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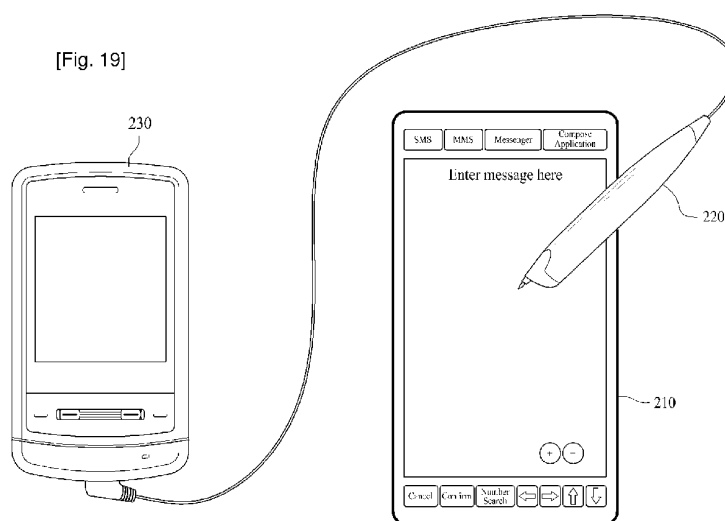
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(54) Title: METHOD AND MOBILE COMMUNICATION TERMINAL FOR WRITING AND TRANSMITTING MESSAGE BY USING DIGITAL PAPER AND DIGITAL PEN

[Fig. 19]



(57) Abstract: Disclosed is a system and a mobile communication terminal for composing and transmitting messages by using digital paper and a digital pen. The system for composing and transmitting an SMS message and an MMS message by using digital paper and a digital pen includes message composition and transmission digital paper, a digital pen, and a mobile communication terminal. Advantageously, SMS or MMS messages are composed and transmitted by using a mobile communication terminal, digital paper having a position display pattern printed thereon, and a digital pen for recognizing the digital paper. Therefore, even users unaccustomed to operating the keypad of their mobile communication terminals can easily enter SMS or MMS messages. In addition, even people having a language the characters of which are not easily entered with the keypad of mobile communication terminals (e.g. Japanese, Chinese) can easily compose SMS or MMS messages.

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Description

METHOD AND MOBILE COMMUNICATION TERMINAL FOR WRITING AND TRANSMITTING MESSAGE BY USING DIGITAL PAPER AND DIGITAL PEN

Technical Field

- [1] The present invention relates to a system and a mobile communication terminal for composing and transmitting messages by using digital paper and a digital pen. More particularly, the present invention relates to a system and a mobile communication terminal for composing and transmitting SMS or MMS messages by using digital paper, which has a position display pattern printed thereon, and a digital pen for recognizing the digital paper, instead of using the keypad of the mobile communication terminal.

Background Art

- [2] As generally known in the art, various wireless communication services are being provided via wireless networks as a result of rapid development of technologies related to computers, electronics, and communication. The most basic type of wireless communication service is wireless voice communication service, which enables users of mobile communication terminals to conduct voice communication wirelessly regardless of time and space. Wireless communication services also include an SMS (Short Messaging Service) and an MMS (Multimedia Messaging Service), which supplement the voice communication service.
- [3] More particularly, the SMS enables users of mobile communication terminals to exchange short messages (containing about 40 characters) without additional equipment. The MMS enables users to send multimedia messages, which incorporate various media (e.g. pictures, moving pictures, characters, music) from a mobile communication terminal to another mobile communication terminal.
- [4] When a mobile communication terminal user wants to input an SMS message into his/her mobile communication terminal and send it to another mobile communication terminal, he/she must operate the keypad on the terminal. This means that, if the user is not accustomed to operating the keypad, he/she must spend considerable time inputting an SMS message into his/her terminal.
- [5] The composition and transmission of MMS messages also require the operation of the keypad of the mobile communication terminal. Therefore, users unaccustomed to operating the keypad must spend considerable time composing and transmitting MMS messages as in the case of SMS messages.
- [6] In order to solve these problems, touch screen phones have appeared in the market,

which have a touch panel on the display module.

- [7] However, this approach cannot solve all problems because, if users of conventional mobile communication terminals are not accustomed to operating the keypad, they must spend additional money to replace their terminals with touch screen phones. Furthermore, as the touch screen of the touch screen phones is frequently exposed to the outside, it may be scratched and cause problems (e.g. degradation of the recognition ratio), not to mention the high repair fee for replacing the display module including the touch panel.

Disclosure of Invention

Technical Solution

- [8] Therefore, the present invention has been made in view of the above-mentioned problems, and the present invention provides a system and a mobile communication terminal for composing and transmitting SMS or MMS messages by using the mobile communication terminal, digital paper, which has a position display pattern printed thereon, and a digital pen for recognizing the digital paper, instead of using the keypad of the mobile communication terminal.
- [9] In accordance with an aspect of the present invention, there is provided a system for composing and transmitting an SMS message and an MMS message by using digital paper and a digital pen, the system including message composition and transmission digital paper having a position display pattern displayed thereon, the position display pattern including a number of unit cell patterns, regions of the message composition and transmission digital paper being distinguished by a pattern ID or X and Y coordinate values assigned to the unit cell patterns, the message composition and transmission digital paper including a number of function button regions and a message composition region for composing and transmitting the SMS message or the MMS message; a digital pen for recognizing a second coordinate value, the second coordinate value being X and Y coordinate values contained in the message composition region on the message composition and transmission digital paper, the digital pen recognizing a first coordinate value, the first coordinate value being X and Y coordinate values contained in one of the function button regions, or a button ID, the button ID being a pattern ID corresponding to one of the function button regions; and a mobile communication terminal for storing a message composition and transmission application for composing the SMS message or the MMS message by using the message composition and transmission digital paper and the digital pen, the mobile communication terminal receiving the second coordinate value from the digital pen and converting the second coordinate value into text data contained in the SMS message or creating an image file or a multimedia file contained in the MMS message

from the second coordinate value, the mobile communication terminal receiving a first coordinate value or button ID corresponding to one of the function button regions from the digital pen and performing control for composing and transmitting the SMS message or the MMS message.

- [10] In accordance with an aspect of the present invention, there is provided a mobile communication terminal for composing and transmitting an SMS message and an MMS message by using message composition and transmission digital paper and a digital pen, the message composition and transmission digital paper including a message composition region and a number of function button regions, the digital pen recognizing a second coordinate value, the second coordinate value being X and Y coordinate values contained in the message composition region, the digital pen recognizing a first coordinate value or a button ID, the first coordinate value being X and Y coordinate values contained in one of the function button regions, the button ID being a pattern ID assigned to one of the function button regions, the mobile communication terminal including a memory unit for storing a message composition and transmission application for composing the SMS message or the MMS message by using the message composition and transmission digital paper and the digital pen, the memory unit storing the second coordinate value received from the digital pen and storing a picture drawn by a user of the mobile communication terminal with the message composition and transmission digital paper and the digital pen as an image file or as a multimedia file, the multimedia file including time information regarding when the second coordinate value has been received, external voices, and the second coordinate value; a text conversion module for converting a second coordinate value into text data, the second coordinate value corresponding to a character written on the message composition and transmission digital paper with the digital pen by the user; a display unit for displaying the text data and a process of drawing the picture; a file creation module for creating the image file or the multimedia file; a viewer module for processing the second coordinate value in the order of the time information from the multimedia file on a time series basis so that the display unit reproduces the processing of drawing the picture; a digital pen interface module for receiving at least one of the first coordinate value, the second coordinate value, and the button ID from the digital pen and transmitting the received one to a different component of the mobile communication terminal; and a control unit for executing the message composition and transmission application when the digital pen is connected to the mobile communication terminal and controlling a process of composing and transmitting the SMS message or the MMS message when the first coordinate value or the button ID is received from the digital pen interface module, the control unit performing control for converting the second coordinate value into the text data or performing control for

creating the image file or the multimedia file from the second coordinate value when the second coordinate value is received from the digital pen interface module.

Brief Description of the Drawings

- [11] The foregoing and other objects, features and advantages of the present invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings in which:
- [12] FIG. 1 illustrates a part of digital paper having a position display pattern on its surface;
- [13] FIGs. 2-5 show an exemplary method for assigning the X coordinate of a position display pattern;
- [14] FIGs. 6-9 show an exemplary method for assigning the Y coordinate of a position display pattern;
- [15] FIG. 10 shows another exemplary product having a position display pattern on its surface as a result of combining the patterns shown in FIGs. 4 and 8;
- [16] FIG. 11 shows exemplary construction of a direction flag having no directive feature;
- [17] FIG. 12 shows the number of cases of direction flag cell distribution that can appear on a coordinator window;
- [18] FIG. 13 shows exemplary coding of binary data displayed at first cells;
- [19] FIG. 14 shows X and Y coordinate values corresponding to meaning values of respective line segments shown in FIG. 13;
- [20] FIG. 15 shows exemplary codes of binary data displayed at second cells;
- [21] FIG. 16 shows other exemplary codes of binary data displayed at second cells;
- [22] FIG. 17 shows still other exemplary codes of binary data displayed at second cells;
- [23] FIG. 18 shows exemplary construction of an object display pattern;
- [24] FIG. 19 briefly shows a system for composing and transmitting messages by using digital paper and a digital pen according to an exemplary embodiment of the present invention;
- [25] FIG. 20 shows exemplary message composition and transmission digital paper according to an exemplary embodiment of the present invention;
- [26] FIG. 21 is a block diagram briefly showing the internal structure of a mobile communication terminal adapted to compose and transmit messages by using digital paper and a digital pen according to an exemplary embodiment of the present invention;
- [27] FIG. 22 shows an exemplary mobile communication terminal screen displaying a process of composing and transmitting a message by using digital paper and a digital pen according to an exemplary embodiment of the present invention;
- [28] FIG. 23 shows an exemplary coordinate range table according to an exemplary embodiment of the present invention; and

- [29] FIG. 24 shows an exemplary ID table according to an exemplary embodiment of the present invention.

Mode for the Invention

- [30] Hereinafter, exemplary embodiments of the present invention will be described with reference to the accompanying drawings. In the following description and drawings, the same reference numerals are used to designate the same or similar components, and so repetition of the description on the same or similar components will be omitted. Furthermore, a detailed description of known functions and configurations incorporated herein is omitted to avoid making the subject matter of the present invention unclear.
- [31] Prior to describing a system and a method for composing and transmitting messages by using digital paper and a digital pen according to an exemplary embodiment of the present invention, as well as a mobile communication terminal for using the same, the detailed construction of digital paper used by the present invention will now be described with reference to FIGs. 1-18.
- [32] FIG. 1 illustrates a part of digital paper 100 having a position display pattern on its surface.
- [33] Referring to FIG. 1, a position display pattern formed on the surface of digital paper 100 includes first cells 101 displaying encoded binary data, second cells 102 displaying encoded data in a manner distinguished from the first cells 101 or having no data, and a unit cell pattern 110 consisting of at least a predetermined number of first and second cells 101 and 102.
- [34] As shown in FIG. 1, each first cell 101 displays binary data information x and y for assigning the X and Y coordinate values of the unit cell pattern 110, e.g. (0,0), (0,1), (1,0), or (1,1).
- [35] Although it has been assumed in the above description that the data encoded and displayed at respective first and second cells 101 and 102 is binary data, the data is not limited to binary data, and may be based on a numeral system having a different radix depending on the number of code types. For example, besides binary data (x=0 or 1, y=0 or 1), the data may be based on a numeral system having a radix of 3 (x=0, 1, or 2, y=0, 1, or 2) or a radix of 4 (x=0, 1, 2, or 3, y=0, 1, 2, or 3).
- [36] According to the embodiment shown in FIG. 1, a unit cell pattern 110 refers to a set of cells 101 and 102 of NxM (4x4) size, which can be read as a whole by the sensing means, i.e. digital pen (described later), and recognized separately. The unit cell pattern 110 is also called a window. Such a 4x4 unit cell pattern 110 consists of thirteen first cells 101 and three second cells 102. Although it has been assumed in the description of the present embodiment that the unit cell pattern 110 has the size of 4x4,

the size is not limited to that. Particularly, N and M may be any natural numbers. In addition, although it has also been assumed that N and M are the same, they may be different. In other words, N and M are natural numbers, and $N=M$ or $N \neq M$.

