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(54) **DISPLAY APPARATUS AND METHOD FOR CONTROLLING THEREOF**

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(57) **ABSTRACT**

A display apparatus includes a plurality of cabinets configured to be arranged to form a screen of the display apparatus, each cabinet of the plurality of cabinets including at least one display module, the plurality of cabinets disposed to be adjacent to one another to form a screen of the display apparatus, a plurality of wireless communicators provided in each cabinet of the plurality of cabinets, and a processor configured to, based on a first cabinet among the plurality of cabinets receiving a signal from at least one adjacent cabinet that is adjacent to the first cabinet via at least one wireless communicator provided in the first cabinet, transmit the signal to adjacent cabinets that are adjacent to the first cabinet via a plurality of wireless communicators provided in the first cabinet, and based on the plurality of cabinets receiving the signal according to the transmission, control a display module of each cabinet of the plurality of cabinets to display an image corresponding to each cabinet through each cabinet based on the signal.

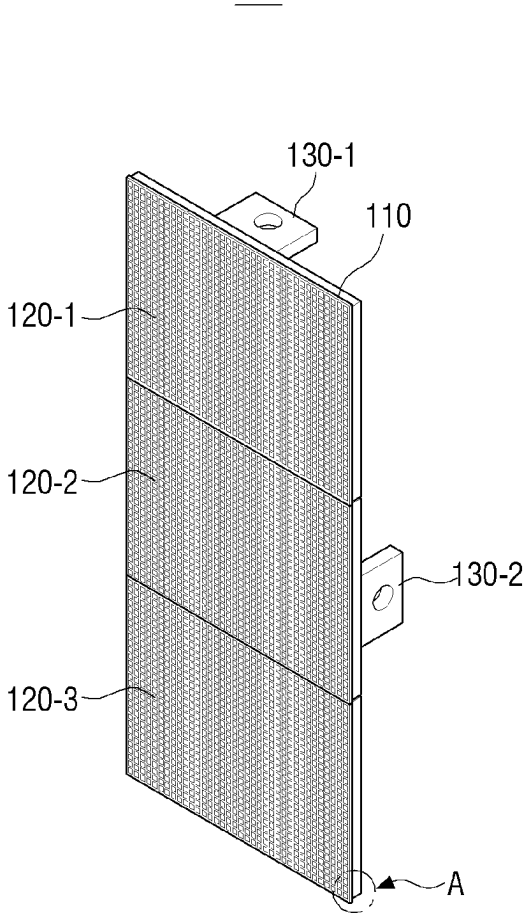


