rubbing sensed by the 3-dimensional touch sensor unit 230 may be used to input a user command to move a pointer to a list including list items of detailed information as shown in FIG. 38D.

[220] As another example, in a case where a GUI picture displaying Korean alphabet search menus of FIG. 39B called by selecting an item Search on a GUI picture shown in FIG. 39A is displayed on the main LCD 280, right-rubbing sensed by the 3-dimensional touch sensor unit 230 may be used to input a user command to call a GUI picture displaying English search menus shown in FIG. 39C.

[221] In a case where the GUI picture displaying the English search menus shown in FIG. 39C is displayed on the main LCD 280, left-rubbing sensed by the 3-dimensional touch sensor unit 230 may be used to input a user command to call the GUI picture displaying the Korean search menus shown in FIG. 39B.

[222] In a case where a GUI picture displaying a list of music files starting with "B" shown in FIG. 39D is displayed on the main LCD 280, right-rubbing sensed by the 3-dimensional touch sensor unit 230 may be used to input a user command to move a pointer to a GUI picture displaying a list of movie files starting with "B"shown in FIG. 39E.

[223] In a case where the GUI picture displaying the list of the movie files starting with "B" shown in FIG. 39E is displayed on the main LCD 280, left-rubbing sensed by the 3-dimensional touch sensor unit 230 may be used to input a user command to move the pointer to the GUI picture displaying the list of the music files starting with "B" shown in FIG. 39.

[224] A selection of a list item of items of the list shown in FIG. 39D may be used to input a user command to execute the list items as shown in FIG. 39F.

[225] As shown in FIG. 40, a method of displaying a pointer (cursor) on a GUI may be the same as the light emitting method of the 3-dimensional touch pad shown in FIG. 21A. In this case, a user may feel that a PUI is equal to a GUI.

[226] As shown in FIG. 41, a method of adding "*" to an item "Search" indicated by a pointer may also be the same as the light emitting method of the 3-dimensional touch pad.

[227] In a case where a selected item is executed to display an image on the main LCD 280, an initial displaying method for the image may vary. A GUI picture displaying a window "Transition Effect for setting an initial displaying method is shown in FIG. 41. As shown in the window "Transition Effect," the initial displaying method may be a "Vertical Slide" method, a "Dissolve" method, a "Flip"method, or the like.

[228] In a case where a music item is executed, an option such as an equalizer or the like may overlap with the music item as shown in FIG. 43.

[229] A method of sensing 3-dimensional rubbing of a user to generate and/or display a 3-dimensionl GUI coinciding with a deciphered user command has been described with detailed examples. The above-described contents may be applied to generate and/or display a 3-dimensional GUI using different methods from the above-described methods. These methods will be understood by those of ordinary skill in the art and thus will not be described in detail herein.

[230] The foregoing embodiment and advantages are merely exemplary and are not to be construed as limiting the present invention. The present teaching can be readily applied to other types of apparatuses. Also, the description of the embodiments of the present invention is intended to be illustrative, and not to limit the scope of the claims, and many alternatives, modifications, and variations will be apparent to those skilled in the art.

Industrial Applicability

[231] The present invention may be applied to an electronic device capable of receiving a user's command.

Claims

[1] An electronic device comprising:
a touch pad sensing a 3-dimensional interface; and
a controller controlling a GUI (graphical user interface) in response to the 3-dimensional interface sensed by the touch pad.

[2] The electronic device of claim 1, wherein the touch pad senses interfaces on a first, a second, and a third axes input by a user, and the controller deciphers the interfaces on the first, second, and third axes sensed by the touch pad as a first, a second, and a third user commands, respectively, and controls the GUI based on the deciphered results.

[3] The electronic device of claim 2, wherein the first user command is a user command related to a fourth axis direction on a GUI picture, the second user command is a user command related to a fifth axis direction on the GUI picture, and the third user command is a user command related to a sixth axis direction on the GUI picture.

[4] The electronic device of claim 2, wherein:
the interface on the first axis is sensed in one of upper and lower areas of the touch pad;
the interface on the second axis is sensed in one of left and right areas of the touch pad; and
the interface on the third axis is sensed in one of the upper, lower, left, and right areas of the touch pad.

[5] The electronic device of claim 1, wherein the touch pad comprises outer and inner parts forming a predetermined slope.

[6] The electronic device of claim 1, wherein the touch pad has one of a ring shape, a circular shape, a square ring shape, a square shape, a C shape, and an L shape.

[7] The electronic device of claim 1, wherein the touch pad senses a point touched by the user, and the controller deciphers a type of a user command based on the touched point sensed by the touch pad.

[8] The electronic device of claim 1, comprising a touchable point displaying information as to a user command input through a touch of the touchable point.

[9] The electronic device of claim 1, comprising a touchable point displaying information as to a user command input through a touch of the touchable point around the touchable point.

[10] The electronic device of claim 1, further comprising a main display positioned outside the touch pad and displaying information as to a user command input through a touch of a touchable point.

[11] The electronic device of claim 10, wherein a position of the information as to the user command on the main display visually corresponds to a position of a touchable point on the touch pad touched to input the user command.

[12] The electronic device of claim 1, further comprising an auxiliary display displaying information as to a user command.

[13] The electronic device of claim 12, wherein the information as to the user command is displayed at a point on the auxiliary display adjacent to a point on a touch pad touched to input the user command.

[14] The electronic device of claim 1, further comprising a manipulation button positioned inside the touch pad and sensing an input of a user,
wherein the controller deciphers the input of the user sensed by the manipulation button as a predetermined user command.

[15] The electronic device of claim 14, wherein the manipulation button comprises at least one button sensing pressing performed by a user.

[16] The electronic device of claim 1, further comprising an auxiliary display positioned inside the touch pad, displaying information as to a user command that can be input, and inputting a user command displayed through a touch.

[17] The electronic device of claim 1, further comprising a light emitter including at least one light emitting device provided in the touch pad.

[18] The electronic device of claim 17, wherein the controller controls the light emitting device to emit light corresponding to a 3-dimensional interface sensed by the touch pad.

[19] The electronic device of claim 17, wherein the touch pad senses interfaces in a first, a second, and a third directions input by a user, and the controller controls the light emitting device to emit light so that the light moves along the first, second, and third directions of the interfaces sensed by the touch pad.

[20] The electronic device of claim 17, wherein the touch pad senses interfaces on a first, a second, and a third axes input by a user, and the controller controls the light emitting device to vary a brightness of light in response to the interfaces on the first, second, and third axes sensed by the touch pad.

[21] The electronic device of claim 17, wherein the touch pad senses a point touched by a user, and the controller controls the light emitting device to emit light at at least one of the touched point sensed by the touch pad and around the touched point.

[22] The electronic device of claim 18, wherein the controller controls the light emitting device to vary a light emission degree with a strength of a touch of the user.

[23] The electronic device of claim 17, wherein the controller controls the light

emitting device to emit light corresponding to an operation state of the electronic device

[24] The electronic device of claim 17, wherein the light emitting device displays information indicating areas in which a user is able to input interfaces on a first, a second, and a third axes, in each of the areas.

[25] The electronic device of claim 1, further comprising a main display positioned outside the touch pad and displaying information as to a user command input through a touch of a touchable point,
wherein a color of the information as to the user command displayed on the main display is equal to a color of a touchable point displayed by the light emitting device.

[26] The electronic device of claim 1, wherein the controller controls a size of an image to be displayed to vary the size of the image in response to the 3-dimensional interface sensed by the touch pad.

[27] The electronic device of claim 1, wherein the controller controls a number of images to be displayed to vary the number of images in response to the 3-dimensional interface sensed by the touch pad.

[28] The electronic device of claim 1, wherein if a plurality of windows performing different tasks are disposed in a multilayer structure, the controller controls a predetermined window to move to another layer so as to display the predetermined window on the another layer in response to the 3-dimensional interface sensed by the touch pad.

[29] The electronic device of claim 1, wherein the controller controls one of upper and lower menus of a predetermined menu item to display the one in response to the 3-dimensional interface sensed by the touch pad.

[30] The electronic device of claim 1, wherein the controller controls an execution picture of a menu item indicated by a pointer to display the execution picture inside the pointer in response to the 3-dimensional interface sensed by the touch pad.

[31] UI (user interface) method comprising:
sensing a 3-dimensional interface; and
controlling a GUI in response to the sensed 3-dimensional interface.

[32] The UI method of claim 31, wherein interfaces on a first, a second, and a third axes input by a user are sensed, the interfaces on the first, second, and third axes are respectively deciphered as a first, a second, and a third user commands, and the GUI is controlled based on the deciphered results.

[33] The UI method of claim 32, wherein the first user command is a user command related to a fourth axis direction on a GUI picture, the second user command is a

user command related to a fifth axis direction on the GUI picture, and the third user command is a user command related to a sixth axis direction on the GUI picture.

[34] An electronic device comprising:
an input unit sensing at least one of interfaces in first, second, and third directions; and
a controller controlling a GUI in response to the interfaces sensed by the input unit.

[35] UI method comprising:
sensing at least one of interfaces in first, second, and third directions; and
controlling a GUI in response to the sensed interfaces.

[36] An electronic device comprising:
an input unit sensing a 3-dimensional interface; and
a controller controlling contents displayed on a display in response to the 3-dimensional interface sensed by the input unit.

[37] An UI method comprising:
sensing a 3-dimensional interface; and
controlling displayed contents in response to the sensed 3-dimensional interface.

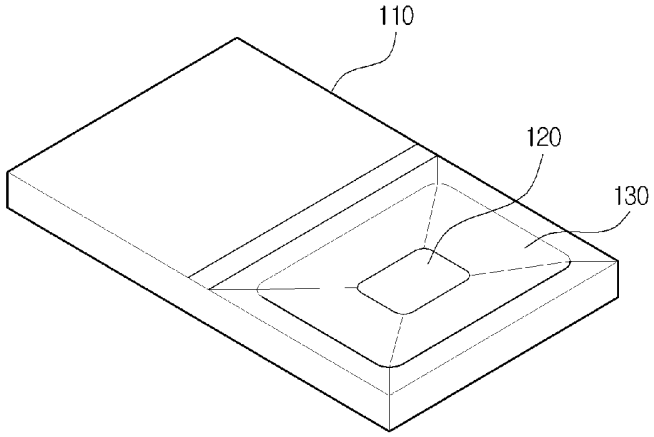
[38] An input unit comprising:
a touch pad sensing a 3-dimensional interface input by a user,
wherein the 3-dimensional interface sensed by the touch pad is transmitted to a device controlling an electronic device.

[39] An electronic device comprising:
an input unit sensing interfaces in first and second directions; and
a controller controlling contents displayed on a display in response to the interfaces sensed by the input unit.

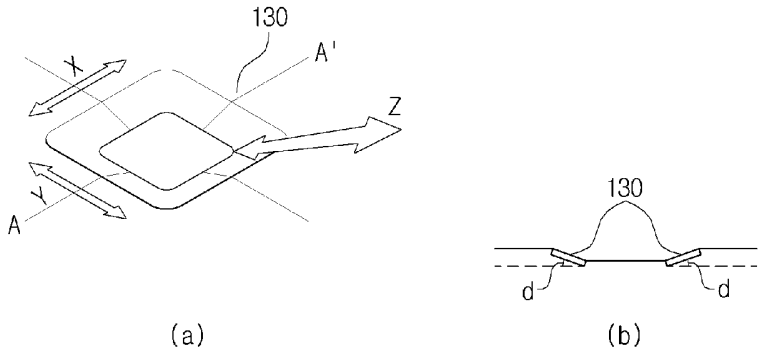
[40] An electronic device comprising:
an input unit sensing an interface input by a user; and
a controller deciphering a type of a user command in response to the interface sensed by the input unit.