- [37] Referring to FIG. 1, the combination of binary data corresponding to thirteen first cells 101 indicates the coordinate value of the corresponding unit cell pattern (also referred to as a window value). In addition, three second cells 102 are placed in a predetermined position (i.e. right lower corner) within the unit cell pattern 110 so that the second cells 102 are joined by line segments in a predetermined shape (i.e. '┘'). Such a set of three second cells 102 placed in predetermined position and shape within the unit cell pattern 110 is referred to as a direction flag 103. The position of the direction flag 103 is determined so that the unit cell pattern 110 is distinguished from other adjacent unit cell patterns, and the shape is determined to identify the direction of the digital paper 100, i.e. the degree of rotation of the digital paper 100, as will be described later in more detail. Although it has been assumed in the description of the present embodiment that the direction flag 103 has the shape of '┘', the shape is not limited to that, and the direction flag 103 may have various shapes (e.g. '┐', '└') as long as it indicates the condition of rotation of the digital paper 100.
- [38] An exemplary method for assigning the X and Y coordinate values of a unit cell pattern will now be described in more detail with reference to FIGs. 2-9.
- [39] Method for assigning X coordinate value of unit cell pattern in position display pattern
- [40] FIG. 2 shows exemplary unit cell patterns 110 in a row in a position display pattern. Although respective cells according to the present invention contain both x and y, i.e. data information regarding both X and Y coordinates of the unit cell patterns 110, as shown in FIG. 1, FIG. 2 separately shows data regarding the X coordinate for convenience of illustration.
- [41] Referring to FIG. 2, the X coordinate value (or binary window value) of the unit cell patterns 110 gradually increases by 1 along the arrows (rightward):
0000000000000→0000000000001→0000000000010→0000000000011. The X coordinate value (or binary window value) corresponds to a combination of binary data, which corresponds to thirteen first cells 101 within each unit cell pattern 110, in the order from 1 to 13 shown in FIG. 3. Such a gradual increase of the X coordinate value (or binary window value) of the unit cell patterns 110 by one in the rightward direction guarantees that, even if the coordinate window does not accurately coincide with the actual window, the actual window value can be restored based on the regularity. As used herein, the coordinate window refers to a set of NxM cells actually read by the digital pen (described later). However, it is to be noted that, during actual application, images observed by the digital pen may be larger than the coordinate

window.

- [42] The unit cell patterns 110 in a row shown in FIG. 2 are repeatedly arranged in the Y direction (vertical direction) so that they span over a plurality of rows, as shown in FIG. 4.
- [43] FIG. 5 shows an embodiment alternative to that shown in FIG. 2. Referring to FIG. 5, the X coordinate value (or binary window value) does not necessarily begin from 0, but an arbitrary value can be the starting value. The digital pen for reading the value is informed of this fact. When the X coordinate value (or binary window data) relative to the starting point is to be obtained, the arbitrary value is subtracted from the currently read X coordinate value (or binary window value). If the maximum value that can be displayed by all X coordinate values (or binary window values) is reached, the next X coordinate value (or binary window value) can be set to be 0.
- [44] Method for assigning Y coordinate value of unit cell pattern in position display pattern
- [45] FIG. 6 shows exemplary unit cell patterns 110 in a column in a position display pattern. Although respective cells contain both x and y, i.e. data information regarding both X and Y coordinates of the unit cell patterns 110, as shown in FIG. 1, FIG. 6 separately shows data regarding the Y coordinate for convenience of illustration.
- [46] Referring to FIG. 6, the Y coordinate value (or binary window value) of the unit cell patterns 110 gradually increases by 1 along the arrows (downward: 0000000000000→0000000000001→0000000000010→0000000000011. The Y coordinate value (or binary window value) corresponds to a combination of binary data, which corresponds to thirteen first cells 101 within each unit cell pattern 110, in the order from 1 to 13 shown in FIG. 7. Such a gradual increase of the Y coordinate value (or binary window value) of the unit cell patterns 110 by one in the downward direction guarantees that, even if the coordinate window does not accurately coincide with the actual window, the actual window value can be restored based on the regularity.
- [47] Although FIG. 3 shows the order of reading data contained in respective cells, particularly the X coordinates, while FIG. 7 shows the order of assigning and reading data contained in respective cells, particularly the Y coordinates, the order is not limited to that. For example, it is possible to commonly apply the order shown in FIG. 3 or 7 to both X and Y coordinates. Alternatively, the order shown in FIG. 3 is applied to Y coordinates, and the order shown in FIG. 7 is applied to X coordinates. Although not shown in the drawings, the positional number of binary data of each cell may increase along a spiral curve starting from the center of the same unit cell pattern (window).
- [48] The unit cell patterns 110 in a column shown in FIG. 6 are repeatedly arranged in the horizontal direction so that they span over a plurality of columns, as shown in FIG. 8.

- [49] FIG. 9 shows an embodiment alternative to that shown in FIG. 6. Referring to FIG. 9, the Y coordinate value (or binary window value) does not necessarily begin from 0, but an arbitrary value can be the starting value. The digital pen for reading the value is informed of this fact. When the Y coordinate value (or binary window value) relative to the starting point is to be obtained, the arbitrary value is subtracted from the currently read Y coordinate value (or binary window value). If the maximum value that can be displayed by all Y coordinate values (or binary window values) is reached, the next window value can be set to be 0.
- [50] As mentioned above, respective cells constituting a position display pattern are assigned x ($x=0$ or 1), i.e. data for assigning the X coordinate value of the unit cell pattern 110, in the manner shown in FIG. 4, and are assigned y ($y=0$ or 1), i.e. data for assigning the Y coordinate value of the unit cell pattern 110, in the manner shown in FIG. 8. Then, the X and Y coordinate values (shown in FIGs. 4 and 8, respectively) in the same cell position are combined to obtain a position display pattern according to the present invention, as shown in FIG. 10. The X and Y coordinate values are assigned with regard to each unit cell pattern 110.
- [51] A comparison between the position display patterns shown in FIGs. 1 and 10 reveals that the binary data values assigned to corresponding cells slightly differ. Such a difference results from the varying methods for assigning/combining binary data corresponding to second cells 102 within the unit cell pattern 110, as has been described with reference to FIGs. 3 and 7. Particularly, the position display pattern shown in FIG. 1 corresponds to an example of applying the order of assigning/combining binary data shown in FIG. 7 to both X and Y coordinates. The position display pattern shown in FIG. 10 corresponds to an example of applying the order of assigning/combining binary data shown in FIG. 3 to X coordinates and applying the order of assigning/combining binary data shown in FIG. 7 to Y coordinates. However, in either case of the position display patterns shown in FIG. 1 and 10, the coordinate value of corresponding unit cell patterns 110 is the same.
- [52] The direction flag 103 will be described in more detail with reference to FIG. 1.
- [53] Second cells 102 constituting a direction flag 103 must be arranged so that the direction flag itself has a directive feature. This requires at least three second cells 102. If a smaller number of second cells constitute a direction flag, it has at least two directive features no matter how the second cells 102 are arranged. However, if the direction flag 103 is not to be used for rotation sensing, but just for error correction, two or more cells may constitute the direction flag 103. Furthermore, if the direction flag 103 is simply used to distinguish between adjacent unit cell patterns, the direction flag may consist of only one second cell 102.
- [54] When the direction flag 103 is not used for error correction, but solely for rotation

- sensing, the second cells 102 contain no information. Alternatively, the second cells 102 contain information encoded and displayed in a manner distinguished from the first cells 101 to make it known that they constitute a direction flag 103.
- [55] When the direction flag 103 is solely used for rotation sensing, it is enough to use three second cells 102 containing no information, and the three cells are preferably joined by line segments in the shape of '┐'.
- [56] Some arrays of three cells have no directive feature because the three cells are arranged along a straight line (e.g. '-', '／', '\') as shown in FIG. 11, or because they have no center point, and are preferably excluded.
- [57] Assuming that '┐'-shaped direction flags 103 are used, there are three possible types of distribution of second cells 102, as shown in FIG. 12a, FIG. 12b, and FIG. 12c, which can be considered on a coordinate window to find the angle or rotation (90°, 180°, 270°) of digital paper having a position display pattern printed thereon. Particularly, all cells are positioned next to one another on a coordinate window in the case of FIG. 12a, cells are divided into two groups in the case of FIG. 12b, and cells are divided into three groups in the case of FIG. 12c.
- [58] In any case of FIG. 12a, FIG. 12b, and FIG. 12c, a cell C acting as the center point is located first, and it is recognized that other cells spaced relative to the cell C are positioned on the opposite side of the center point. The rotated direction flag is restored in this manner.
- [59] If the restored direction flag has the shape of '┐', it indicates clockwise 90° rotation. Similarly, '┌' indicates 180° rotation, and '└' indicates counterclockwise 90° rotation. For example, the direction flag shown in FIG. 12a has not rotated; restoration of the direction flag shown in FIG. 12b gives the shape of '┐' and indicates clockwise 90° rotation; and restoration of the direction flag shown in FIG. 12c gives the shape of '┌' and indicates 180° rotation. Such characteristics are used to obtain the angle of rotation of the digital paper 100, and make it possible to rotate a matrix of cells on the coordinate window accordingly.
- [60] The correction of errors of a position display pattern will now be described.
- [61] Error correction requires that 2-bit binary data be encoded and displayed at second cells 102 of the above-mentioned direction window 103 for distinguishing a window in a manner different from that of first cells 101. The 2-bit values become the error correcting codes for the X and Y coordinate values of a unit cell pattern 110, respectively. The error correcting code for the X coordinate value of a unit cell pattern 110 functions independent of that for the Y coordinate value of the unit cell pattern 110, but in the same manner. Therefore, the error correcting code for the X coordinate of the unit cell pattern 110 will solely be described for clarity.
- [62] A 4x4 window contains 13-bit information regarding the X coordinate value of a unit

cell pattern 110. However, 2-bit error correction requires at least 4 redundant bits. The RS (Reed-Solomon) code, which is the optimal algorithm for block codes, has the code type of $(2^k-1, 2^k-1-k)$. Therefore, (2^k-1-k) -bit data can be reconstructed into a (2^k-1) -bit codeword to correct errors of up to 2 bits. In this case, k refers to the code number for error correction. If $k=4$, 12 of 16 cells are used for data, and the remaining 4 cells are used as error correcting codes. To this end, the number of second cells 102 constituting the direction flag must be increased by 1 (i.e. a total of 4). Then, 11 of 12 cells are subjected to error correction, and the remaining one cell is subjected to error processing by the upper layer.

- [63] A method for correcting bits other than the upper one bit will now be described.
- [64] Second cells 102 constituting a direction flag 103 are reconstructed so that they amount to 4. Respective second cells 102 are encoded by using a type of representation different from that of first cells 101 so that the second cells 102 can contain 2-bit information. The method for calculating the X and Y coordinate values of a unit cell pattern 110 is the same as mentioned above even if the second cells 102 amount to 4. The only difference is that the number of first cells 101 within the window is reduced by one. Then, RS coding (one of error correcting codes) is used to calculate (encode) error correcting codes with regard to the entire information (or a part of it) existing in the data cells, and the error correcting codes are encoded and displayed at the direction flag 103. If the window is not read accurately, but obliquely, the error correcting codes cannot function properly. However, errors can be corrected by calculating the position according to the original position calculation method and conducting RS decoding. It is to be noted that the RS decoding is conducted with regard to estimated codewords, not the original RS-encoded codewords, and that the resulting restoration may not be accurate.
- [65] A method for limitedly correcting the errors of lower bits only will now be described.
- [66] Among binary data constituting a window, bits of higher positional numbers are less likely to change than bits of lower positional numbers. This means that, if error correction is solely conducted with regard to bits of lower positional numbers, which undergo frequent change, the number of second cells 102 constituting a direction flag 103 can be reduced. As a result, a larger number of different unit cell patterns (windows) can be realized. As mentioned above, the number of cells constituting a direction flag 103 decreases, and the possibility that three cells may not be seen simultaneously is lower than the possibility that four cells may not be seen simultaneously. Therefore, there are more chances that the error correcting function will be conducted as desired.
- [67] Those skilled in the art can easily understand that, although it has been assumed in the above description that RS coding is used to correct errors of a position display

pattern, the method is not limited to that type.