FIG. 1A

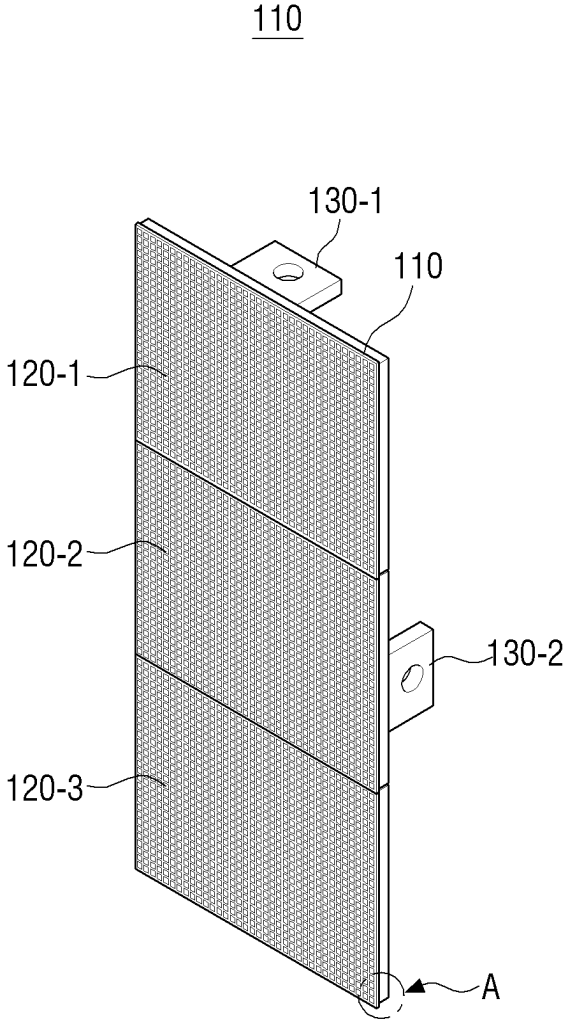


FIG. 1B

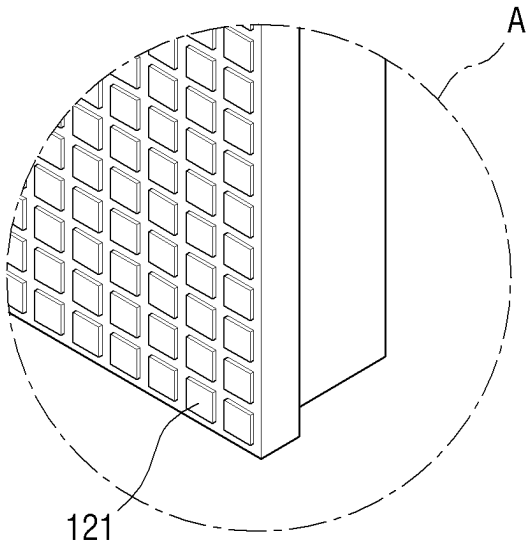


FIG. 1C

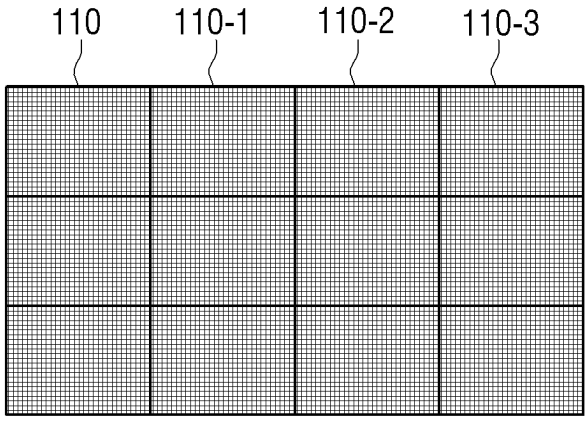


FIG. 2

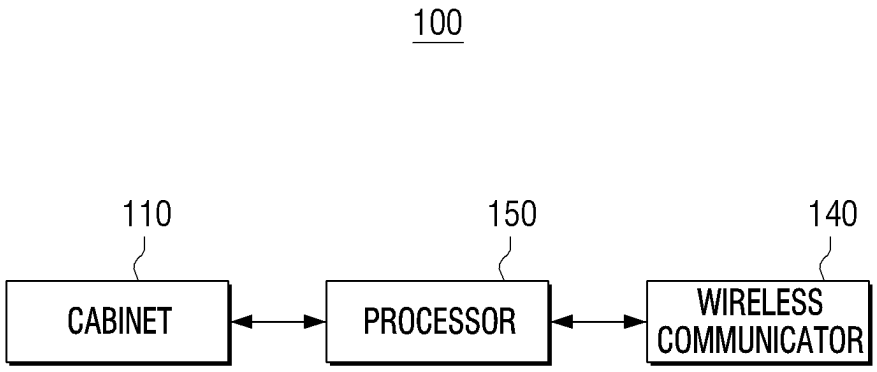


FIG. 3

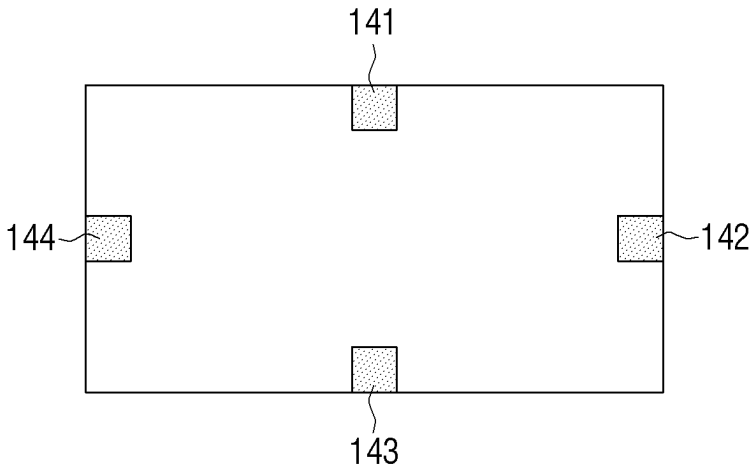


FIG. 4

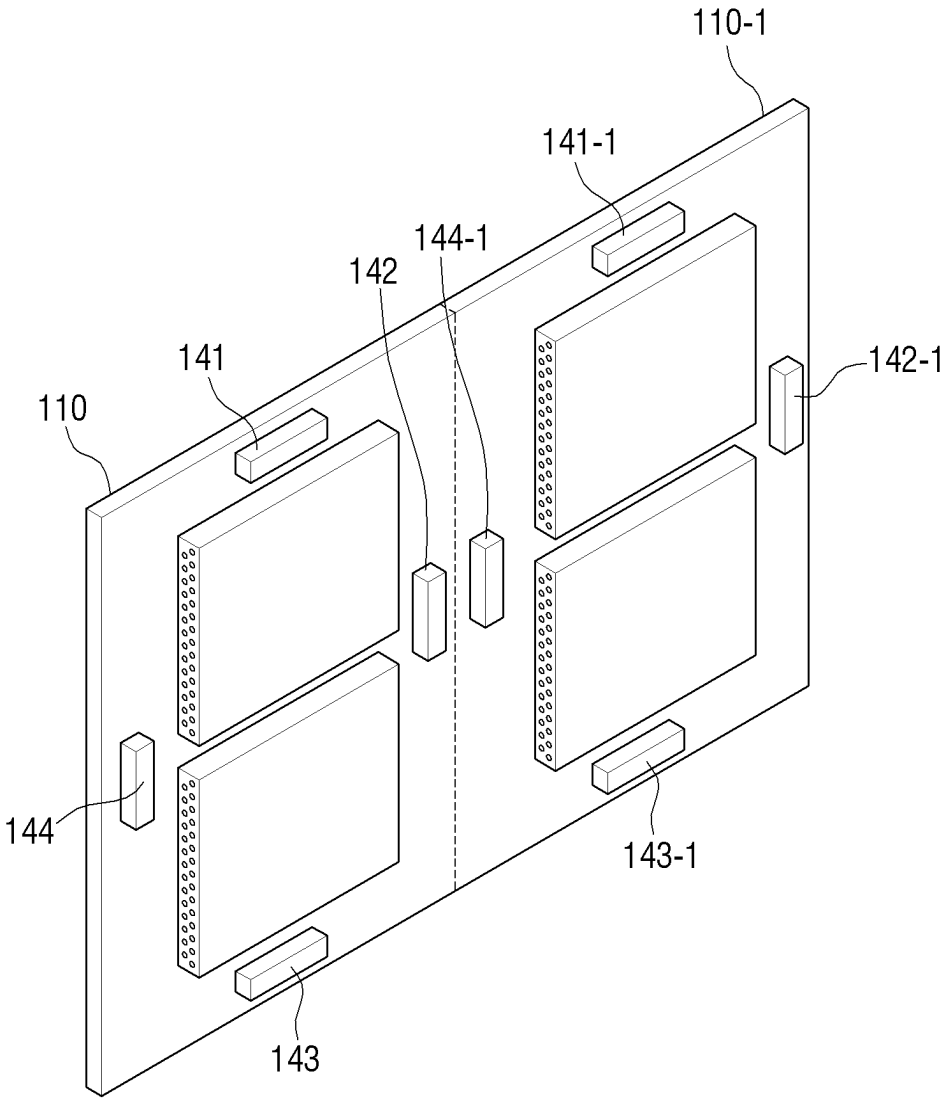


FIG. 5

100

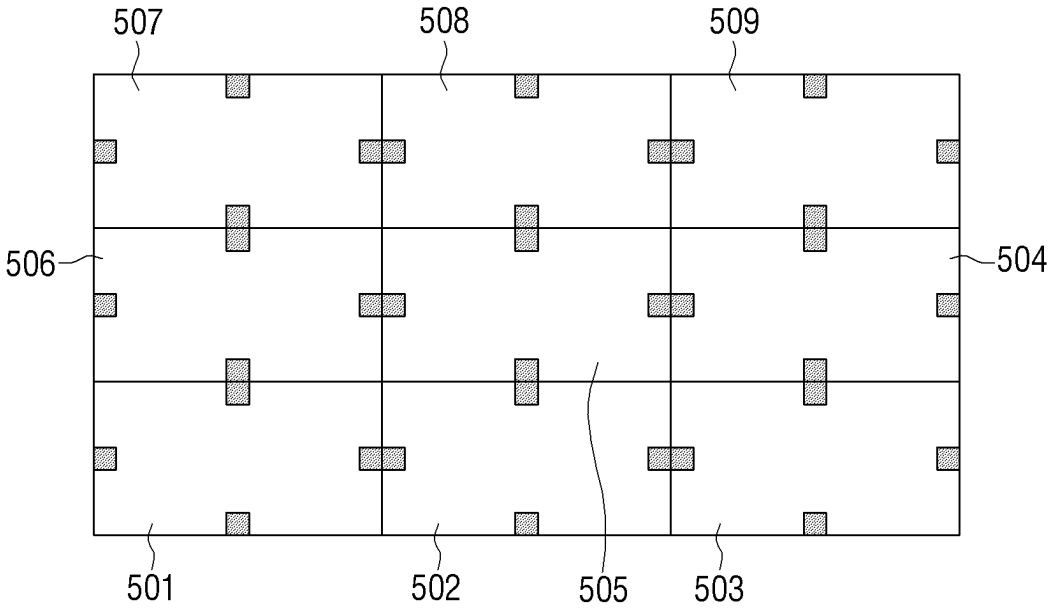


FIG. 6

100

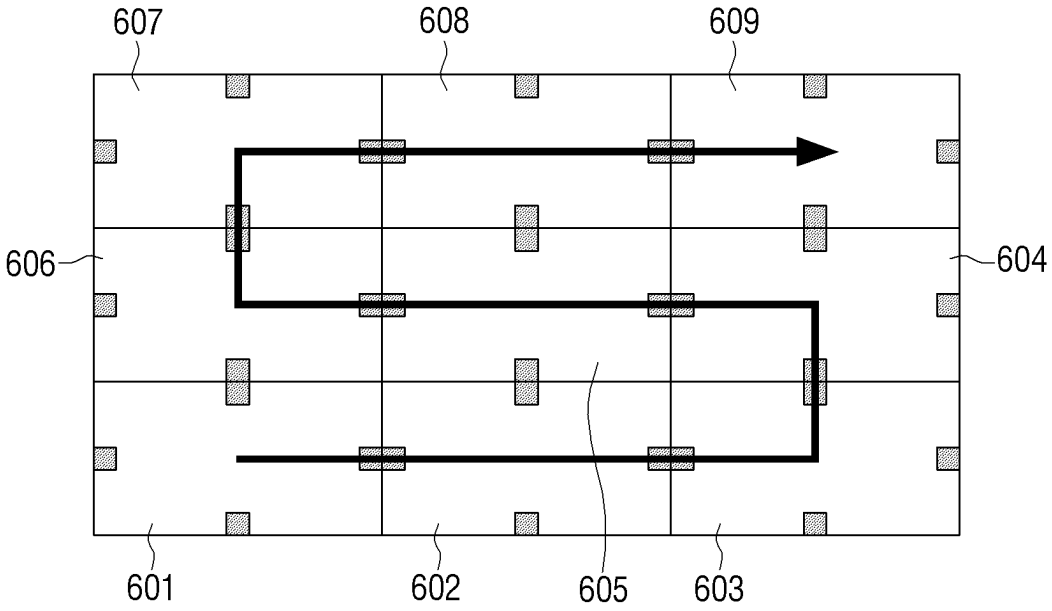


FIG. 7