[41] An electronic device comprising:
an input unit comprising at least two areas sensing an interface input by a user,
wherein a type of the interface sensed by the at least two areas of the input unit is determined depending on a direction along which an image is displayed on a display.

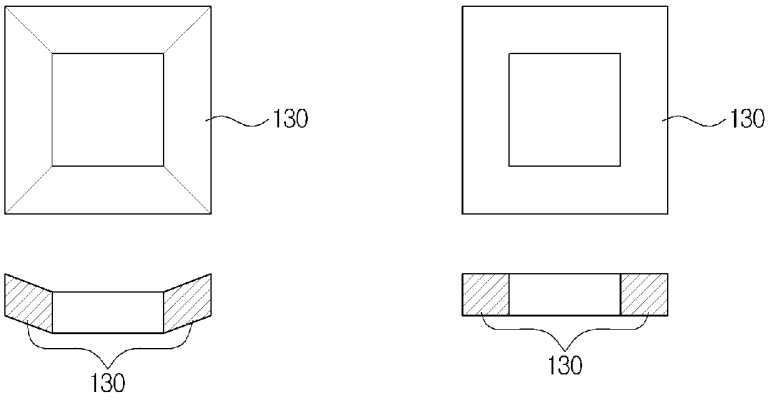
[Fig. 1]

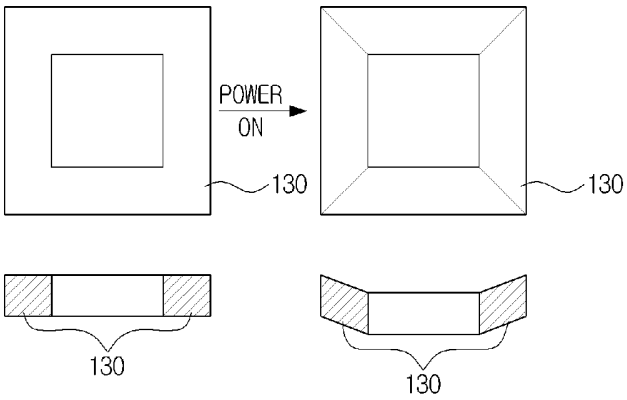


[Fig. 2]

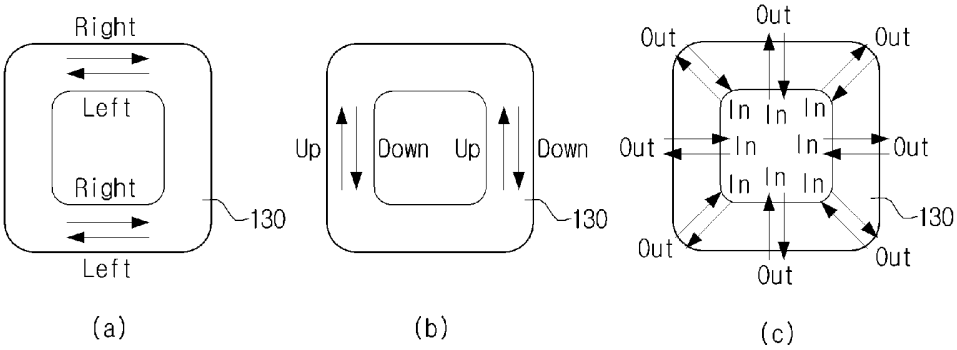


[Fig. 3]

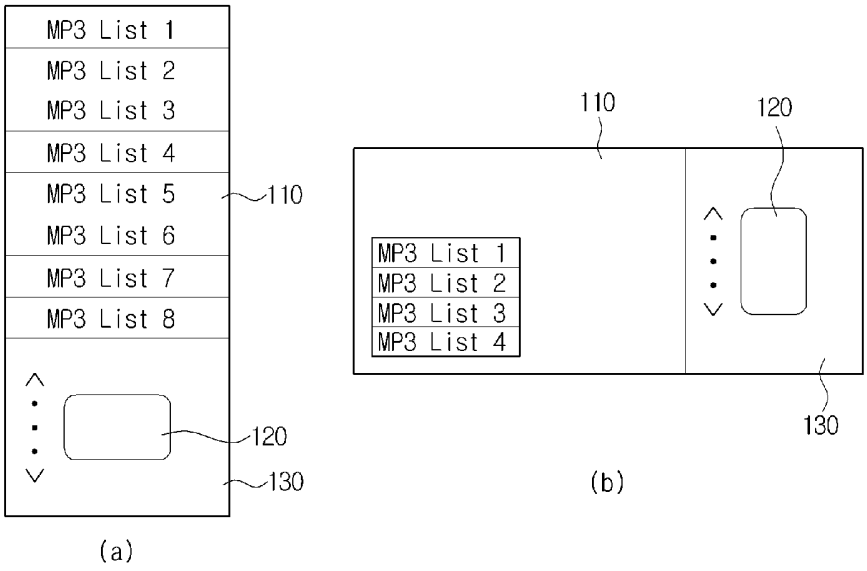

130
130
130
130
(a)
(b)


POWER
ON
130
130
130
130
(c)

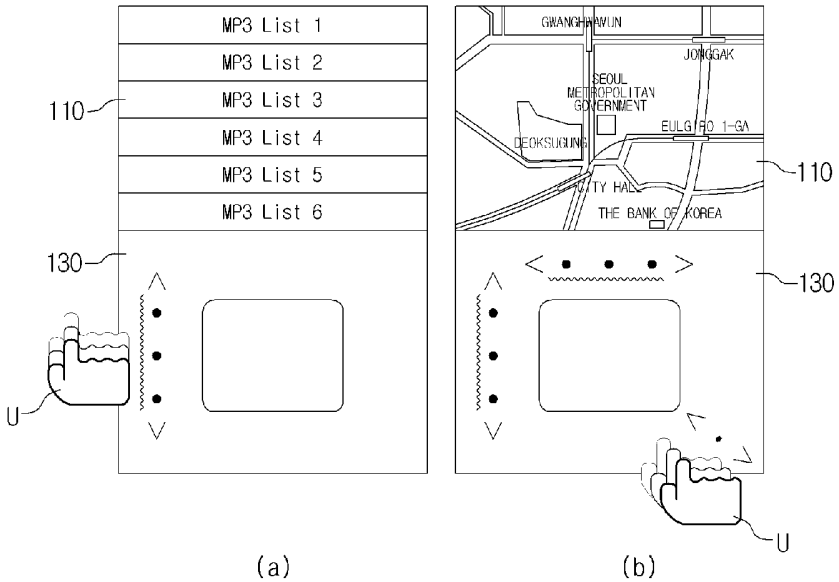
[Fig. 4]


Right
Left
Right
Left
130
(a)
Up
Down
Up
Down
130
(b)
Out
Out
Out
In
In
In
Out
In
In
Out
In
In
In
Out
Out
Out
130
(c)

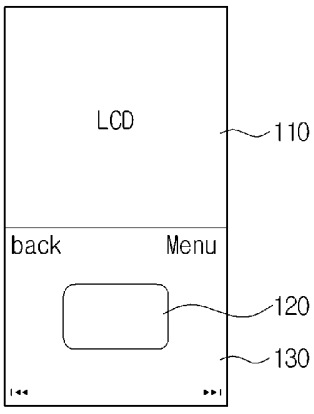
[Fig. 5]



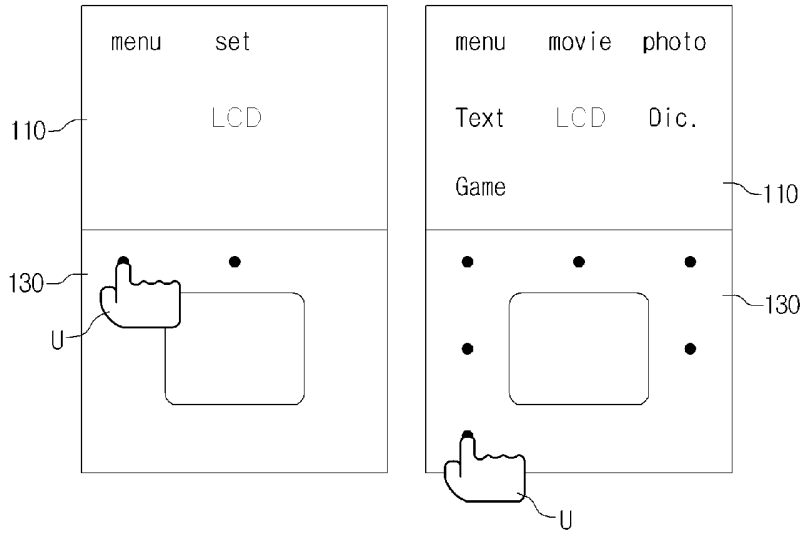
[Fig. 6]



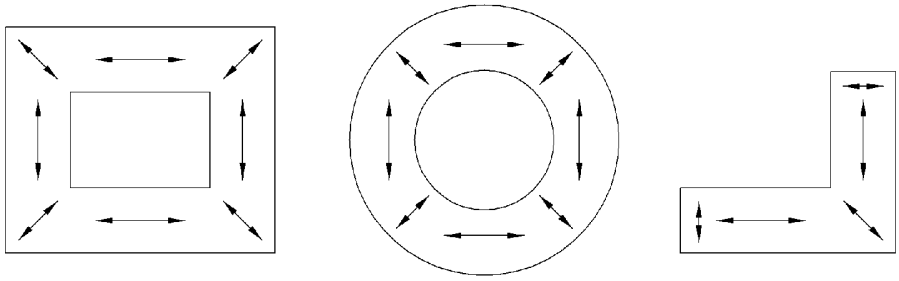
[Fig. 7]



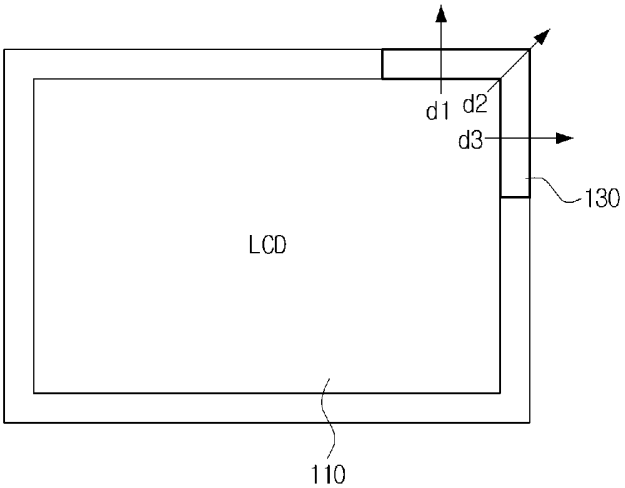
[Fig. 8]



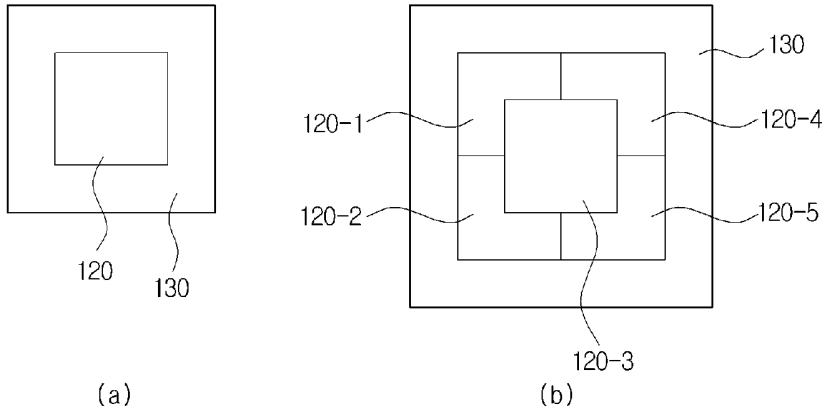
[Fig. 9]