- [68] Binary data codes displayed at the first and second cells 101 and 102 will now be described.
- [69] FIG. 13 shows exemplary binary data codes displayed at the first cells 101. Particularly, assuming that virtual X and Y axes intersect with each other at the center point of each cell, FIG. 13a shows a first line segment lying on the X axis with the intersection point at its center, FIG. 13b shows a second line segment lying on the Y axis with the intersection point at its center, FIG. 13c shows a third line segment lying in the first and third quadrants with the intersection point at its center, and FIG. 13d shows a fourth line segment lying in the second and fourth quadrants with the intersection point at its center. Each binary data code is displayed by one of the first to fourth line segments. Those skilled in the art can understand that the scheme shown in FIG. 13 is only an example, and the binary data codes displayed at the first cells 101 may be based on a different scheme.
- [70] FIG. 14 shows a table enumerating data for assigning the X and Y coordinate values of a unit cell pattern 110 corresponding to the meaning value of respective line segments shown in FIG. 13. Particularly, the first line segment shown in FIG. 13a has a meaning value of 0, and the corresponding x and y are (1,1). The second line segment shown in FIG. 13b has a meaning value of 1, and the corresponding x and y are (0,1). The third line segment shown in FIG. 13c has a meaning value of 2, and the corresponding x and y are (1,0). The fourth line segment shown in FIG. 13d has a meaning value of 3, and the corresponding x and y are (0,0). Those skilled in the art can understand that the matching between the meaning values and x and y shown in FIG. 14 is only an example, and can be varied as desired. In this case, x refers to data entered into the first cells 101 to assign the X coordinate value to the unit cell pattern 110, and y refers to data entered into the first cells 101 to assign the Y coordinate value to the unit cell pattern 110.
- [71] FIG. 15 shows exemplary codes of binary data displayed at the second cells 102. Particularly, assuming that virtual X and Y axes intersect with each other at the center point of each cell, FIG. 15a shows a first line segment lying in the first and second quadrants in parallel with the X axis, FIG. 15b shows a second line segment lying in the third and fourth quadrants in parallel with the X axis, FIG. 15c shows a third line segment lying in the second and third quadrants in parallel with the Y axis, and FIG. 15d shows a fourth line segment lying in the first and fourth quadrants in parallel with the Y axis. Each binary data code is displayed by one of the first to fourth line segments.
- [72] Referring to FIG. 14, the first line segment shown in FIG. 15a has a meaning value of 0, and the corresponding data is (1,1). The second line segment shown in FIG. 15b

has a meaning value of 1, and the corresponding data is (0,1). The third line segment shown in FIG. 15c has a meaning value of 2, and the corresponding data is (1,0). The fourth line segment shown in FIG. 15d has a meaning value of 3, and the corresponding data is (0,0).

[73]

[74] *As another example of binary data codes displayed at the second cells 102, line segments may be displayed in the same manner as the first to fourth line segments of first cells 101 shown in FIGs. 13a to 13d, except that they have different lengths to be distinguished from the line segments of the first cells.

[75] FIG. 16 shows another example of binary data codes displayed at the second cells 102. Particularly, assuming that virtual X and Y axes intersect with each other at the center point of each cell, FIG. 16a shows a first line segment extending from the intersection point to a point in the first quadrant, FIG. 16b shows a second line segment extending from the intersection point to a point in the second quadrant, FIG. 16c shows a third line segment extending from the intersection point to a point in the third quadrant, and FIG. 16d shows a fourth line segment extending from the intersection point to a point in the fourth quadrant. Each binary data code is displayed by one of the first to fourth line segments, each of which corresponds to data expressed as (0,0), (0,1), (1,0), and (1,1).

[76] FIG. 17 shows another example of binary data codes displayed at the second cells 102. Particularly, assuming that virtual X and Y axes intersect with each other at the center point of each cell, FIG. 17a shows a first line segment lying on the positive X and Y axes with the intersection point at its center, FIG. 17b shows a second line segment lying on the negative X axis and on the positive Y axis with the intersection point at its center, FIG. 17c shows a third line segment lying on the negative X and Y axes with the intersection point at its center, and FIG. 17d shows a fourth line segment lying on the positive X axis and on the negative Y axis with the intersection point at its center. Each binary data code is displayed by one of the first to fourth line segments, each of which corresponds to data expressed as (0,0), (0,1), (1,0), and (1,1).

[77] Various types of line segments have been described as means for encoding binary data displayed at the first or second cells 102. Respective line segments, which have been defined as lines of a predetermined length, may also be expressed as a plurality of points constituting the same straight line. In order to prevent points belonging to a cell from constituting a line segment together with points belonging to an adjacent cell, the maximum distance between points constituting a line segment must always be smaller than the distance between any point belonging to the corresponding cell and other points belonging to an adjacent cell.

[78] Furthermore, although it has been assumed in the above description that binary data

is encoded and displayed at respective cells, the data is not limited to binary data. For example, the data may be based on a numeral system having a radix larger than 2 (e.g. 3 or 4) depending on the number of code types.

[79] FIG. 18 shows exemplary construction of an object display pattern.

[80] A pattern ID refers a unique ID assigned to an object display pattern 120 consisting of at least one unit cell pattern 110. The pattern ID is indicated by a combination of data corresponding to codes of binary data of at least one first cell 101 included in the unit cell pattern 110. Unit cell patterns 110 belonging to the object display pattern 120 indicate the same pattern ID. As used herein, the object display pattern 120 refers to a position display pattern needed by the digital pen 320 to recognize an object displayed on the digital paper 100 so that the user can identify it with the naked eye.

[81] The example of "SMS" among a number of function button regions 214 displayed at the message composition and transmission digital paper 210 (described later) will now be described. The object display pattern 120 corresponding to "SMS" in FIG. 18 consists of a number of unit cell patterns 110 included in the region of the object "SMS". The object display pattern 120 is assigned the pattern ID particular to the object "SMS", which is a combination of data corresponding to codes of binary data displayed at the first cells 101 of the unit cell patterns 110. The unit cell patterns 110 constituting the object display pattern 120 have a common pattern ID. For example, if the object display pattern 120 corresponding to "SMS" is assigned pattern ID "003", the unit cell patterns 110 constituting the object display pattern 120 indicate the same pattern ID "003". Those skilled in the art can easily understand from the above description that, although not shown in FIG. 18, each unit cell pattern 110 includes a number of first and second cells 101 and 102.

[82] FIG. 19 briefly shows a system for composing and transmitting messages by using digital paper and a digital pen according to an exemplary embodiment of the present invention.

[83] The system 200 for composing and transmitting messages by using digital paper and a digital pen according to an exemplary embodiment of the present invention includes message composition and transmission digital paper 210, a digital pen 220, and a mobile communication terminal 230.

[84] The message composition and transmission digital paper 210 refers to digital paper 210 having the construction described with reference to FIGs. 1-17, and includes a message composition region 212 and a number of function button regions 214 defined on its surface to compose and transmit messages, as shown in FIG. 20. The message composition region 212 and the function button regions 214 are printed on the message composition and transmission digital paper 210 so that they can be identified with the naked eye.

- [85] The function button regions 214 according to the present invention, as shown in FIG. 20, include an SMS button region, an MMS button region, a messenger button region, a menu button region, a CONFIRM button region, a CANCEL button region, a number search button region, movement button regions, and an ENLARGE/REDUCE button region. Although not shown in FIG. 20, the function button regions 214 may also include a START/END button region for creating multimedia files. The message composition region 212 and the function button regions 214 according to an exemplary embodiment of the present invention will be described later in more detail with reference to FIG. 20.
- [86] The message composition and transmission digital paper 210 according to the present invention assigns X and Y coordinate values to a number of unit cell patterns 110 included in the position display pattern in the manner described with reference to FIGs. 2-9, or assigns the pattern ID of the object display pattern 120 in the manner described with reference to FIG. 18. Particularly, a number of unit cell patterns 110 constituting the message composition region 212 and the function button regions 214 are assigned X and Y coordinate values so that the message composition region 212 and the function button regions 214 are allocated from the message composition and transmission digital paper 210. Alternatively, a number of unit cell patterns 110 constituting the message composition region 212 are assigned X and Y coordinate values, and a number of unit cell patterns 110 constituting respective button regions of the function button regions 214 are assigned corresponding button IDs (i.e. pattern ID) so that the message composition region 212 and the function button regions 214 are allocated from the message composition and transmission digital paper 210.
- [87] In the case of assigning X and Y coordinate values to a number of unit cell patterns 110 constituting the message composition region 212 and the function button regions 214, for example, the X coordinate value of the unit cell patterns 110 in the message composition region 212 of the message composition and transmission digital paper 210 shown in FIG. 20 is in the range of 85-230 (decimal numbers), and the Y coordinate value is in the range of 120-450. The X coordinate value of unit cell patterns 110 in the SMS button region among the function button regions 214 may be in the range of 75-100 (decimal numbers), and the Y coordinate value may be in the range of 77-110. The X coordinate value of unit cell patterns 110 in the MMS button region may be in the range of 103-128 (decimal numbers), and the Y coordinate value may be in the range of 77-110. The range of Y coordinate values in function button regions parallel in the X direction is the same (i.e. 77-110).
- [88] In the case of assigning X and Y coordinate values to a number of unit cell patterns 110 constituting the message composition region 212 and assigning a corresponding pattern ID (respective button IDs) to one of the function button regions 214, for

example, the X coordinate value of unit cell patterns 110 in the message composition region 212 displayed on the message composition and transmission digital paper 210 shown in FIG. 20 is in the range of 85-230 (decimal numbers), and the Y coordinate value is in the range of 120-450. The button ID assigned to unit cell patterns constituting the SMS button region among the function button regions 214 may be "003", and the button ID assigned to unit cell patterns 110 constituting the MMS button region may be "005". Those skilled in the art can understand that unit cell patterns 110 included in each button region of the function button regions 214 indicate a button ID corresponding to one button region of the function button regions 214.

- [89] Hereinafter, the X and Y coordinate values included in one of the function button regions 214 will be referred to as a first coordinate value, and the X and Y coordinate values included in the message composition region 212 will be referred to as a second coordinate value.
- [90] The digital pen 220 includes an optical system lens for optically inputting a position display pattern including an object display pattern 120 and a unit cell pattern 110, i.e. codes displayed at first and second cells 101 and 102 of digital paper 100, an image sensor for recognizing the image of the inputted position display pattern, a micro-processor for processing information inputted from the image sensor, an internal memory for storing predetermined information under the control of the micro-processor, and a serial interface for communicating with an external device under the control of the microprocessor. More preferably, the digital pen 220 includes a serial interface including a USB (Universal Serial Bus) port or a 24-pin port.
- [91] The digital pen 220 is adapted to recognize the X and Y coordinate values or pattern ID of a unit cell pattern 110 included in the digital paper 100, and transmits the recognized values to an external device.
- [92] The digital pen 220 according to the present invention transmits/receives data with the mobile communication terminal 230 via the serial interface, recognizes first and second coordinate values from the message composition and transmission digital paper 210 or recognizes a button ID and a second coordinate value from it, and transmits the recognized values to the mobile communication terminal 230.
- [93] Particularly, the second coordinate value recognized from the message composition and transmission digital paper 210 is transmitted to the mobile communication terminal 230 to compose an SMS or MMS message. In addition, the first coordinate value or button ID of a button region of the message composition and transmission digital paper 210 is transmitted to the mobile communication terminal 230 so that the process of composing and transmitting an SMS or MMS message with the mobile communication terminal 230 is controlled.
- [94] When the mobile communication terminal user writes a character or draws a picture

in the message composition region 212 of the message composition and transmission digital paper 210 with the digital pen 220 according to the present invention, the digital pen 220 continuously recognizes the second coordinate value while moving in the message composition region 212, and transmits the second coordinate value to the mobile communication terminal 230 in real time. It can be said that, as the digital pen 220 continuously recognizes the second coordinate value and transmits it to the communication terminal 230 in real time, the character or picture corresponding to the trajectory of the moving digital pen 220 is transmitted to the mobile communication terminal 230 in real time.