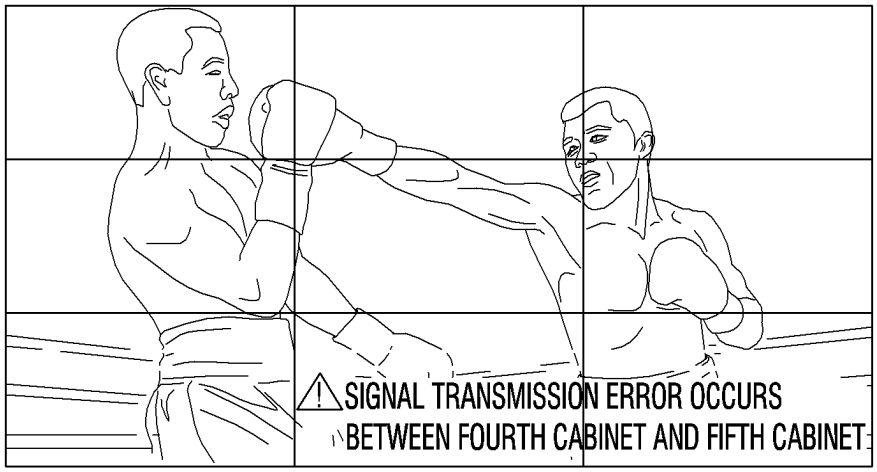

⚠SIGNAL TRANSMISSION ERROR OCCURS
BETWEEN FOURTH CABINET AND FIFTH CABINET

FIG. 8

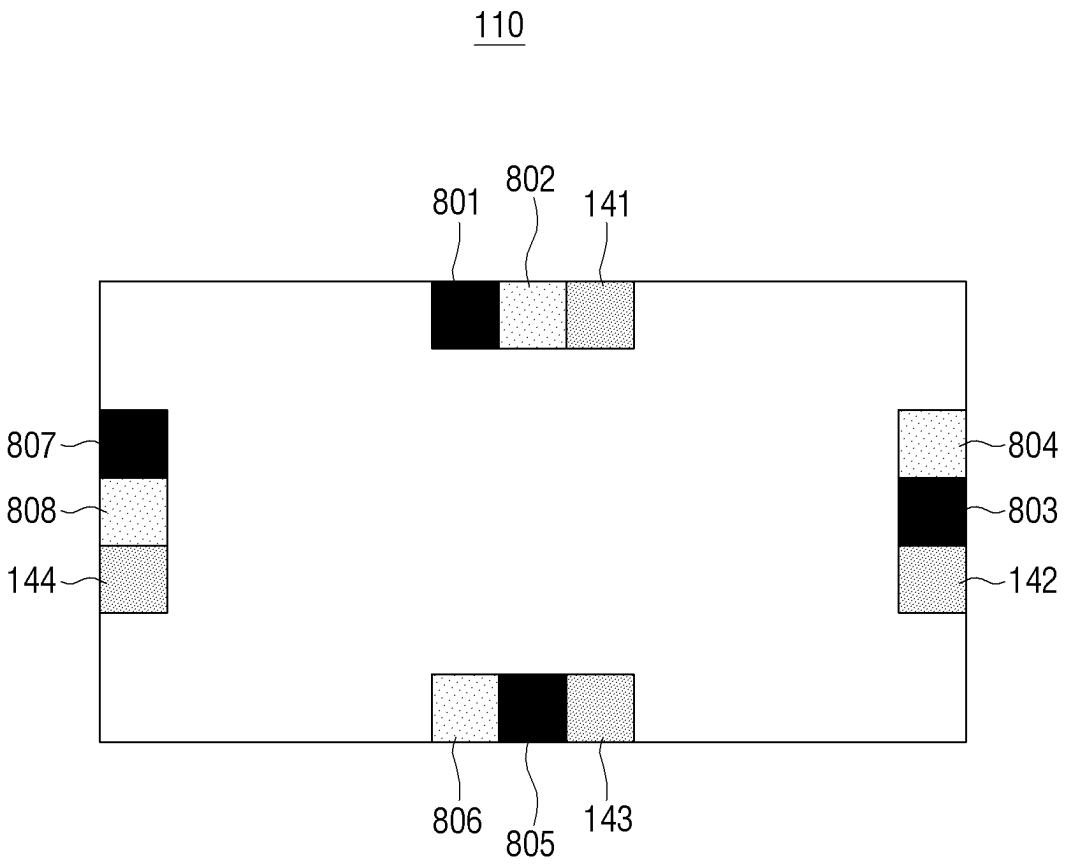


FIG. 9

100

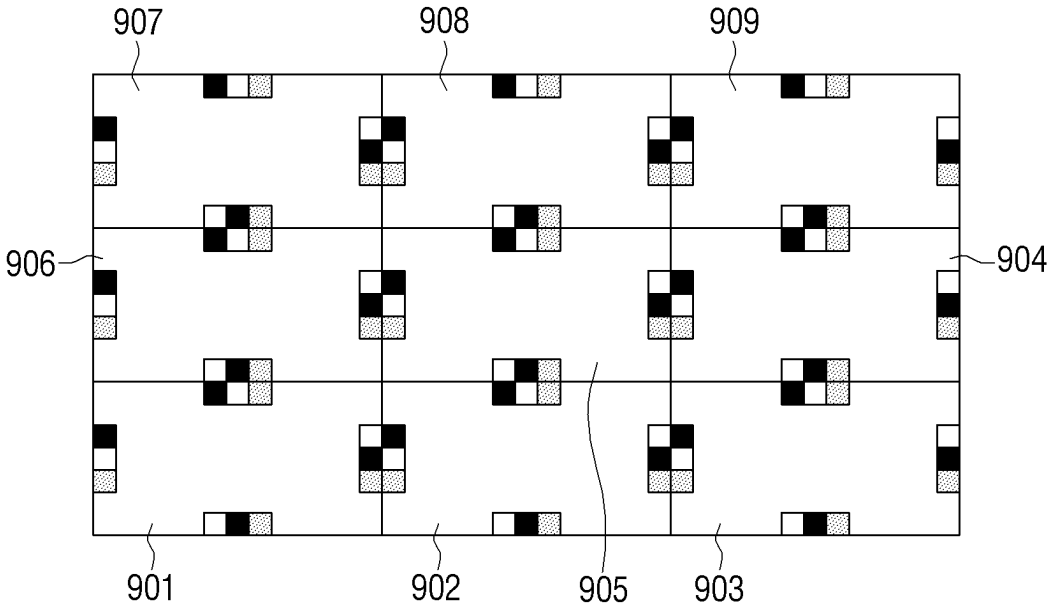


FIG. 10

Hall Sensor Flag	DC Flag	Tx/Rx	REMARK
1,2	No problem	2/-	FIRST ROW LEFT SIDE CORNER
1,2,4	No problem	2/4	FIRST ROW HORIZONTAL DIRECTION
1,4	No problem	1/2	FIRST ROW RIGHT SIDE CORNER