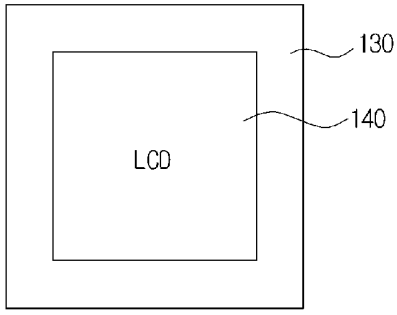
[Fig. 10]



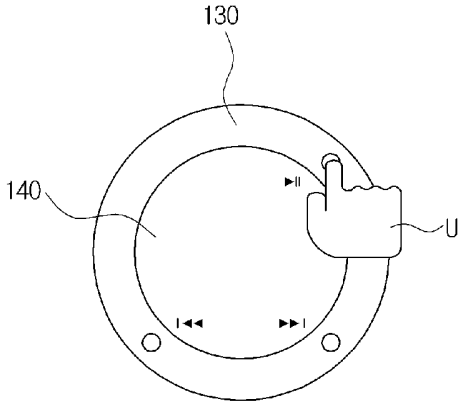
[Fig. 11]



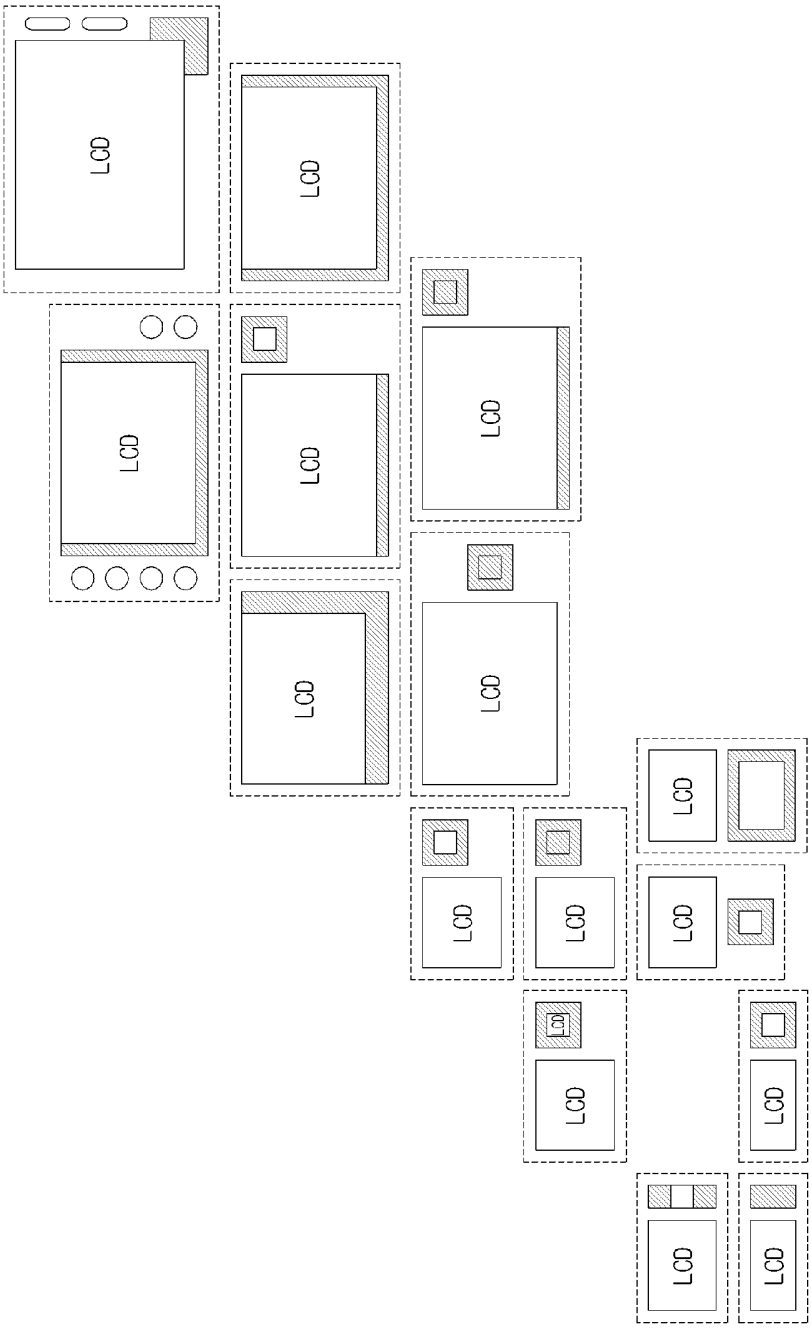
[Fig. 12]



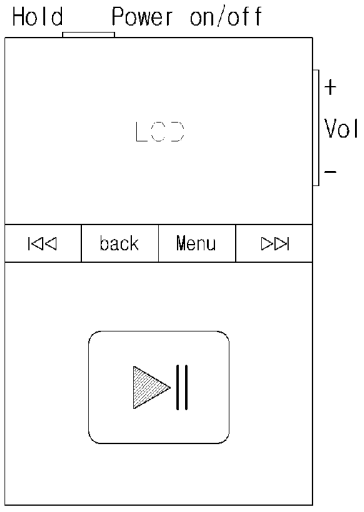
[Fig. 13]



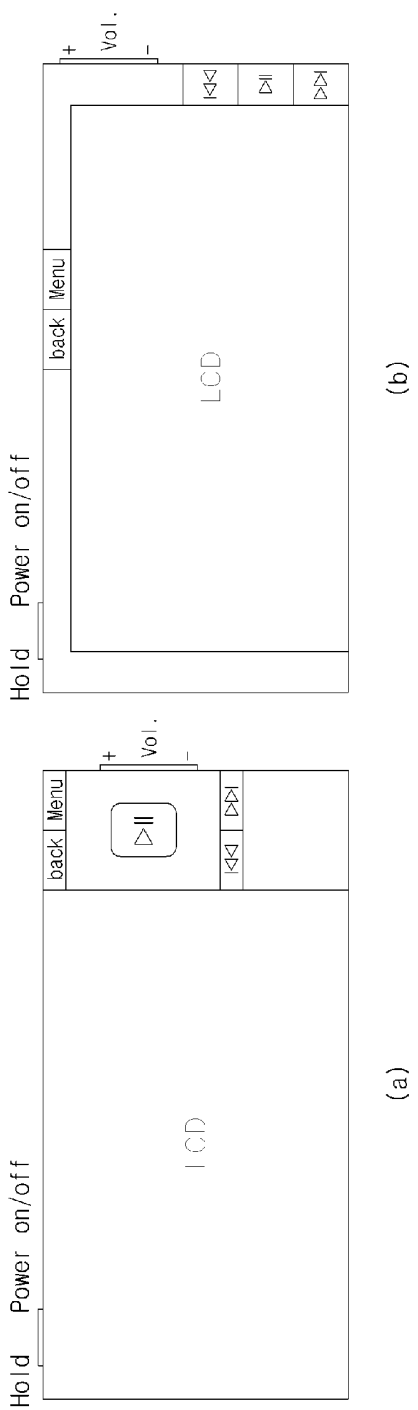
[Fig. 14]



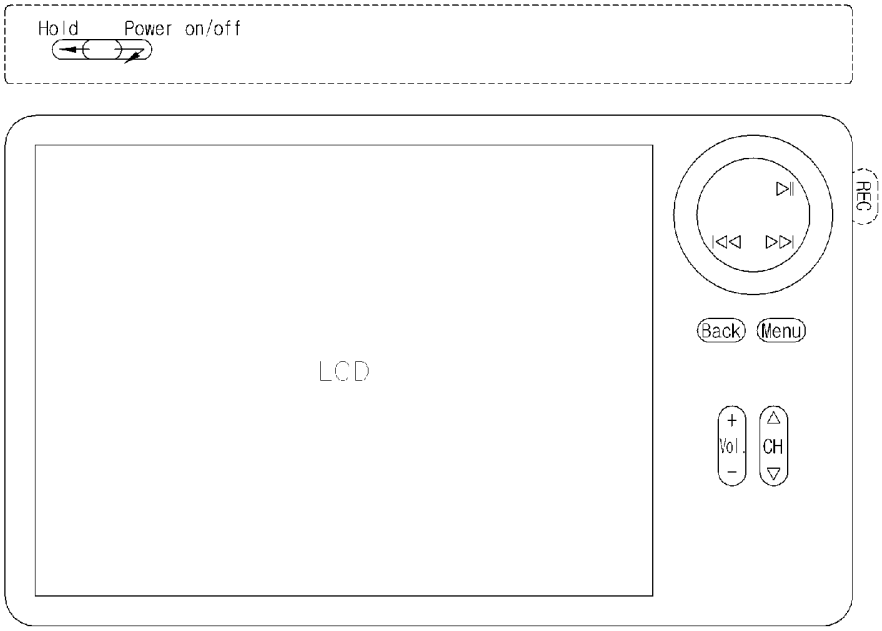
[Fig. 15]



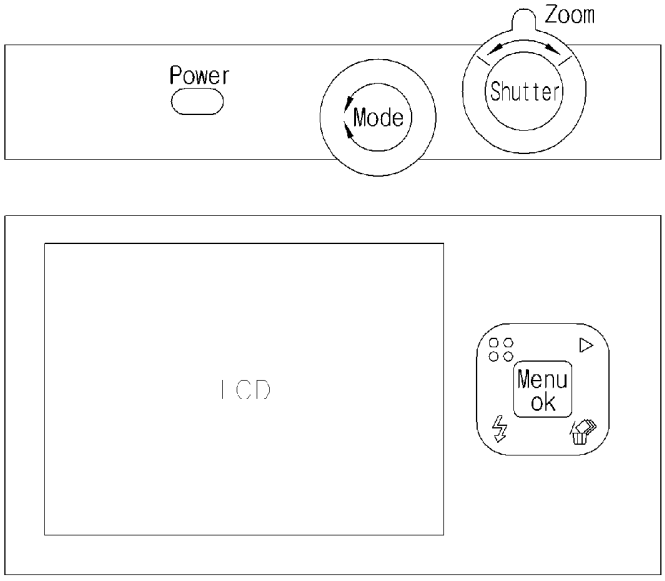
[Fig. 16]


Hold
Power on/off
LCD
back
Menu
Vol.
+
-
(a)
Hold
Power on/off
LCD
back
Menu
Vol.
+
-
(b)