- [95] The mobile communication terminal 230 is adapted to conduct voice communication and transmit/receive SMS and MMS messages with other mobile communication terminals via mobile communication networks. The mobile communication terminal 230 used by the present invention is supposed to transmit/receive SMS and MMS messages via mobile communication networks, access the wireless Internet via an installed WAP browser, for example, and receive a data communication service. The mobile communication terminal 230 is selected from a PDA (Personal Digital Assistant), a cellular phone, a PCS (Personal Communication Service) phone, a GSM (Global System for Mobile) phone, a W-CDMA (Wideband CDMA) phone, a CDMA-2000 phone, an MBS (Mobile Broadband System) phone, and a DMB (Digital Multimedia Broadcasting) phone.
- [96] The mobile communication terminal 230 according to the present invention downloads an installation program, which includes a message composition and transmission application, a digital pen interface module, a text conversion module, a file creation module, and a viewer module, via the wireless Internet or the serial interface, and installs the message composition and transmission application, the digital pen interface module, the text conversion module, the file creation module, and the viewer module inside the mobile communication terminal 230.
- [97] When the digital pen 220 and the mobile communication terminal 230 are connected to each other via the serial interface, the mobile communication terminal 230 automatically executes the message composition and transmission application and displays an initial screen as shown in 4A of FIG. 22.
- [98] Upon receiving a first coordinate value or button ID from the digital pen 220, the mobile communication terminal 230 determines which of the SMS button region, the MMS button region, and the message button region the first coordinate value or button ID corresponds to. To this end, the mobile communication terminal 230 stores a coordinate range table enumerating the X and Y coordinate value ranges of the function button regions 214 and function buttons corresponding to the X and Y coordinate value ranges as shown in FIG. 23. Alternatively, the mobile communication

terminal 230 stores an ID table enumerating button IDs regarding the function button regions 214 and function buttons corresponding to the button IDs as shown in FIG. 24. Particularly, the mobile communication terminal 230 determines which of the function button regions 214 the first coordinate value corresponds to with reference to the coordinate range table. Alternatively, the mobile communication terminal 230 determines which of the function button regions 214 the button ID corresponds to with reference to the ID table.

- [99] If the first coordinate value or button ID received from the digital pen 220 is one of the SMS button region and the messenger button region, the mobile communication terminal 230 activates one of a SMS message composition window and a messenger window, and receives the second coordinate value, which is continuously recognized by the digital pen 220, in real time.
- [100] Based on the X and Y coordinate values received from the digital pen 220 in real time, the mobile communication terminal 230 identifies characters written by the mobile communication terminal user with the message composition and transmission digital paper 210 and the digital pen 220, and converts the characters into text data. The characters written on the message composition and transmission digital paper 210 by the user with the digital pen 220 are converted into text data one after another.
- [101] The construction for converting the X and Y coordinate values, which have been received from the digital pen 220 in real time, into text according to the present invention is based on conventional ICR (Intelligent Character Recognition) technology or HCR (Handwriting Character Recognition) technology, and further description thereof will be omitted herein.
- [102] If the first coordinate value or button ID received from the digital pen 220 corresponds to the MMS button region, the mobile communication terminal 230 activates a MMS message composition window, and confirms if a first coordinate value of button ID, which corresponds to the START/END button region for creating multimedia files, has been received from the digital pen 220.
- [103] After confirming if a first coordinate value or button ID corresponding to the START/END button region has been received, the mobile communication terminal 230 receives the second coordinate value, which is continuously recognized by the digital pen 220, in real time and displays the same process of the user's drawing pictures on the message composition and transmission digital paper 210 with the digital pen 220 on the screen of the mobile communication terminal 230.
- [104] If a first coordinate or button ID corresponding to the START/END button region has been received, the mobile communication terminal 230 receives the second coordinate value, which is continuously recognized by the digital pen 220, in real time and creates time information regarding when the second coordinate value has been

received. The mobile communication terminal 230 stores multimedia files including time information, second coordinate values, and external voices inputted via the microphone (not shown) of the mobile communication terminal 230 until another first coordinate value or button ID corresponding to the START/END button region is received. The reason the multimedia files include time information according to the present invention is that, when the mobile communication terminal 230 plays a multimedia file by means of the viewer module according to an exemplary embodiment of the present invention, the viewer module processes the second coordinate values in the order of the time information on a time series basis so that the same process of the user's drawing pictures on the message composition and transmission digital paper 220 with the digital pen 220 is reproduced on the screen of the mobile communication terminal 230.

- [105] If the first coordinate value or button ID corresponding to the START/END button region has not been received, the mobile communication terminal 230 receives the second coordinate value, which is continuously recognized by the digital pen 220, in real time and displays the same process of the user's drawing pictures on the message composition and transmission digital paper 210 with the digital pen 220 on the screen of the mobile communication terminal 230. Then, the mobile communication terminal 230 stores an image file corresponding to the screen at the point of time when X and Y coordinate values within the X and Y coordinate value range of the confirmation button region or a button ID in the confirmation button region has been received.
- [106] The mobile communication terminal 230 according to the present invention transmits the SMS or MMS message, which has been composed in the above-mentioned manner, to another mobile communication terminal based on the first and second coordinate values received from the digital pen 220. Alternatively, the mobile communication terminal 230 transmits the SMS or MMS message, which has been composed in the above-mentioned manner, to another mobile communication terminal based on the second coordinate value and the button ID received from the digital pen 220. The MMS message includes image files or multimedia files.
- [107] As mentioned above, the mobile communication terminal 210 according to the present invention neither composes nor transmits SMS or MMS messages by means of the key input unit of the mobile communication terminal 210, but composes SMS or MMS messages by means of the second coordinate value received from the digital pen 220. Then, the mobile communication terminal 210 conducts control for composing and transmitting SMS or MMS messages by means of the first coordinate value or button ID received from the digital pen 220.
- [108] A detailed embodiment of composing and transmitting SMS or MMS messages by the mobile communication terminal 230 with the message composition and

transmission digital paper 210 and the digital pen 220 according to an exemplary embodiment of the present invention will be described later with reference to FIG. 22.

- [109] Meanwhile, the mobile communication terminal 230 according to the present invention may receive an MMS message, which includes multimedia files, from another mobile communication terminal and play the multimedia files by means of the viewer module. Particularly, the mobile communication terminal 230 processes second coordinate values in the order of the time information on a time series basis by means of the viewer module and reproduces the same process of the user's drawing pictures on the message composition and transmission digital paper 210 with the digital pen 220 on the screen of the mobile communication terminal 230.
- [110] FIG. 20 shows exemplary message composition and transmission digital paper according to an exemplary embodiment of the present invention.
- [111] The message composition and transmission digital paper 210 according to an exemplary embodiment of the present invention includes a message composition region 212 and a number of function button regions 214.
- [112] The message composition region 212 is used to compose SMS or MMS messages on the message composition and transmission digital paper 210.
- [113] When the mobile communication terminal user writes characters or numbers or draws pictures in the message composition region 212 with the digital pen 220, i.e. when the user composes an SMS or MMS message in the message composition region 212 with the digital pen 220, the digital pen 220 continuously recognizes the second coordinate value while characters or numbers are written in the message composition region 212 or while pictures are drawn in it, and transmits the second coordinate value to the mobile communication terminal 230 in real time. The mobile communication terminal 230 receives the second coordinate value in real time, converts the value into text data, and displays the data on the screen. Alternatively, the mobile communication terminal 230 displays the same picture, which is being drawn in the message composition region 212 by the user with the digital pen 220, on the screen. This means that the same SMS or MMS message composed in the message composition region 212 by the user with the digital pen 220 is displayed on the screen of the mobile communication terminal 230.
- [114] The function button regions 214 include button regions for providing an SMS message composition and transmission function, an MMS message composition and transmission function, a messenger function, etc., which are provided by the mobile communication terminal 230. Particularly, the function button regions 214 include an SMS button region, an MMS button region, a messenger button region, a menu button region, a CONFIRM button region, a CANCEL button region, a number search button region, movement button regions, and an ENLARGE/REDUCE button region. The

function button regions 214 are distinguished by the range of X and Y coordinate values or by the pattern ID.

- [115] If the digital pen 220 recognizes a first coordinate value or button ID, which corresponds to the SMS button region, and transmits it to the mobile communication terminal 230, the mobile communication terminal 230 activates an SMS message composition window.
- [116] If the digital pen 220 recognizes a first coordinate value or button ID, which corresponds to the MMS button region, and transmits it to the mobile communication terminal 230, the mobile communication terminal 230 activates an MMS message composition window.
- [117] The digital pen 220 recognizes a first coordinate value or button ID, which corresponds to the messenger button region, and transmits it to the mobile communication terminal 230. If the mobile communication terminal 230 has a messenger application installed therein, the mobile communication terminal 230 activates a messenger window.
- [118] If the digital pen 220 recognizes a first coordinate value or button ID, which corresponds to the menu button region, and transmits it to the mobile communication terminal 230, the mobile communication terminal 230 activates its initial menu or a menu window corresponding to the function currently activated on the screen.
- [119] If the digital pen 220 recognizes a first coordinate value or button ID, which corresponds to the CONFIRM button region, and transmits it to the mobile communication terminal 230, the mobile communication terminal 230 finishes the currently proceeding task (e.g. composing SMS and MMS messages) and activates a window for proceeding to the next step. As such, the CONFIRM button region is used to finish the composition of an SMS or MMS message or to transmit them.
- [120] If the digital pen 220 recognizes a first coordinate value or button ID, which corresponds to the CANCEL button region, and transmits it to the mobile communication terminal 230, the mobile communication terminal 230 cancels the currently proceeding task and activates the window of the previous step.
- [121] If the digital pen 220 recognizes a first coordinate value or button ID, which corresponds to the number search button region, and transmits it to the mobile communication terminal 230, the mobile communication terminal 230 activates an address book window.
- [122] If the digital pen 220 recognizes a first coordinate value or button ID, which corresponds to one of the movement button regions (up, down, left, right), and transmits it to the mobile communication terminal 230, the mobile communication terminal 230 moves the cursor, which is displayed on the currently activated window, in the corresponding direction.

- [123] If the digital pen 220 recognizes a first coordinate value or button ID, which corresponds to one of the ENLARGE/REDUCE button regions, and transmits it to the mobile communication terminal 230, the mobile communication terminal 230 correspondingly enlarges or reduces the font displayed on the screen of the mobile communication terminal 230. Those skilled in the art can easily understand that, although the ENLARGE/REDUCE button regions are shown in FIG. 20 to be positioned in a specific section within the message composition region, the position is not limited to that.
- [124] In addition, although not shown in FIG. 20, the message composition and transmission digital paper 210 according to an exemplary embodiment of the present invention may additionally include a START/END button region providing a function for creating multimedia files.
- [125] FIG. 21 is a block diagram briefly showing the internal structure of a mobile communication terminal adapted to compose and transmit messages by using digital paper and a digital pen according to an exemplary embodiment of the present invention.
- [126] The mobile communication terminal 230 according to an exemplary embodiment of the present invention includes a key input unit 300, a memory unit 310, a display unit 320, a control unit 330, a digital pen interface module 340, a text conversion module 350, a file creation module 360, a viewer module 370, a wireless circuit unit 380, and an antenna 385. The construction of the key input unit 300, the wireless circuit unit 380, and the antenna 385 is widely known in the art, and detailed description thereof will be omitted herein.
- [127] The memory unit 310 stores programs for driving functions processed by the control unit 330, other programs for providing user convenience and implementing various functions, etc.
- [128] The memory unit 310 according to the present invention stores an installation program, which includes a message composition and transmission application, a digital pen interface module 340, a text conversion module 350, a file creation module 360, and a viewer module 370, and stores second coordinate values received from the digital pen 220 in real time.
- [129] In addition, the memory unit 310 stores pictures, which have been drawn by the user with the message composition and transmission digital paper 210 and the digital pen 220, as image files. The memory unit 310 also stores multimedia files including time information, second coordinate values, and external voices inputted through the microphone (not shown) of the mobile communication terminal 230.
- [130] The memory unit 310 stores a coordinate range table enumerating the X and Y coordinate value ranges of the function button regions 214 and function buttons corresponding to the X and Y coordinate value ranges, or an ID table enumerating button

IDs regarding the function button regions 214 and function buttons corresponding to the button IDs.