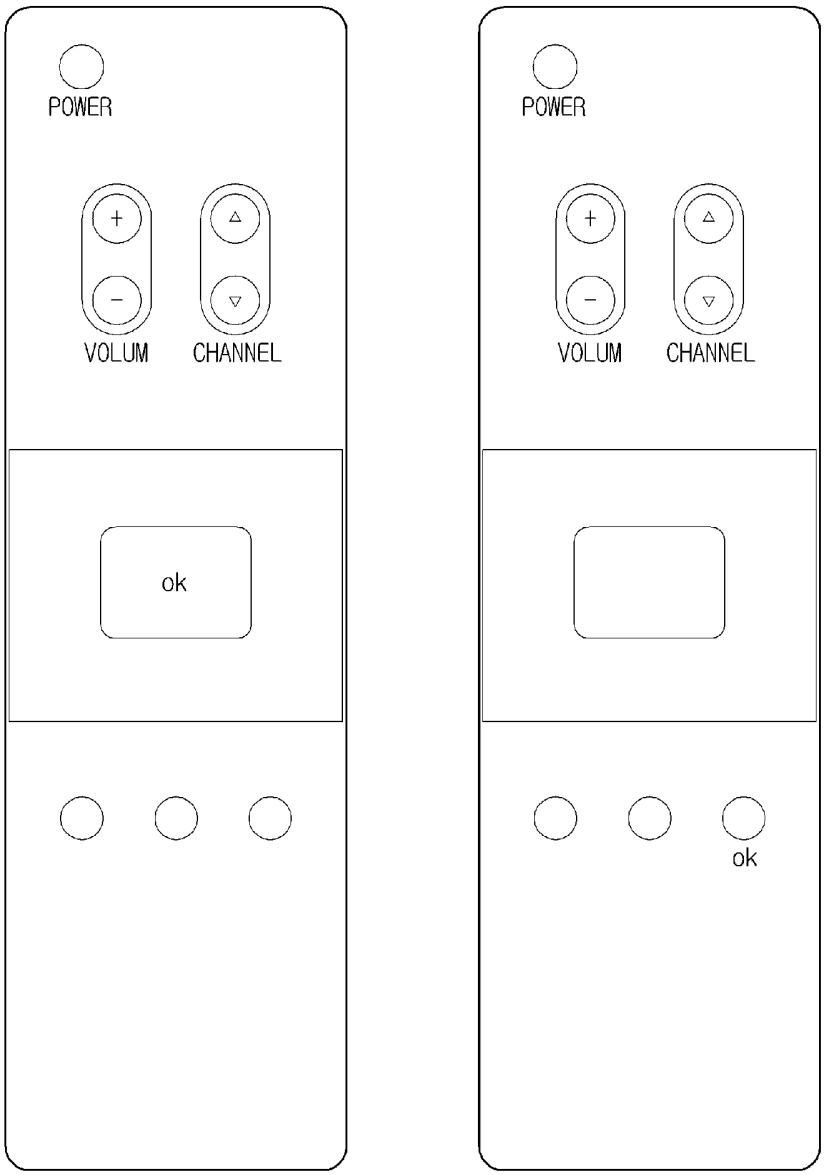
[Fig. 17]


Hold
Power on/off
LCD
REC
Back
Menu
Vol
CH

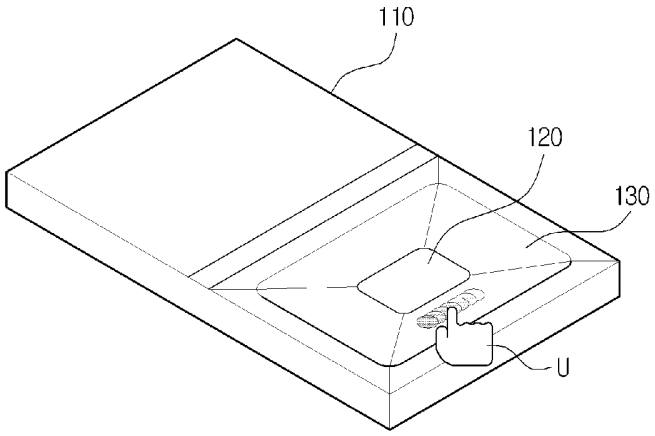
[Fig. 18]


Zoom
Power
Mode
Shutter
LCD
Menu
ok

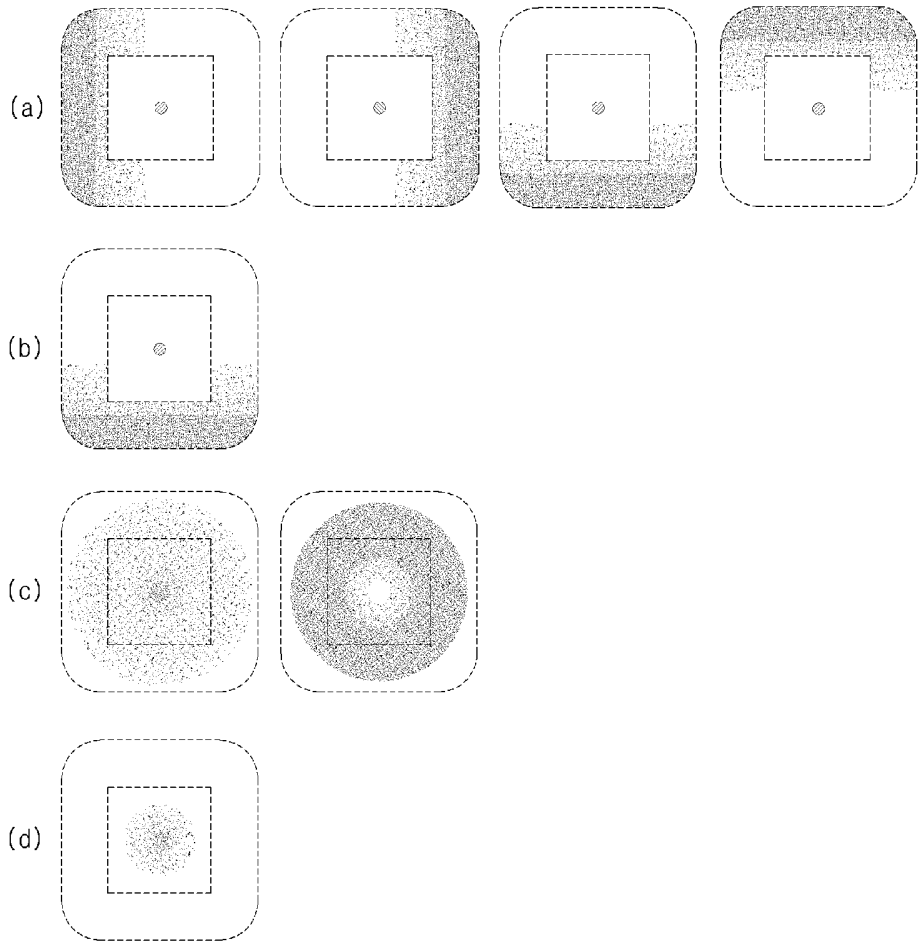
[Fig. 19]



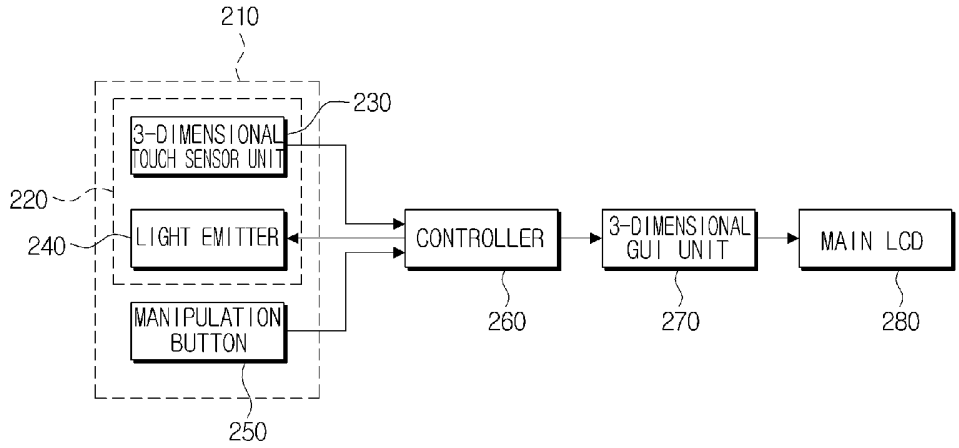
[Fig. 20]



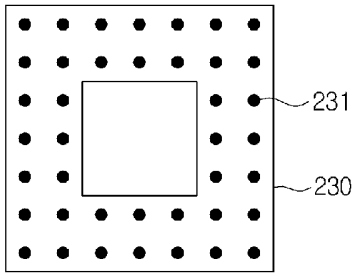
[Fig. 21]



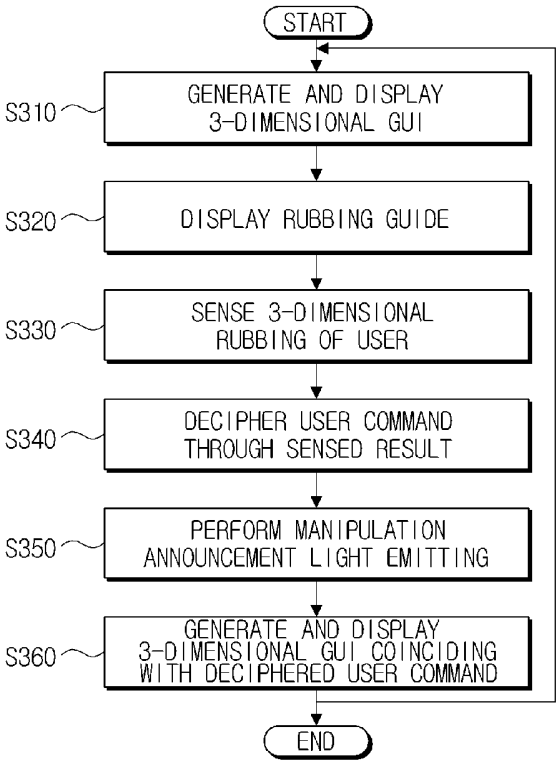
[Fig. 22]



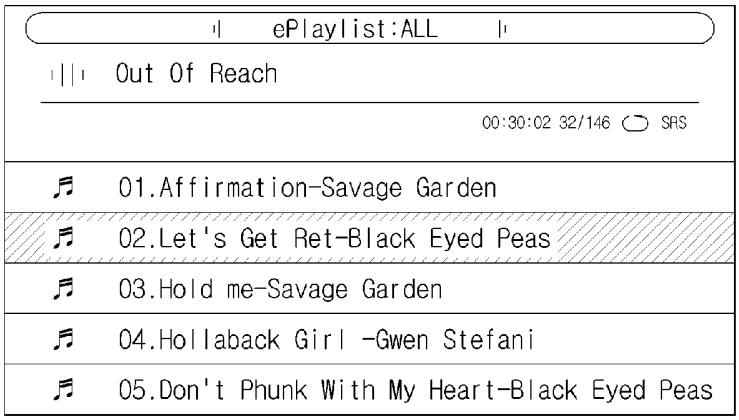
[Fig. 23]



[Fig. 24]

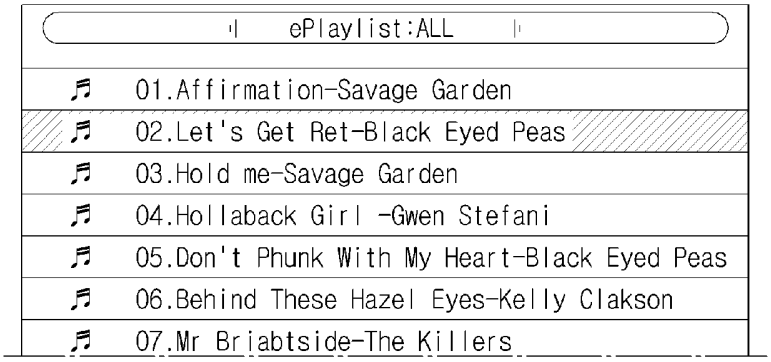

START
S310
GENERATE AND DISPLAY 3-DIMENSIONAL GUI
S320
DISPLAY RUBBING GUIDE
S330
SENSE 3-DIMENSIONAL RUBBING OF USER
S340
DECIPHER USER COMMAND THROUGH SENSED RESULT
S350
PERFORM MANIPULATION ANNOUNCEMENT LIGHT EMITTING
S360
GENERATE AND DISPLAY 3-DIMENSIONAL GUI COINCIDING WITH DECIPHERED USER COMMAND
END

[Fig. 25]

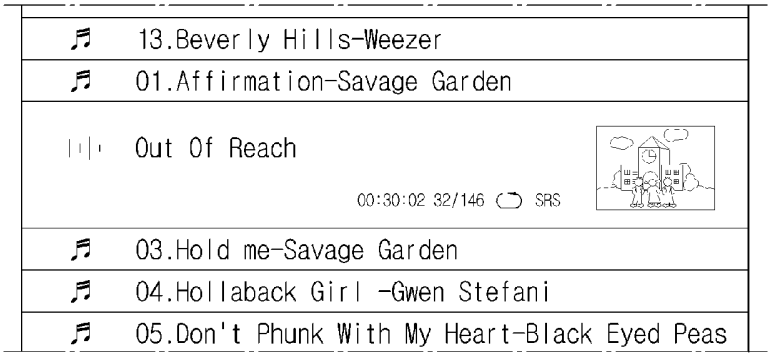

ePlaylist:ALL
Out Of Reach
00:30:02 32/146 SRS
01.Affirmation-Savage Garden
02.Let's Get Ret-Black Eyed Peas
03.Hold me-Savage Garden
04.Hollaback Girl -Gwen Stefani
05.Don't Phunk With My Heart-Black Eyed Peas

[Fig. 26]

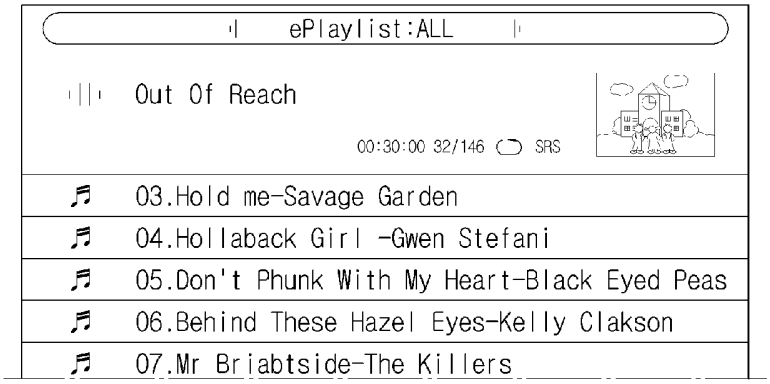
(a)


ePlaylist:ALL
01.Affirmation-Savage Garden
02.Let's Get Ret-Black Eyed Peas
03.Hold me-Savage Garden
04.Hollaback Girl -Gwen Stefani
05.Don't Phunk With My Heart-Black Eyed Peas
06.Behind These Hazel Eyes-Kelly Clakson
07.Mr Briabtside-The Killers

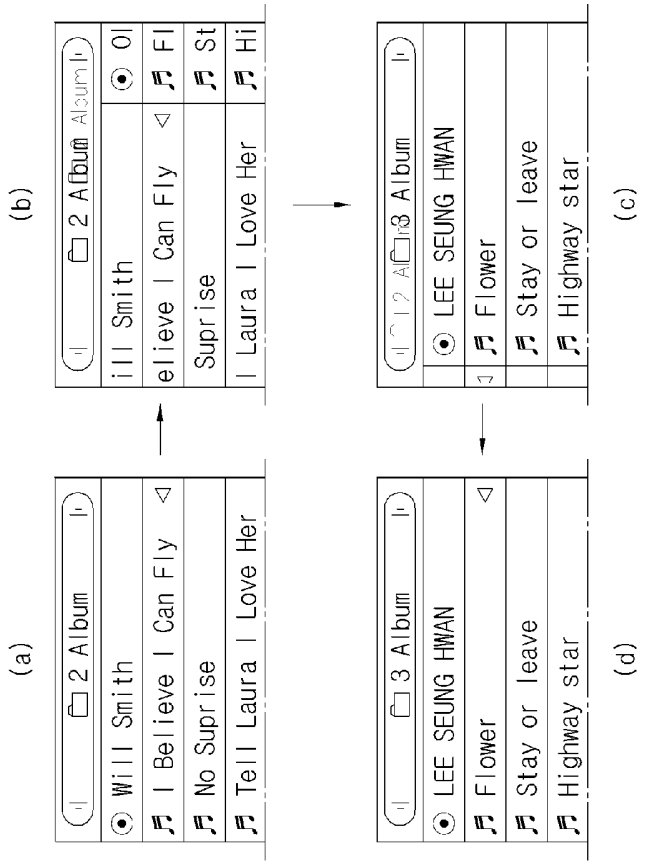
(b)


13.Beverly Hills-Weezer
01.Affirmation-Savage Garden
Out Of Reach
00:30:02 32/146 SRS
03.Hold me-Savage Garden
04.Hollaback Girl -Gwen Stefani
05.Don't Phunk With My Heart-Black Eyed Peas

(c)

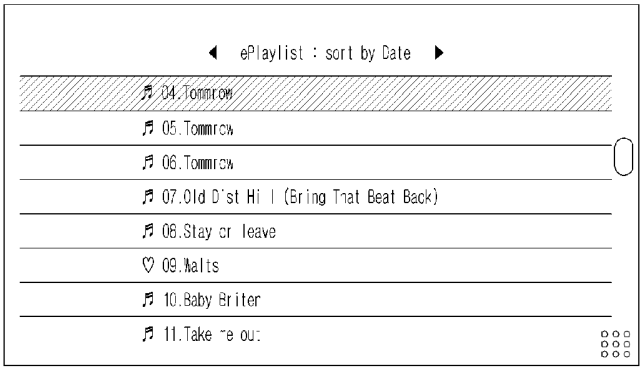

ePlaylist:ALL
Out Of Reach
00:30:00 32/146 SRS
03.Hold me-Savage Garden
04.Hollaback Girl -Gwen Stefani
05.Don't Phunk With My Heart-Black Eyed Peas
06.Behind These Hazel Eyes-Kelly Clakson
07.Mr Briabtside-The Killers

[Fig. 27]

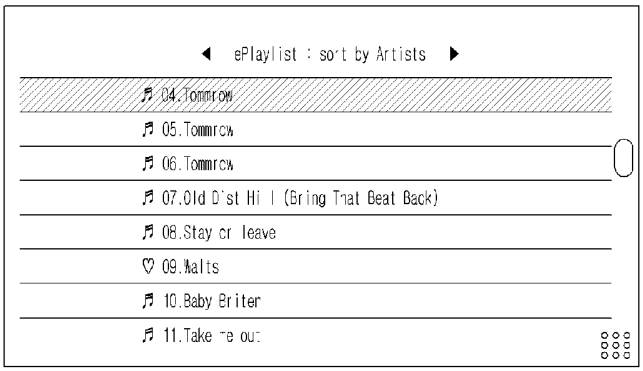

(a)
2 Album
Will Smith
I Believe I Can Fly
No Suprise
Tell Laura I Love Her
(b)
(c)
LEE SEUNG HWAN
Flower
Stay or leave
Highway star
(d)
3 Album

[Fig. 28]

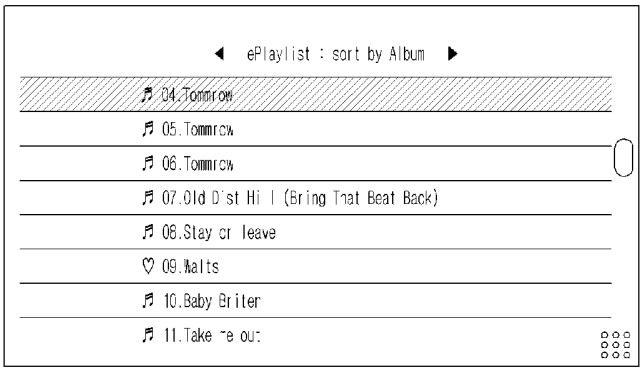
(a)


ePlaylist : sort by Date
04.Tommrow
05.Tommrow
06.Tommrow
07.Old D'st Hi l (Bring That Beat Back)
08.Stay or leave
09.Malts
10.Baby Briter
11.Take me out

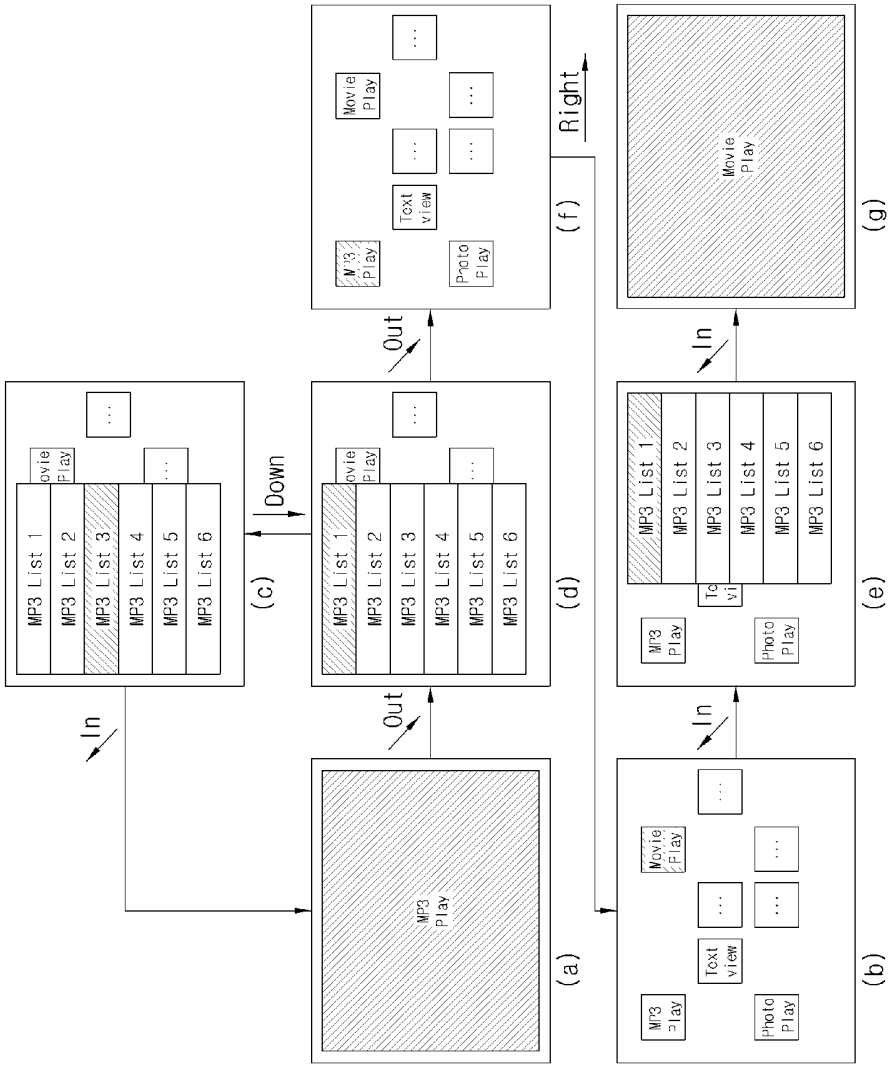
(b)


ePlaylist : sort by Artists
04.Tommrow
05.Tommrow
06.Tommrow
07.Old D'st Hi l (Bring That Beat Back)
08.Stay or leave
09.Malts
10.Baby Briter
11.Take me out

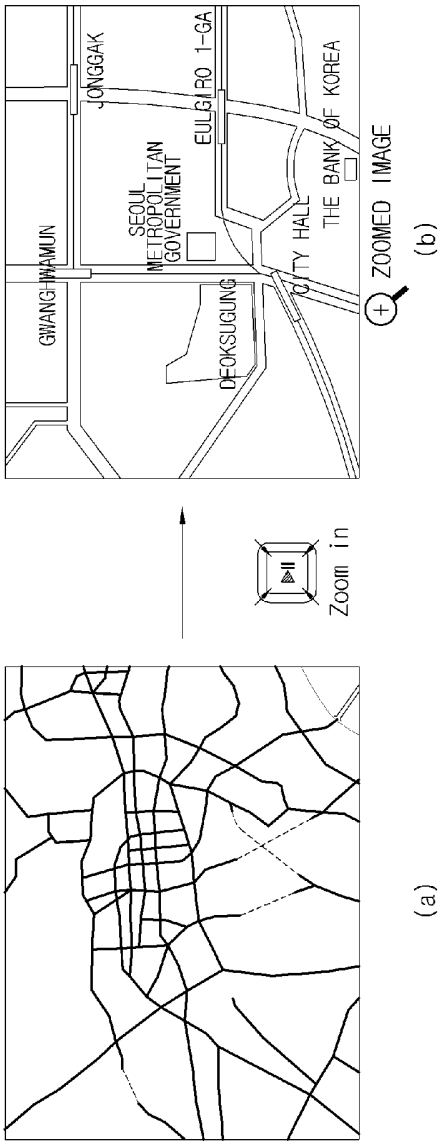
(c)


ePlaylist : sort by Album
04.Tommrow
05.Tommrow
06.Tommrow
07.Old D'st Hi l (Bring That Beat Back)
08.Stay or leave
09.Malts
10.Baby Briter
11.Take me out