- [131] The display unit 320 provides an information screen for providing information regarding the mobile communication terminal 230, a menu screen showing various functions, an input screen for inputting characters or numbers, an editing screen for showing pictures or photographs to be edited, a screen for accessing the wireless Internet, etc. under the control of the control unit 330.
- [132] The display unit 320 according to the present invention functions in the following manner: when the mobile communication terminal user writes a character on the message composition and transmission digital paper 210 with the digital pen 220, and when the text conversion module 360 converts the second coordinate value corresponding to the character into text data, the display unit 320 displays the text data on the SMS message composition window or on the messenger window. Alternatively, the display unit 320 displays the same process of the user's drawing pictures in the message composition region 212 with the digital pen 220 on the screen of the mobile communication terminal 230, particularly on the MMS message composition window.
- [133] In addition, the display unit 320 plays multimedia files, which have been created from processing of second coordinate values in the order of the time information on a time series basis by the viewer module 380. In other words, the display unit 320 reproduces the same process of the user's drawing pictures on the message composition and transmission digital paper 210 with the digital pen 220.
- [134] The control unit 330 executes driving programs, which are stored in the memory unit 310, according to the user's instruction entered via the key input unit 300, and controls communication services, various menu items including the telephone book, portable telephone setup, schedule management, gaming, screen setup, volume/bell sound setup, etc.
- [135] When the digital pen 220 is connected to the mobile communication terminal 230, the controller 330 according to the present invention automatically executes the message composition and transmission application and controls the digital pen interface module 340 so that a first coordinate value or button ID, which corresponds to one of the SMS button region, the messenger button region, and the MMS button region, is received from the digital pen 220. The controller 330 confirms which of the SMS button region, the messenger button region, and the MMS button region the first coordinate value or button ID received from the digital pen 220 corresponds to with reference to the coordinate range table or ID table stored in the memory unit 310.
- [136] If the first coordinate value or button ID received via the digital pen interface module 340 corresponds to the SMS button region or the messenger button region, the control unit 330 activates the SMS message composition window or messenger window on the

display unit 320.

- [137] Upon receiving a second coordinate value via the digital pen interface module 340 while the SMS message composition window or the messenger window remains activated, the controller 330 controls the text conversion module 360 to convert the second coordinate value into text data.
- [138] If the first coordinate value or button ID received via the digital pen interface module 340 corresponds to the MMS button region, the controller 330 activates the MMS message composition window.
- [139] Upon receiving a second coordinate value from the digital pen 220 while the MMS message composition window remains activated, the control unit 330 controls the file creation module 360 to create an image file or a multimedia file from the second coordinate value. If the controller 330 receives a first coordinate value or button ID, which corresponds to the START/END button region, via the digital pen interface module 340, the file creation module 360 creates a multimedia file from the second coordinate value. If the controller 330 receives no first coordinate value or button ID corresponding to the START/END button region, the file creation module 360 creates an image file corresponding to the picture displayed by the display unit 320 based on the second coordinate value.
- [140] Upon receiving a first coordinate value or button ID, which corresponds to the CONFIRM button region, from the digital pen 220, the control unit 330 performs control for proceeding to the next step from the currently activated task window, i.e. task window currently displayed by the display unit 320. According to an exemplary embodiment of the present invention, the control unit 330 activates a recipient number input window for inputting the recipient number to transmit an SMS or MMS message, which has been composed based on the second coordinate value. As used herein, the task window refers to a screen displaying a number of functions incorporated by the mobile communication terminal 230 and utilizing them, e.g. an SMS message window, a messenger window, an MMS message composition window, and an address book window.
- [141] Upon receiving a second coordinate value corresponding to a recipient telephone number, which has been written by the user on the message composition and transmission digital paper 210 with the digital pen 220, while the recipient number input window remains activated, the control unit 330 controls the text conversion module 360 to convert the second coordinate value into text data.
- [142] Upon receiving a first coordinate value or button ID corresponding to the number search button region from the digital pen 220 while the recipient number input window remains activated, the control unit 330 activates the address book window. Upon receiving a first coordinate value or button ID corresponding to one of movement

button regions from the digital pen 220 while the address book window remains activated, the control unit 330 moves the cursor displayed on the address book window up or down.

- [143] Upon receiving a first coordinate value or button ID corresponding to the CONFIRM button region from the digital pen 220 while the cursor remains at a specific one of a number of telephone numbers displayed on the address book window, the control unit 330 inputs the specific telephone number as the recipient number.
- [144] Upon receiving a first coordinate value or button ID corresponding to the CONFIRM button region from the digital pen 220 with at least one recipient number inputted into the recipient number input window, the control unit 330 performs control for transmitting the SMS or MMS message to a mobile communication terminal corresponding to the recipient number.
- [145] As is clear from the above description of the control unit 330, the control unit 330 of the mobile communication terminal 230 according to the present invention performs control for composing and transmitting SMS or MMS messages based on the first or second coordinate value recognized from the message composition and transmission digital paper 210 by the digital pen 220. Particularly, based on the first coordinate value or button ID, the control unit 330 controls the process of composing and transmitting an SMS or MMS message, and performs control for converting the second coordinate value into text data or control for creating an image file or a multimedia file from the second coordinate value.
- [146] The digital pen interface module 340 receives at least one of a first coordinate value, a second coordinate value, and a button ID from the digital pen 220, and transmits it to the controller 330 that is currently executing a message composition and transmission application.
- [147] The text conversion module 350 converts second coordinate values, which correspond to characters written by the user on the message composition and transmission digital paper 210 with the digital pen 220, into text data character by character. For the purpose of this conversion, the text conversion module 350 employs ICR (Intelligent Character Recognition) or HCR (Handwriting Character Recognition) technology.
- [148] The file creation module 360 receives the second coordinate value in real time and displays the same process of the user's drawing pictures on the message composition and transmission digital paper 210 with the digital pen 220 on the screen of the display unit 320.
- [149] If the control unit 330 has received a first coordinate value or button ID corresponding to the START/END button region via the digital pen interface module 340, the file creation module 360 creates time information regarding when the second

coordinate value has been received. In addition, the control unit 330 creates multimedia files including time information, second coordinate values, and external voices inputted via the microphone (not shown) of the mobile communication terminal 230 until the control unit 330 receives another first coordinate value or button ID corresponding to the START/END button region.

- [150] If the control unit 330 has received no first coordinate value or button ID corresponding to the START/END button region, the file creation module 360 receives the second coordinate value in real time and displays the same process of the user's drawing pictures on the message composition and transmission digital paper 210 with the digital pen 220 on the screen of the mobile communication terminal 230. Then, the file creation unit 360 creates an image file corresponding to the screen at the point of time when the control unit 330 has received the first coordinate value or button ID corresponding to the CONFIRM button region.
- [151] The viewer module 370 is adapted to play multimedia files stored in the memory unit 310 or multimedia files received from another mobile communication terminal. The multimedia files include time information, second coordinate values, external voices, etc.
- [152] The viewer module 370 processes the second coordinate values in the order of the time information included in the multimedia files on a time series basis so that the same process of the user's drawing pictures on the message composition and transmission digital paper 210 with the digital pen 220 is reproduced on the screen of the display unit 320.
- [153] FIG. 22 shows an exemplary mobile communication terminal screen displaying a process of composing and transmitting messages by using digital paper and a digital pen according to an exemplary embodiment of the present invention.
- [154] When the mobile communication terminal 230 is connected to the digital pen 220, the mobile communication terminal 230 automatically executes a message composition and transmission application as shown in 4A.
- [155] If the mobile communication terminal user selects the SMS button region on the message composition and transmission digital paper 210 with the digital pen 220 while the mobile communication terminal 230 displays the screen shown in 4A, the mobile communication terminal 230 displays a screen for inputting an SMS message as shown in 4B.
- [156] After the user enters an SMS message into the message composition region 212 of the message composition and transmission digital paper 210 with the digital pen 220, the digital pen 220 transmits second coordinate values corresponding to characters written by the user to the mobile communication terminal 230. Then, the mobile communication terminal 230 converts the characters written by the user into text data in

real time (character by character) by means of the text conversion module 350.

- [157] If the user selects the MMS button region on the message composition and transmission digital paper 210 with the digital pen 220 while the mobile communication terminal 230 displays the screen shown in 4A, the mobile communication terminal 230 displays a screen for inputting an MMS message as shown in 4C.
- [158] If the user draws a picture in the message composition region 212 of the message composition and transmission digital paper 210 with the digital pen 220, the digital pen 220 transmits a second coordinate value corresponding to the picture drawn by the user to the mobile communication terminal 230. Then, the mobile communication terminal 230 displays the same process of the user's drawing the picture on the message composition and transmission digital paper 210 with the digital pen 220 on the screen of the display unit 320 by means of the file creation module. Upon receiving a first coordinate value or button ID corresponding to the START/END button region from the digital pen 220, the mobile communication terminal 230 creates a multimedia file including time information, second coordinate values, external voices, etc. so that information regarding the user's process of drawing pictures on the message composition and transmission digital paper 210 with the digital pen 220 can be inserted into an MMS message and transmitted to another mobile communication terminal.
- [159] Upon receiving a first coordinate value or button ID corresponding to the CONFIRM button region from the digital pen 220 in a state shown in 4B or 4C, the mobile communication terminal 230 activates a recipient telephone number input window for inputting the recipient telephone number as shown in 4D.
- [160] After the user enters a recipient telephone number into the message composition region 212 of the message composition and transmission digital paper 210 with the digital pen 220 in a state shown in 4D, the digital pen 220 transmits a second coordinate value corresponding to the recipient telephone number entered by the user to the mobile communication terminal 230. Then, the mobile communication terminal 230 converts the recipient telephone number entered by the user into text data in real time (character by character) by means of the text conversion module 350 so that at least one recipient telephone number is entered into the recipient telephone number input window as shown in 4E. In order to enter at least one recipient telephone number into the mobile communication terminal 230, the mobile communication terminal 230 must receive a first coordinate value or button ID corresponding to a movement button region of the message composition and transmission digital paper 210 from the digital pen 220 and move the cursor displayed on the recipient telephone number input window to the next recipient telephone number input cell.
- [161] Upon receiving a first coordinate value or button ID corresponding to the number search button region from the digital pen 220 in a state shown in 4D or 4E, the mobile

communication terminal 230 activates the address book window as shown in 4F. Then, the mobile communication terminal 230 receives a first coordinate value or button ID corresponding to a movement button region and another first coordinate value or button ID corresponding to the CONFIRM button region from the digital pen 220, extracts at least one recipient telephone number from the address book, and enters it into the recipient telephone number input window.

[162] Upon receiving a first coordinate or button ID corresponding to the CONFIRM button region from the digital pen 220 with at least one recipient telephone number entered into the recipient telephone number input window, the mobile communication terminal 230 receives a second coordinate value from the digital pen 220 in real time and transmits the composed SMS or MMS message to another mobile communication terminal.

[163] Although several exemplary embodiments of the present invention have been described for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

Industrial Applicability

[164] As mentioned above, according to the present invention, SMS or MMS messages are composed and transmitted by using a mobile communication terminal, digital paper having a position display pattern printed thereon, and a digital pen for recognizing the digital paper. Therefore, even users unaccustomed to operating the keypad of their mobile communication terminals can easily enter SMS or MMS messages. In addition, even people having a language the characters of which are not easily entered with the keypad of mobile communication terminals (e.g. Japanese, Chinese) can easily compose SMS or MMS messages.

[165] If the user of a conventional mobile communication terminal installs a message composition and transmission application on the terminal and connects a digital pen to it, he/she can compose SMS or MMS messages on the digital paper. This means that users of conventional mobile communication terminals can use the touch screen function at a lower cost than when the terminals are replaced. Furthermore, the digital paper acting as the touch panel of touch screen phones is inexpensive so that users can maintain their mobile communication terminals, which provide the touch screen function, at a cost lower than when touch screen phones are used.

Claims

- [1] A system for composing and transmitting an SMS message and an MMS message by using digital paper and a digital pen, the system comprising: message composition and transmission digital paper having a position display pattern displayed thereon, the position display pattern comprising a number of unit cell patterns, regions of the message composition and transmission digital paper being distinguished by a pattern ID or X and Y coordinate values assigned to the unit cell patterns, the message composition and transmission digital paper comprising a number of function button regions and a message composition region for composing and transmitting the SMS message or the MMS message; a digital pen for recognizing a second coordinate value, the second coordinate value being X and Y coordinate values contained in the message composition region on the message composition and transmission digital paper, the digital pen recognizing a first coordinate value, the first coordinate value being X and Y coordinate values contained in one of the function button regions, or a button ID, the button ID being a pattern ID corresponding to one of the function button regions; and
a mobile communication terminal for storing a message composition and transmission application for composing the SMS message or the MMS message by using the message composition and transmission digital paper and the digital pen, the mobile communication terminal receiving the second coordinate value from the digital pen and converting the second coordinate value into text data contained in the SMS message or creating an image file or a multimedia file contained in the MMS message from the second coordinate value, the mobile communication terminal receiving a first coordinate value or button ID corresponding to one of the function button regions from the digital pen and performing control for composing and transmitting the SMS message or the MMS message.
- [2] The system as claimed in claim 1, wherein the message composition and transmission digital paper allocates the message composition region with regard to a range of the X and Y coordinate values and allocates the function button regions with regard to the X and Y coordinate values or the pattern ID.
- [3] The system as claimed in claim 1, wherein the function button regions comprise an SMS button region, an MMS button region, a messenger button region, movement button regions, an ENLARGE/REDUCE button region, and a START/END button region.
- [4] The system as claimed in claim 1, wherein the position display pattern

comprises:

first cells displaying encoded data expressed by a numeral system having a radix of 2 or a larger number;

second cells displaying encoded data in a manner distinguished from the first cells or having no data; and

a unit cell pattern comprising at least a predetermined number of first and second cells,

a combination of data corresponding to the first cells within the unit cell pattern indicates the X and Y coordinate values or the pattern ID of the corresponding unit cell pattern, and the unit cell pattern is separated and distinguished from other adjacent unit cell patterns by the second cells within the unit cell pattern.

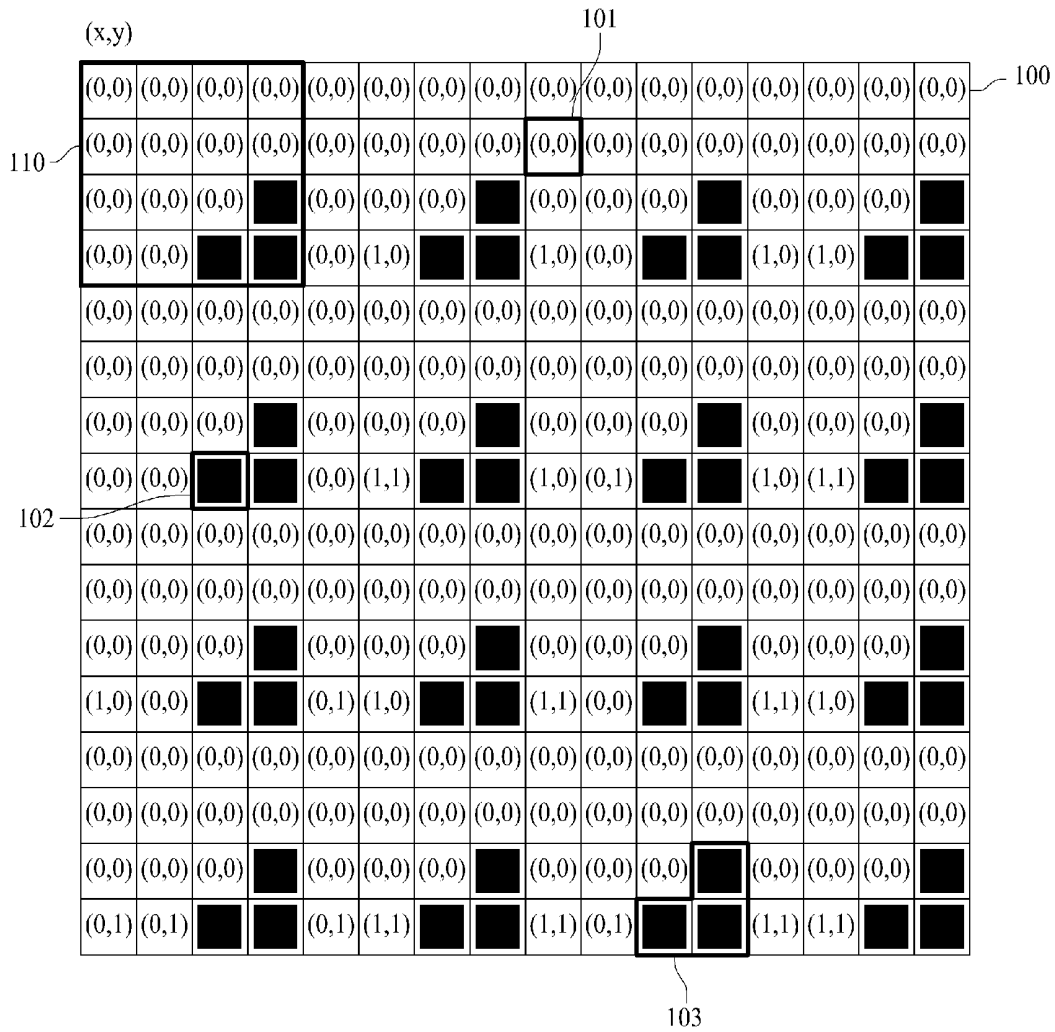
- [5] The system as claimed in claim 4, wherein the number of the second cells within the unit cell pattern is equal to or larger than 3, and the second cells are joined by line segments of a type having no rotational symmetry.
- [6] The system as claimed in claim 4, wherein errors of the X and Y coordinate values or the pattern ID are corrected by using a value of data corresponding to the second cells within the unit cell pattern.
- [7] The system as claimed in claim 1, wherein the digital pen is adapted to transmit the second coordinate value to the mobile communication terminal in real time, the second coordinate value having been recognized from the message composition and transmission digital paper.
- [8] The system as claimed in claim 1, wherein the mobile communication terminal is connected with the digital pen via a serial interface.
- [9] The system as claimed in claim 1, wherein the mobile communication terminal stores a coordinate range table enumerating X and Y coordinate value ranges of the function button regions and function buttons corresponding to the X and Y coordinate value ranges, and determines which of the function button regions the first coordinate value corresponds to with reference to the coordinate range table.
- [10] The system as claimed in claim 1, wherein the mobile communication terminal stores an ID table enumerating button IDs and function buttons corresponding to the button IDs, and determines which of the function button regions the button ID corresponds to with reference to the ID table.
- [11] The system as claimed in claim 1, wherein the multimedia file comprises time information regarding when the mobile communication terminal has received the second coordinate value, external voices inputted via a microphone of the mobile communication terminal, and the second coordinate value.
- [12] The system as claimed in claim 11, wherein the mobile communication terminal is adapted to process the second coordinate value in the order of the time in-

- formation on a time series basis to play the multimedia file.
- [13] A mobile communication terminal for composing and transmitting an SMS message and an MMS message by using message composition and transmission digital paper and a digital pen, the message composition and transmission digital paper comprising a message composition region and a number of function button regions, the digital pen recognizing a second coordinate value, the second coordinate value being X and Y coordinate values contained in the message composition region, the digital pen recognizing a first coordinate value or a button ID, the first coordinate value being X and Y coordinate values contained in one of the function button regions, the button ID being a pattern ID assigned to one of the function button regions, the mobile communication terminal comprising:
- a memory unit for storing a message composition and transmission application for composing the SMS message or the MMS message by using the message composition and transmission digital paper and the digital pen, the memory unit storing the second coordinate value received from the digital pen and storing a picture drawn by a user of the mobile communication terminal with the message composition and transmission digital paper and the digital pen as an image file or as a multimedia file, the multimedia file comprising time information regarding when the second coordinate value has been received, external voices, and the second coordinate value;
 - a text conversion module for converting a second coordinate value into text data, the second coordinate value corresponding to a character written on the message composition and transmission digital paper with the digital pen by the user;
 - a display unit for displaying the text data and a process of drawing the picture;
 - a file creation module for creating the image file or the multimedia file;
 - a viewer module for processing the second coordinate value in the order of the time information from the multimedia file on a time series basis so that the display unit reproduces the processing of drawing the picture;
 - a digital pen interface module for receiving at least one of the first coordinate value, the second coordinate value, and the button ID from the digital pen and transmitting the received one to a different component of the mobile communication terminal; and
 - a control unit for executing the message composition and transmission application when the digital pen is connected to the mobile communication terminal and controlling a process of composing and transmitting the SMS message or the MMS message when the first coordinate value or the button ID is received from the digital pen interface module, the control unit performing

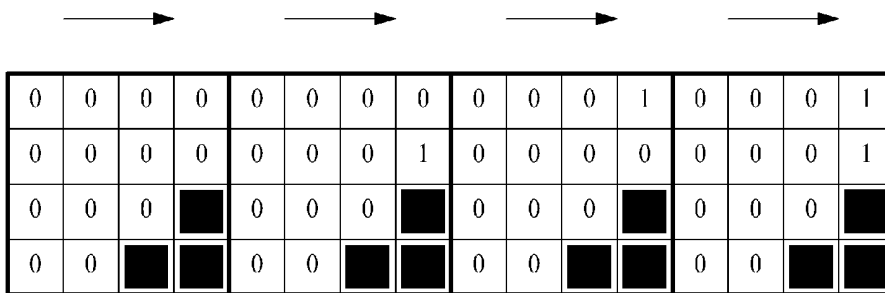
control for converting the second coordinate value into the text data or performing control for creating the image file or the multimedia file from the second coordinate value when the second coordinate value is received from the digital pen interface module.

- [14] The mobile communication terminal as claimed in claim 13, wherein the memory unit stores an installation program comprising the message composition and transmission application, the digital pen interface module, the text conversion module, the file creation module, and the viewer module.
- [15] The mobile communication terminal as claimed in claim 13, wherein the memory unit stores a coordinate range table enumerating X and Y coordinate value ranges of the function button regions and function buttons corresponding to the X and Y coordinate value ranges.
- [16] The mobile communication terminal as claimed in claim 15, wherein the control unit is adapted to determine which of the function button regions the first coordinate value corresponds to with reference to the coordinate range table.
- [17] The mobile communication terminal as claimed in claim 13, wherein the memory unit stores an ID table enumerating button IDs, the button IDs being pattern IDs assigned to respective function button regions, and function buttons corresponding to the button IDs.
- [18] The mobile communication terminal as claimed in claim 17, wherein the control unit is adapted to determine which of the function button regions the button ID corresponds to with reference to the ID table.
- [19] The mobile communication terminal as claimed in claim 13, wherein the file creation module is adapted to create the multimedia file when the control unit has received a first coordinate value or button ID corresponding to a START/END button region among the function button regions.
- [20] The mobile communication terminal as claimed in claim 13, wherein the file creation module is adapted to create the image file when the control unit has received no first coordinate value or button ID corresponding to a START/END button region among the function button regions.

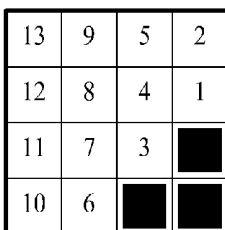
[Fig. 1]



[Fig. 2]



[Fig. 3]



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[Fig. 4]

	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
	0	0	0		0	0	0		0	0	0		0	0	0	
	0	0			0	0			0	0			0	0		
	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
	0	0	0		0	0	0		0	0	0		0	0	0	
	0	0			0	0			0	0			0	0		

[Fig. 5]

1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
1	1	1	0	1	1	1	1	0	0	0	0	0	0	0	1
1	1	1		1	1	1		0	0	0		0	0	0	
1	1			1	1			0	0			0	0		

[Fig. 6]

0	0	0	0
0	0	0	0
0	0	0	
0	0		
0	0	0	0
0	0	0	0
0	0	0	
0	1		
0	0	0	0
0	0	0	0
0	0	0	
1	0		
0	0	0	0
0	0	0	0
0	0	0	
1	1		



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[Fig. 7]

13	12	11	10
9	8	7	6
5	4	3	
2	1		

[Fig. 8]

0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0		0	0	0	
0	0			0	0		
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0		0	0	0	
0	1			0	1		
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0		0	0	0	
1	0			1	0		
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0		0	0	0	
1	1			1	1		

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[Fig. 9]

1	1	1	1
1	1	1	1
1	1	1	
1	0		
1	1	1	1
1	1	1	1
1	1	1	
1	1		
0	0	0	0
0	0	0	0
0	0	0	
0	0		
0	0	0	0
0	0	0	0
0	0	0	
0	1		

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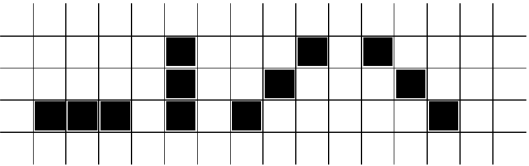
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[Fig. 10]