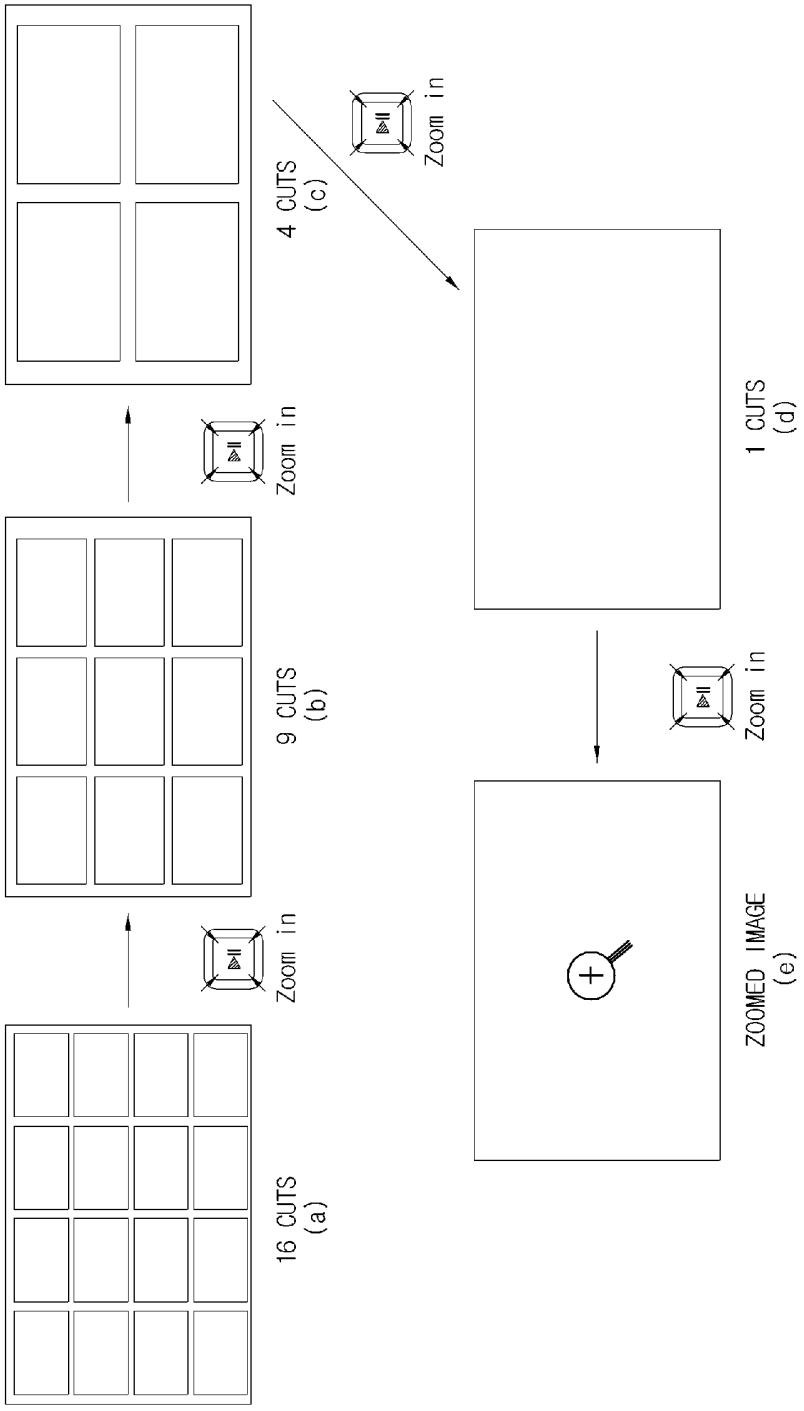
[Fig. 29]


MP3 Play
Movie Play
Text view
Photo Play
MP3 List 1
MP3 List 2
MP3 List 3
MP3 List 4
MP3 List 5
MP3 List 6
In
Out
Down
Right
(a)
(b)
(c)
(d)
(e)
(f)
(g)

[Fig. 30]


JONGGAK
EULGIRO 1-GA
SEOUL METROPOLITAN GOVERNMENT
THE BANK OF KOREA
CITY HALL
GWANGHWAMUN
DEOKSUGUNG
ZOOMED IMAGE
(b)
Zoom in
(a)

[Fig. 31]


16 CUTS
(a)
Zoom in
9 CUTS
(b)
Zoom in
4 CUTS
(c)
Zoom in
1 CUTS
(d)
Zoom in
ZOOMED IMAGE
(e)

[Fig. 32]

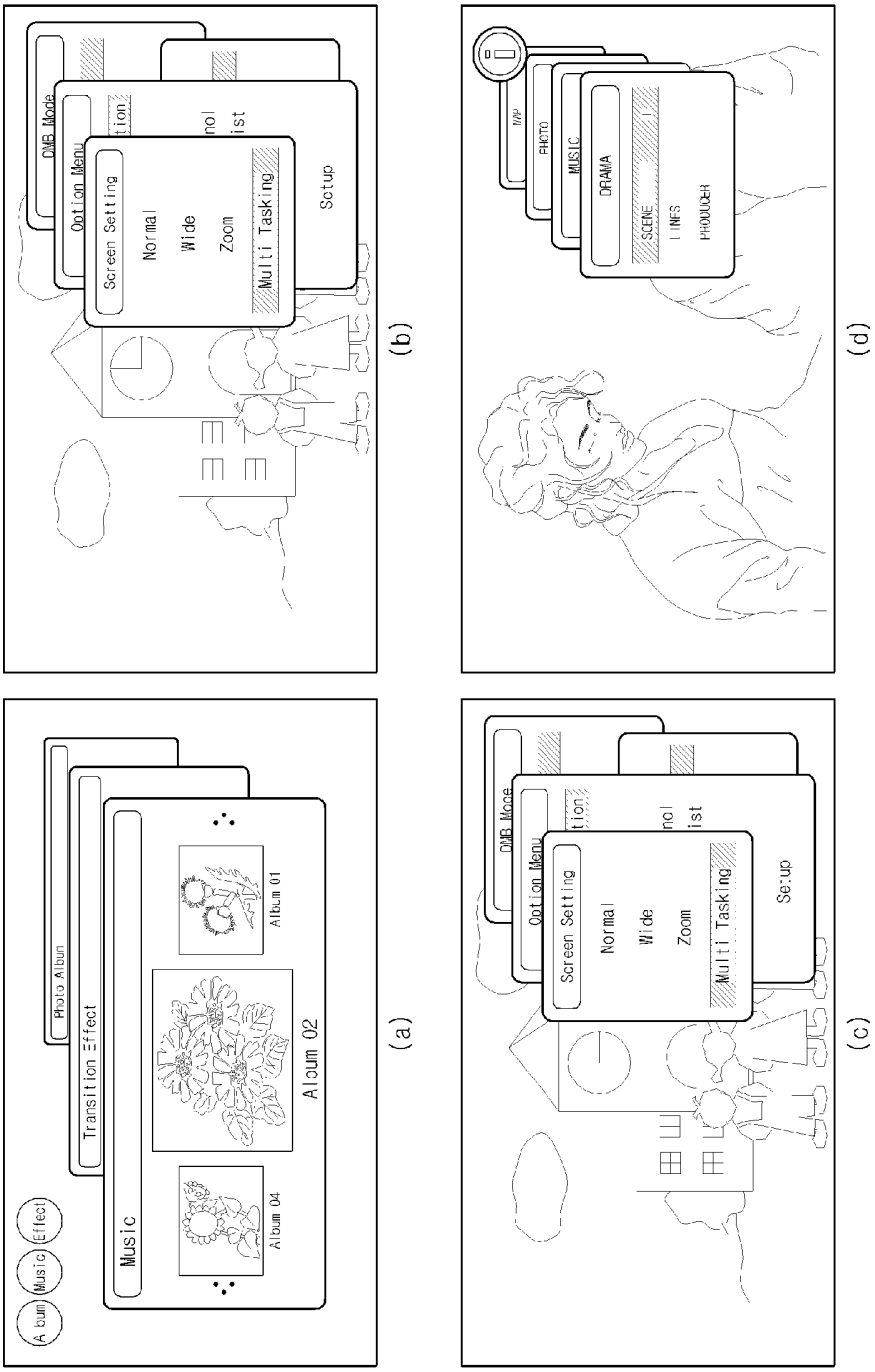
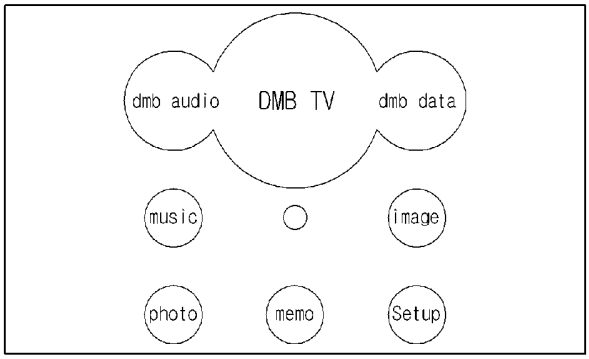


Photo Album
Transition Effect
Music
Album 01
Album 02
Album 04
Album
Music
Effect
(a)
DMB Mode
Option Menu
Screen Setting
Normal
Wide
Zoom
Multi Tasking
Setup
(b)
(c)
MAP
PHOTO
MUSIC
DRAMA
SCENE
LINES
PRODUCER
(d)

[Fig. 33]

(a)


dmb audio
DMB TV
dmb data
music
image
photo
memo
Setup

(b)

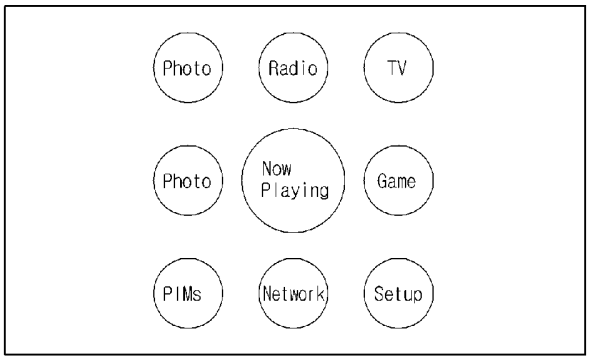
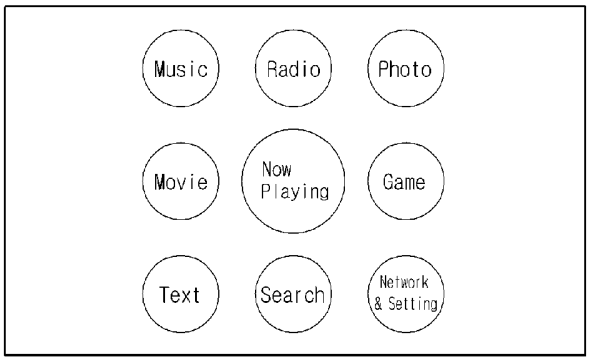