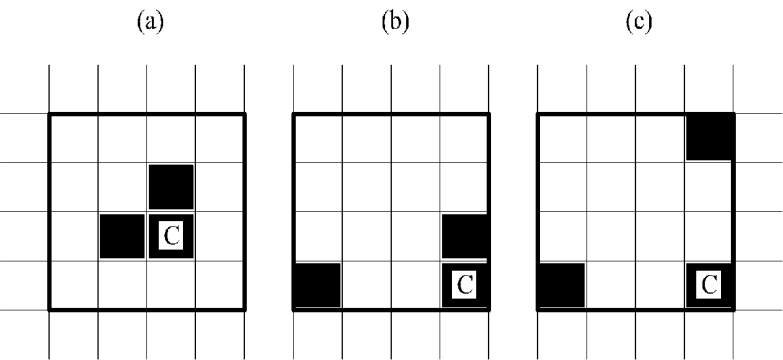
(x,y)

(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(1,0)	(0,0)	(0,0)	(0,0)	(1,0)
(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(1,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(1,0)
(0,0)	(0,0)	(0,0)	■	(0,0)	(0,0)	(0,0)	■	(0,0)	(0,0)	(0,0)	■	(0,0)	(0,0)	(0,0)	(0,0)	■
(0,0)	(0,0)	■	■	(0,0)	(0,0)	■	■	(0,0)	(0,0)	■	■	(0,0)	(0,0)	■	■	■
(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(1,0)	(0,0)	(0,0)	(0,0)	(1,0)
(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(1,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(1,0)
(0,0)	(0,0)	(0,0)	■	(0,0)	(0,0)	(0,0)	■	(0,0)	(0,0)	(0,0)	■	(0,0)	(0,0)	(0,0)	(0,0)	■
(0,0)	(0,1)	■	■	(0,0)	(0,1)	■	■	(0,0)	(0,1)	■	■	(0,0)	(0,1)	■	■	■
(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(1,0)	(0,0)	(0,0)	(0,0)	(1,0)
(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(1,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(1,0)
(0,0)	(0,0)	(0,0)	■	(0,0)	(0,0)	(0,0)	■	(0,0)	(0,0)	(0,0)	■	(0,0)	(0,0)	(0,0)	(0,0)	■
(0,1)	(0,0)	■	■	(0,1)	(0,0)	■	■	(0,1)	(0,0)	■	■	(0,1)	(0,0)	■	■	■
(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(1,0)	(0,0)	(0,0)	(0,0)	(1,0)
(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(1,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(1,0)
(0,0)	(0,0)	(0,0)	■	(0,0)	(0,0)	(0,0)	■	(0,0)	(0,0)	(0,0)	■	(0,0)	(0,0)	(0,0)	(0,0)	■
(0,1)	(0,1)	■	■	(0,1)	(0,1)	■	■	(0,1)	(0,1)	■	■	(0,1)	(0,1)	■	■	■

[Fig. 11]



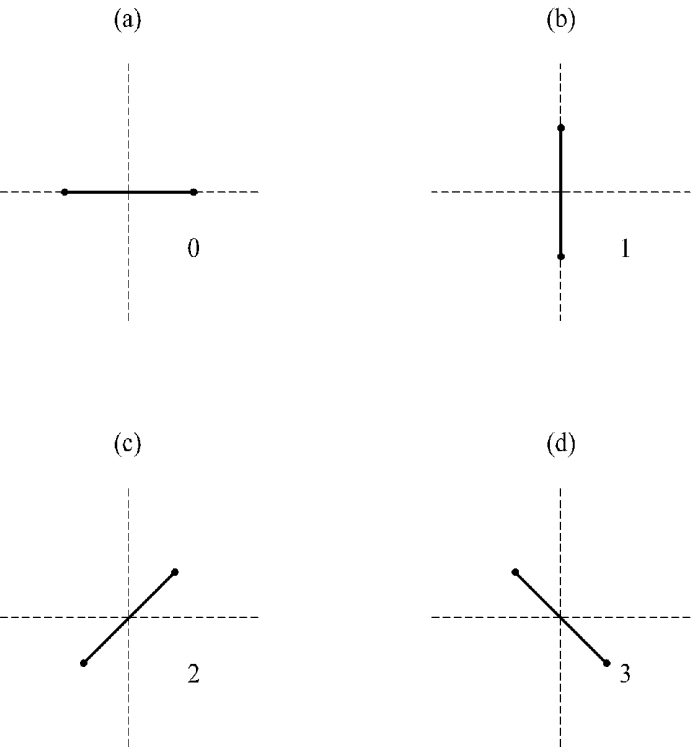
[Fig. 12]



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[Fig. 13]



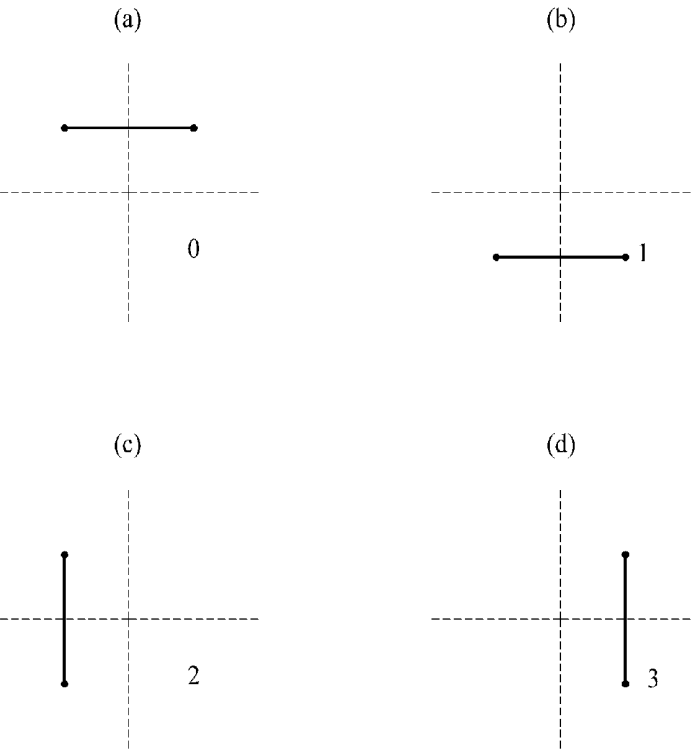
[Fig. 14]

Meaning Value of Code	X	Y
0	1	1
1	0	1
2	1	0
3	0	0

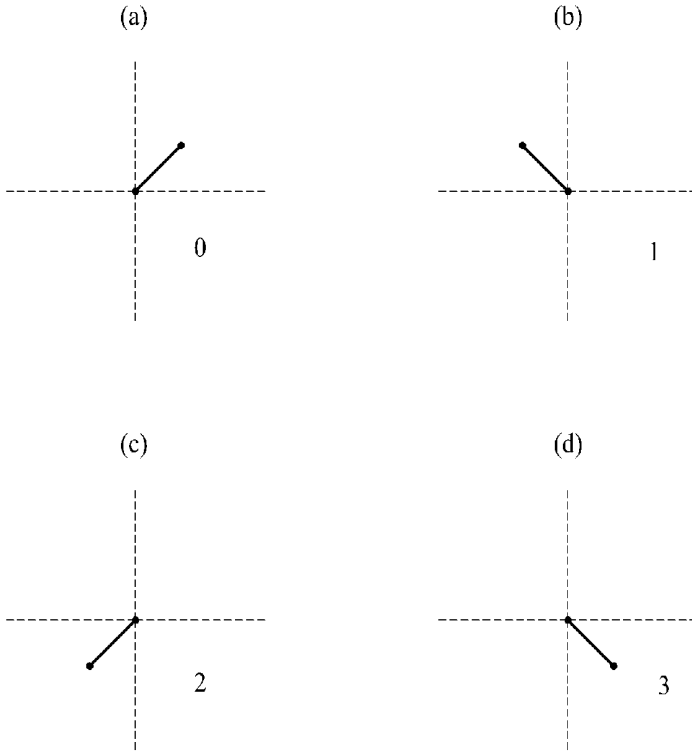
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[Fig. 15]



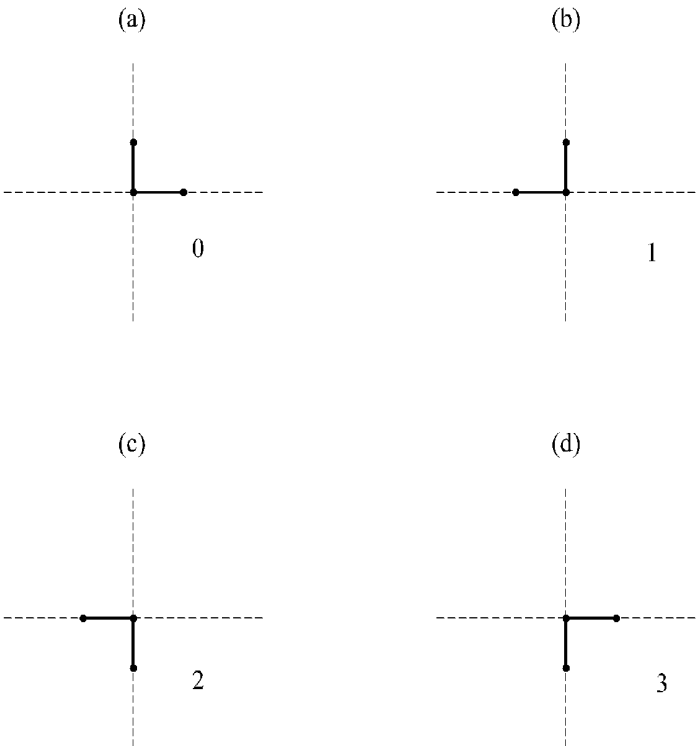
[Fig. 16]



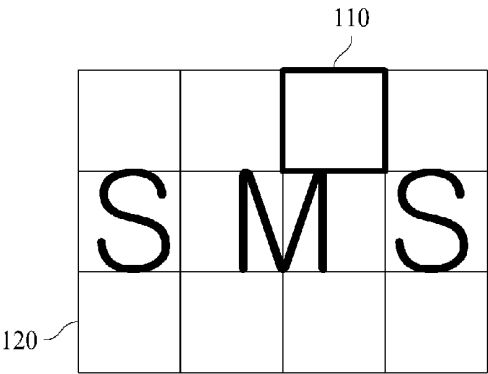
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[Fig. 17]



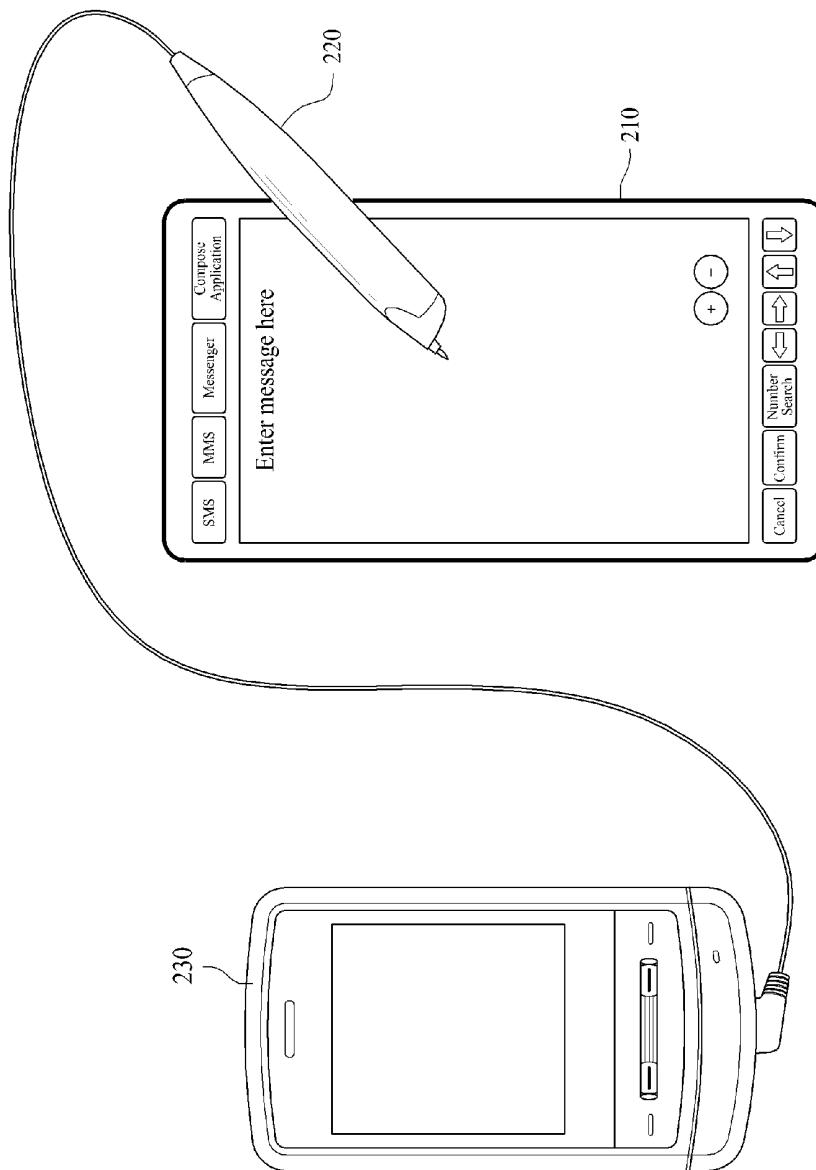
[Fig. 18]