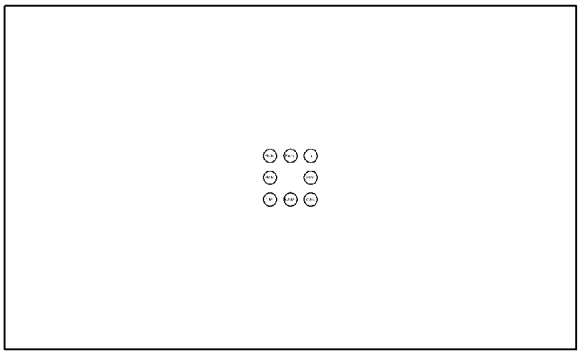
Photo
Radio
TV
Photo
Now Playing
Game
PIMs
Network
Setup

(c)


Music
Radio
Photo
Movie
Now Playing
Game
Text
Search
Network & Setting

[Fig. 34]

(a)



(b)

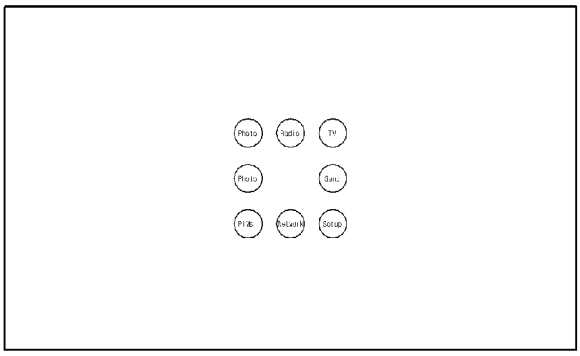


Photo
Radio
TV
Photo
Game
PIMs
Network
Setup

(c)

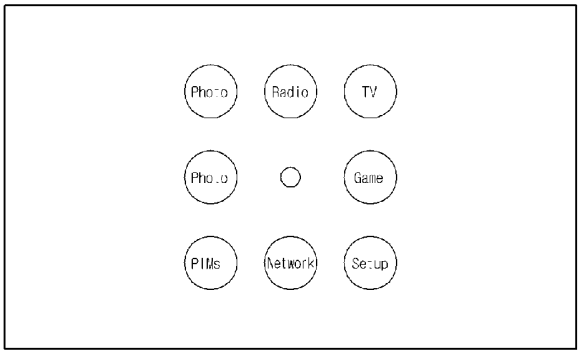
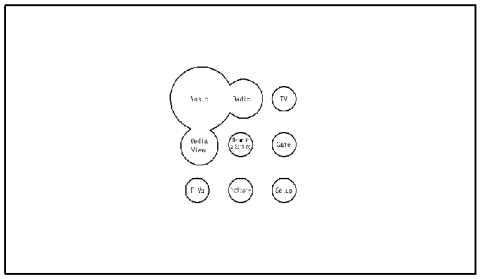


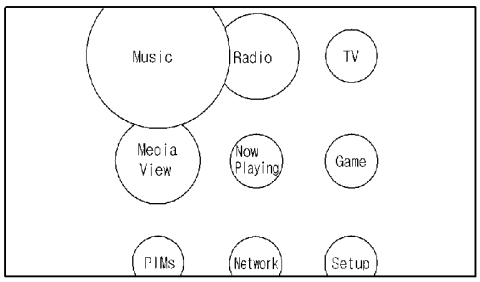
Photo
Radio
TV
Photo
Game
PIMs
Network
Setup

[Fig. 35]

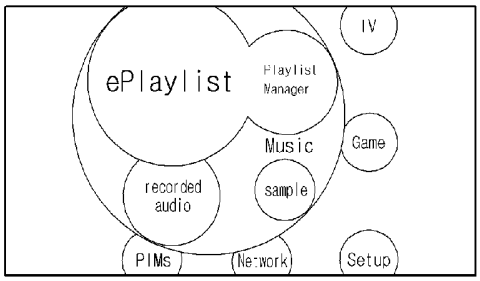
(a)



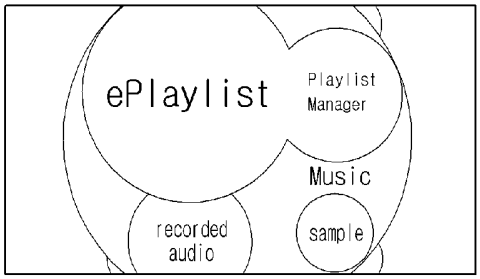
(b)


Music
Radio
TV
Media View
Now Playing
Game
PIMs
Network
Setup

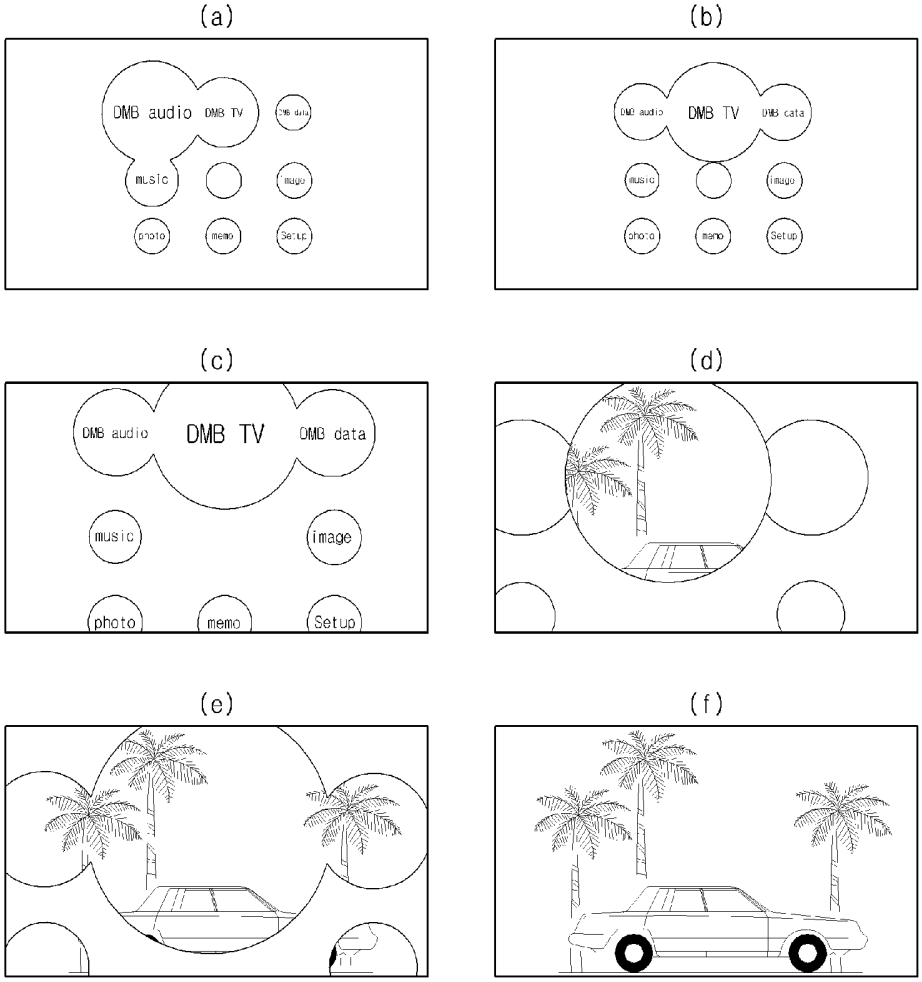
(c)


TV
ePlaylist
Playlist Manager
Music
Game
recorded audio
sample
PIMs
Network
Setup

(d)

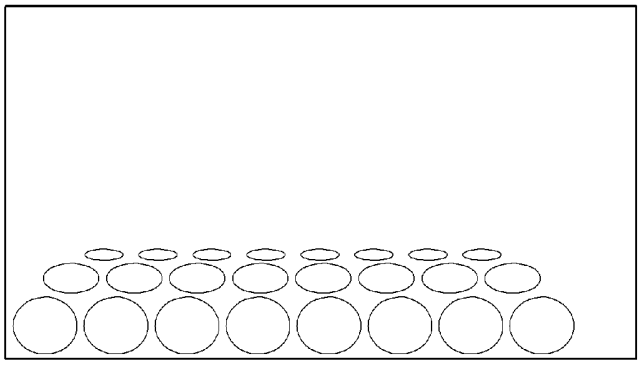

ePlaylist
Playlist Manager
Music
recorded audio
sample

[Fig. 36]

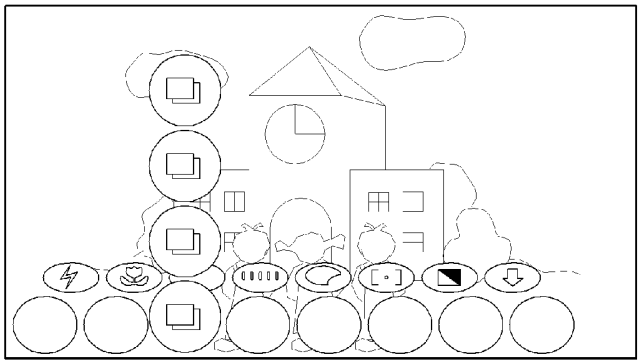

(a)
DMB audio
DMB TV
music
photo
memo
(b)
DMB audio
DMB TV
music
photo
memo
Setup
(c)
DMB audio
DMB TV
DMB data
music
image
photo
memo
Setup
(d)
(e)
(f)

[Fig. 37]

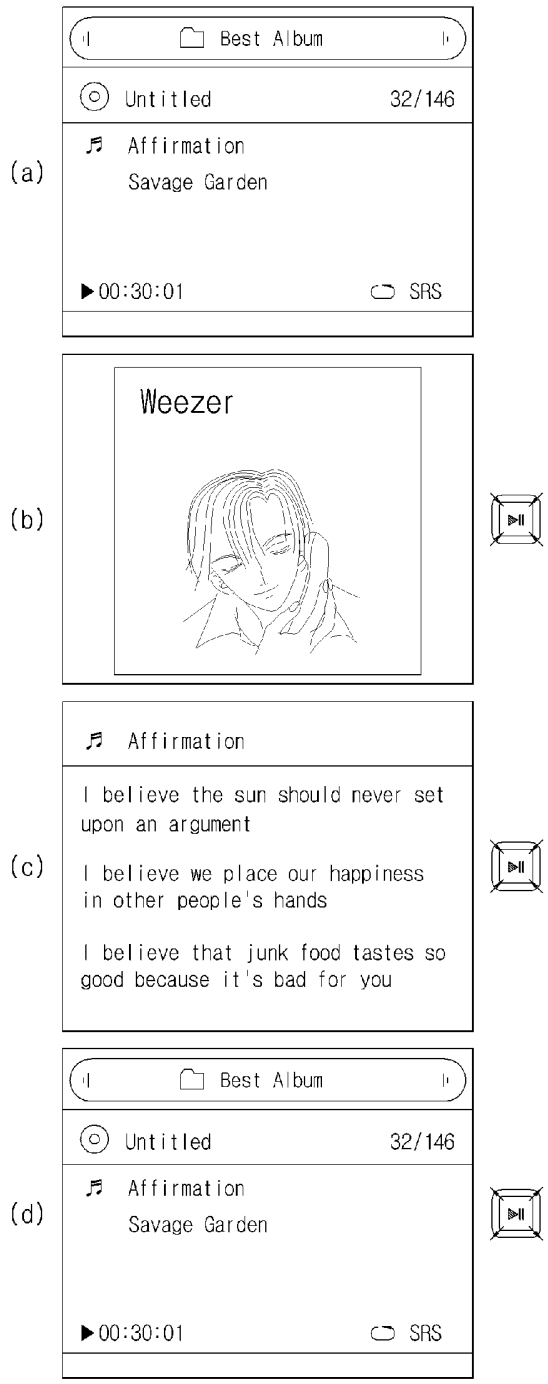
(a)