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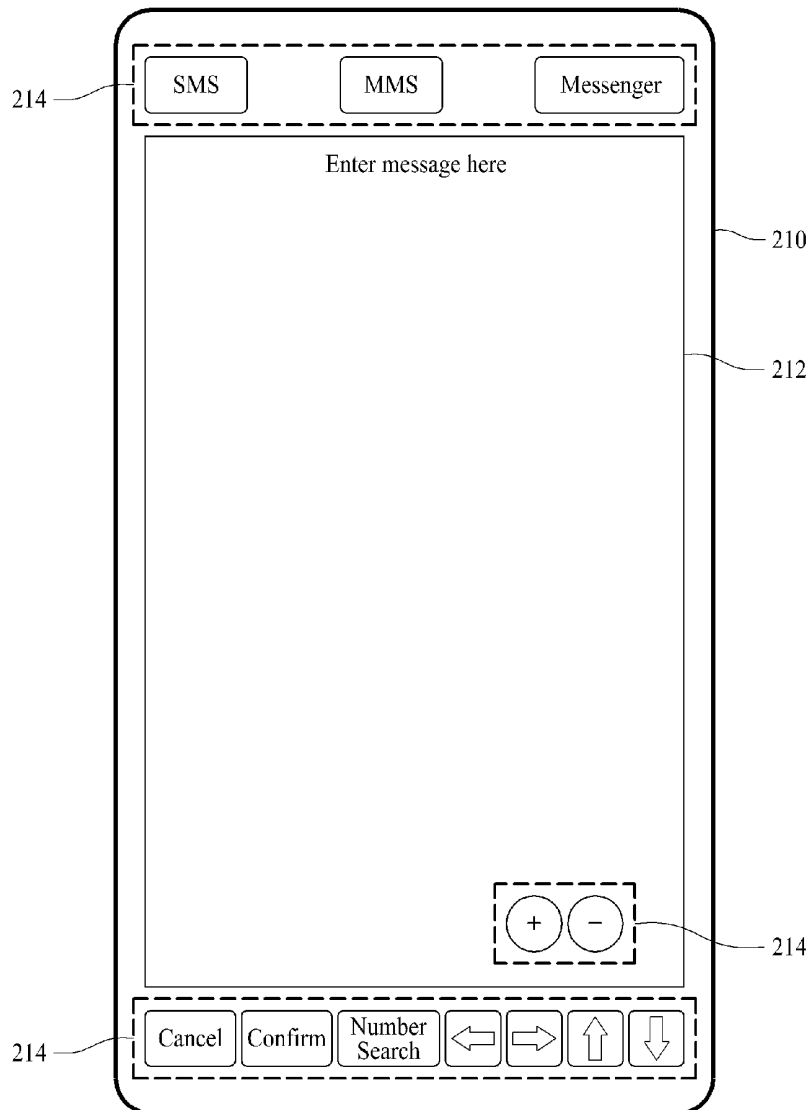
[Fig. 19]



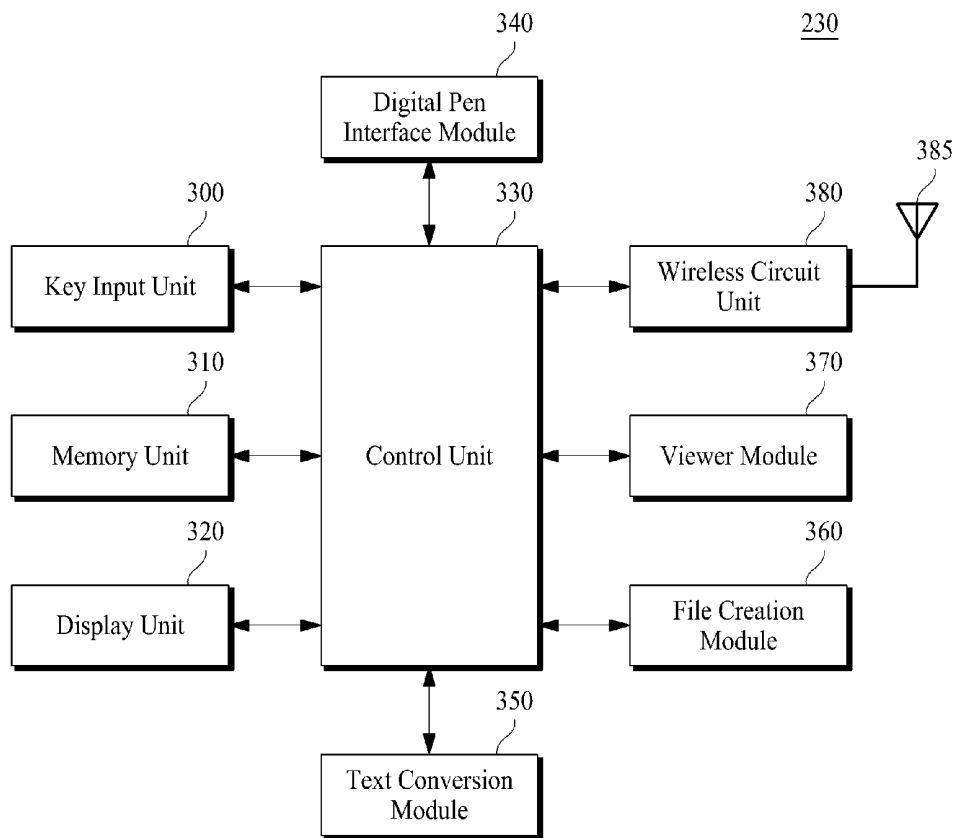
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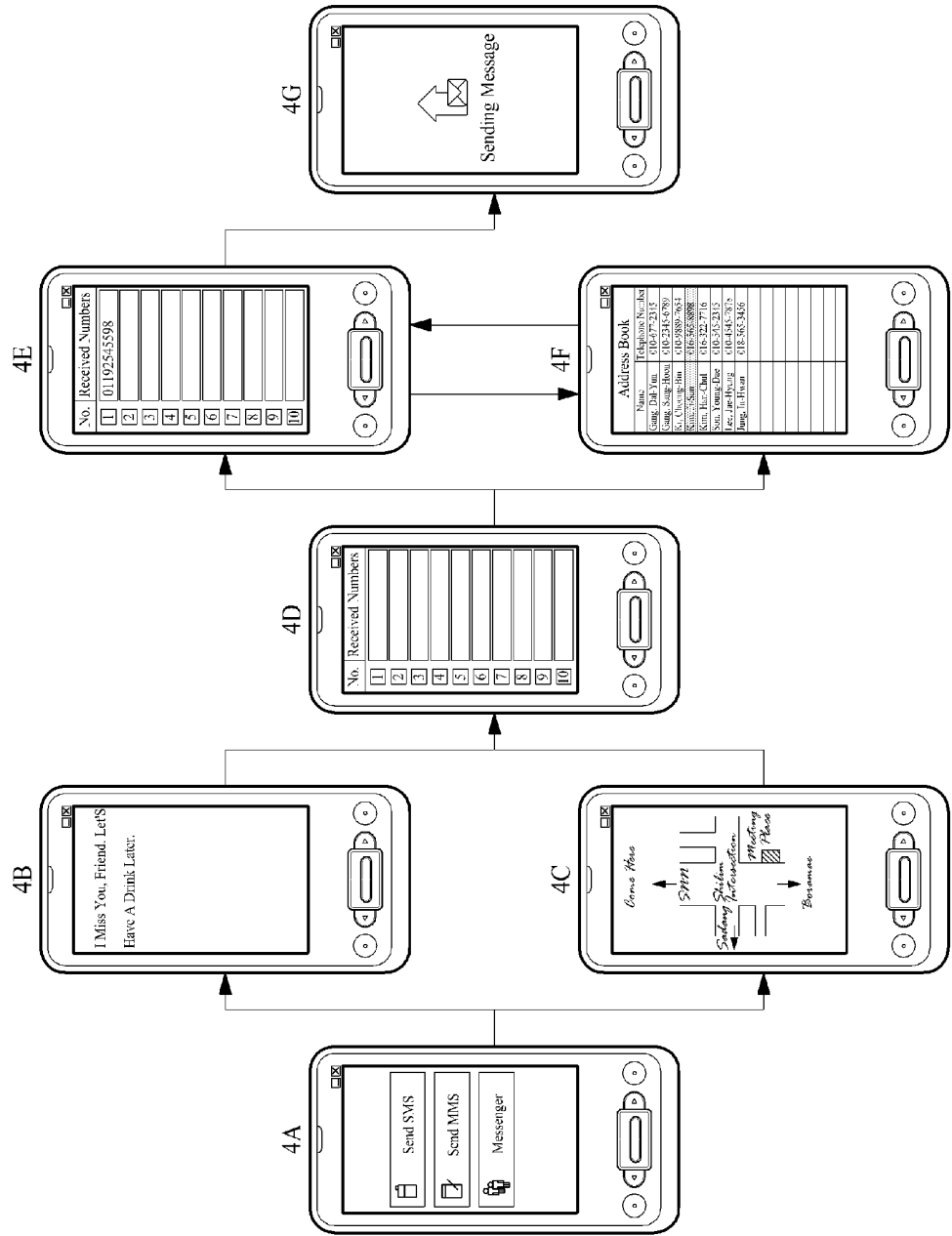
[Fig. 20]



[Fig. 21]



[Fig. 22]



[Fig. 23]

X, Y Coordinate Range	Function Button
(75 ~ 100, 77 ~ 110)	SMS Button
(113 ~ 138, 77 ~ 110)	MMS Button
(151 ~ 176, 77 ~ 110)	Messenger Button
(160 ~ 170, 460 ~ 493)	Movement Button (Up)
(173 ~ 183, 460 ~ 493)	Movement Button (Down)
⋮	⋮
(x1 ~ x2, y1 ~ y2)	Start/End Button

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[Fig. 24]

Button ID	Function Button
001	Confirm Button
002	Menu Button
003	SMS Button
004	Messenger Button
005	MMS Button
006	Movement Button (Up)
007	Movement Button (Down)
⋮	⋮
014	Start/End Button

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2008/001729**A. CLASSIFICATION OF SUBJECT MATTER****H04Q 7/20(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 H04Q, G06F, G09G

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

Korean Utility models and applications for Utility models since 1975

Japanese Utility models and applications for Utility models since 1975

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

eKIPASS(KIPO internal)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- A	US 2003 0117381 A1 (YUAN-HENG WU et al.) 26 June 2003 See abstract, Paragraph [0016] & Fig. 1	13-20 ----- 1-12
A	US 7 003 308 B1 (PAUL HENRY FUOSS et al.) 21 February 2006 See abstract	1-20
A	US 6 295 372 B1 (JEFFREY C. HAWKINS et al.) 25 September 2001 See Column 5, Line 11 - Line 65 & Figs. 5a-5b	1-20
A	JAEJUN LEE et al. 'Design of a wireless handwriting input system for mobile devices' In: Proceedings of the Ninth International Symposium on Consumer Electronics, 2005. (ISCE 2005), 14-16 June 2005, pp 222-225, ISBN 0-7803-8920-4 See page 223 & Fig. 3	1-20



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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"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

14 JULY 2008 (14.07.2008)

Date of mailing of the international search report

14 JULY 2008 (14.07.2008)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
Government Complex-Daejeon, 139 Seonsa-ro, Seo-gu,
Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

YEO, Won Hyeon

Telephone No. 82-42-481-5696



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2008/001729

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2003-0117381 A1	26.06.2003	EP 1331546 A2 EP 1331546 A3 JP 2003-196016 US 6724375 B2	30.07.2003 12.07.2006 11.07.2003 20.04.2004
US 7003308 B1	21.02.2006	None	None
US 6295372 B1	25.09.2001	US 2002-028018 A1	07.03.2002