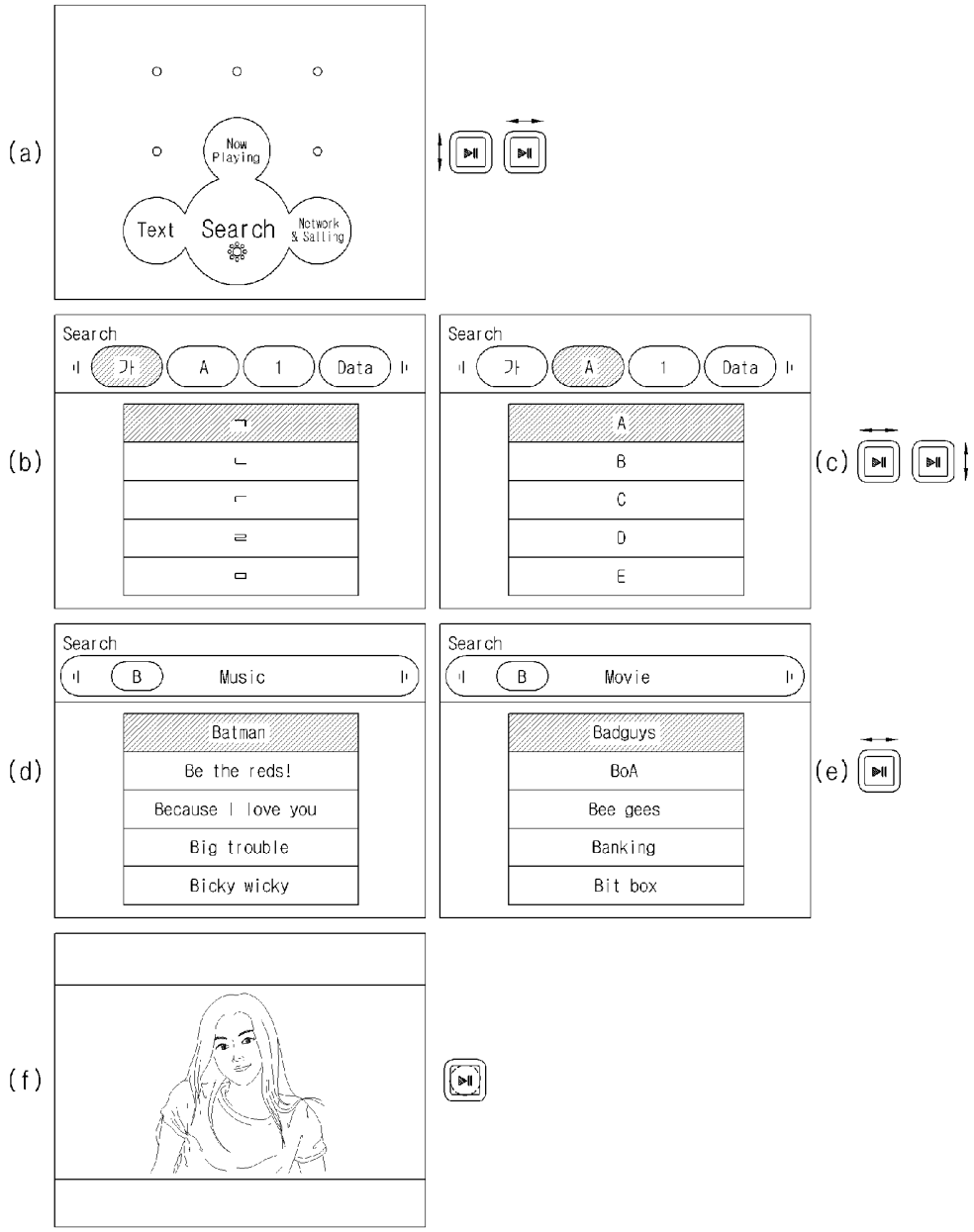
(b)



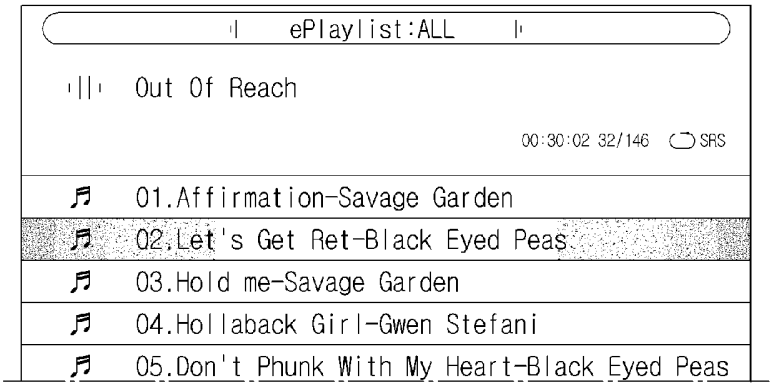
[Fig. 38]


(a)
Best Album
Untitled 32/146
Affirmation
Savage Garden
▶00:30:01 SRS
(b)
Weezer
(c)
Affirmation
I believe the sun should never set upon an argument
I believe we place our happiness in other people's hands
I believe that junk food tastes so good because it's bad for you
(d)
Best Album
Untitled 32/146
Affirmation
Savage Garden
▶00:30:01 SRS

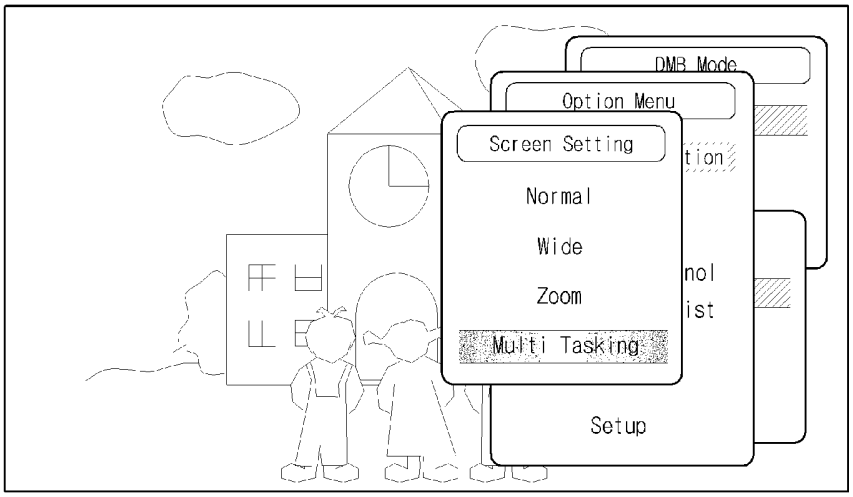
[Fig. 39]


(a)
Now Playing
Text
Search
Network & Sailing
(b)
Search
가
A
1
Data
ㄱ
ㄴ
ㄷ
ㄹ
ㅁ
(c)
Search
가
A
1
Data
A
B
C
D
E
(d)
Search
B
Music
Batman
Be the reds!
Because I love you
Big trouble
Bicky wicky
(e)
Search
B
Movie
Badguys
BoA
Bee gees
Banking
Bit box
(f)

[Fig. 40]

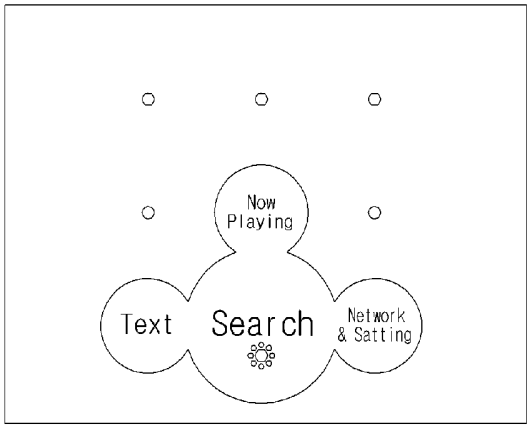


(a)

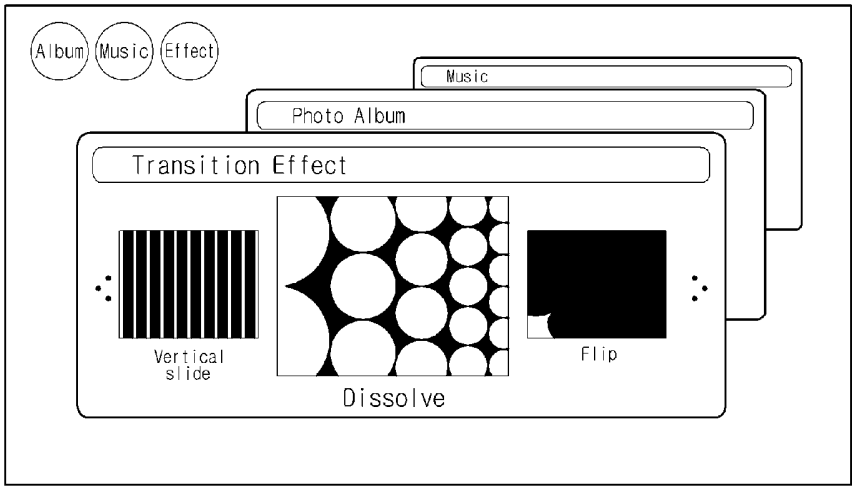


(b)

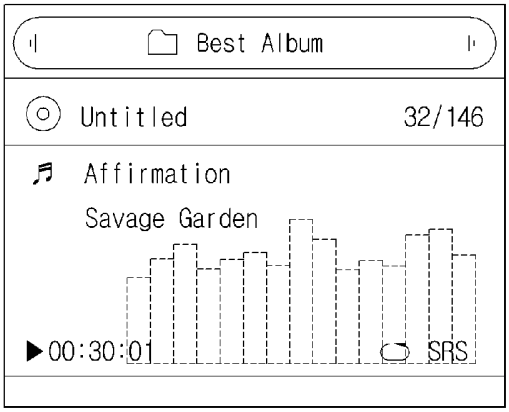
[Fig. 41]



[Fig. 42]


Album
Music
Effect
Music
Photo Album
Transition Effect
Vertical slide
Flip
Dissolve

[Fig. 43]


Best Album
Untitled
32/146
Affirmation
Savage Garden
▶00:30:01
SRS

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2006/002057

A. CLASSIFICATION OF SUBJECT MATTER

G06F 3/03(2006.01)i, G06F 3/033(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 8 G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Patents and applications for inventions since 1975
Korean Utility models and applictions for Utility models since 1975
Japanese Utility models and application for Utility models since 1975

Electronic data base consulted during the intertnational search (name of data base and, where practicable, search terms used)

e-KIPASS : "touch pad", "3D", "GUI"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	JP 10-149254 A (ALPS ELECTRIC CO., LTD.) 2 JUNE 1998	
X	see the whole documents	39, 40, 41
A	aee the abstract, [0026]-[0027], figures 3-5	1-38
	US 2003/0001898 A1 (MARCUS BERNHARDSON) 2 JANUARY 2003	
X	see the whole documents	39, 40, 41
A	see the abstract, figures 3-7	1-38
	US 6157383 A (MICROSOFT CORPORATION) 5 DECEMBER 2000	
X	see the whole documents	39, 40, 41
A	see the abstract, figures 2-4, cliams 1-4	1-38
	US 2001/0035880 A1 (IGOR MUSATOV et. al.) 1 NOVEMBER 2001	
X	see the whole documents	39, 40, 41
A	see the abstract, figure 1	1-38

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
17 OCTOBER 2006 (17.10.2006)	**18 OCTOBER 2006 (18.10.2006)**

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KIM, Dong Yup

Telephone No. 82-42-481-5749

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/KR2006/002057

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		WO 2003003180 A3	27.11.2003
US 6157383 A	05.12.2000	NONE	
US 2001/0035880 A1	01.11.2001	NONE	