1,3,4	3 or 4	4/3 or 1/4	ACTIVATE Tx CORRESPODING TO Rx AT WHICH DC INPUT IS RECEIVED
1,2,3,4	2 or 4	4/2 or 2/4	ACTIVATE Tx CORRESPODING TO Rx AT WHICH DC INPUT IS RECEIVED
1,2,3	2 or 3	1/2 or 2/3	ACTIVATE Tx CORRESPODING TO Rx AT WHICH DC INPUT IS RECEIVED
2,3	No problem	3/2	LAST ROW LEFT SIDE CORNER
2,3,4	No problem	4/2	LAST ROW HORIZONTAL DIRECTION
3,4	No problem	-/4	LAST ROW RIGHT SIDE CORDER

FIG. 11

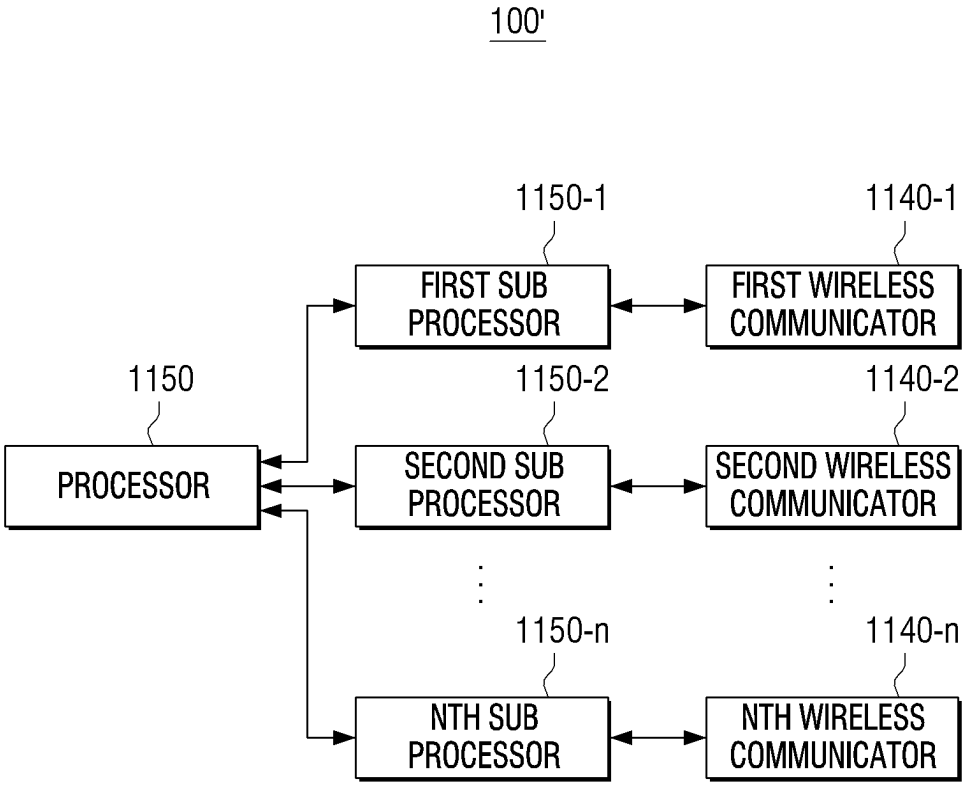
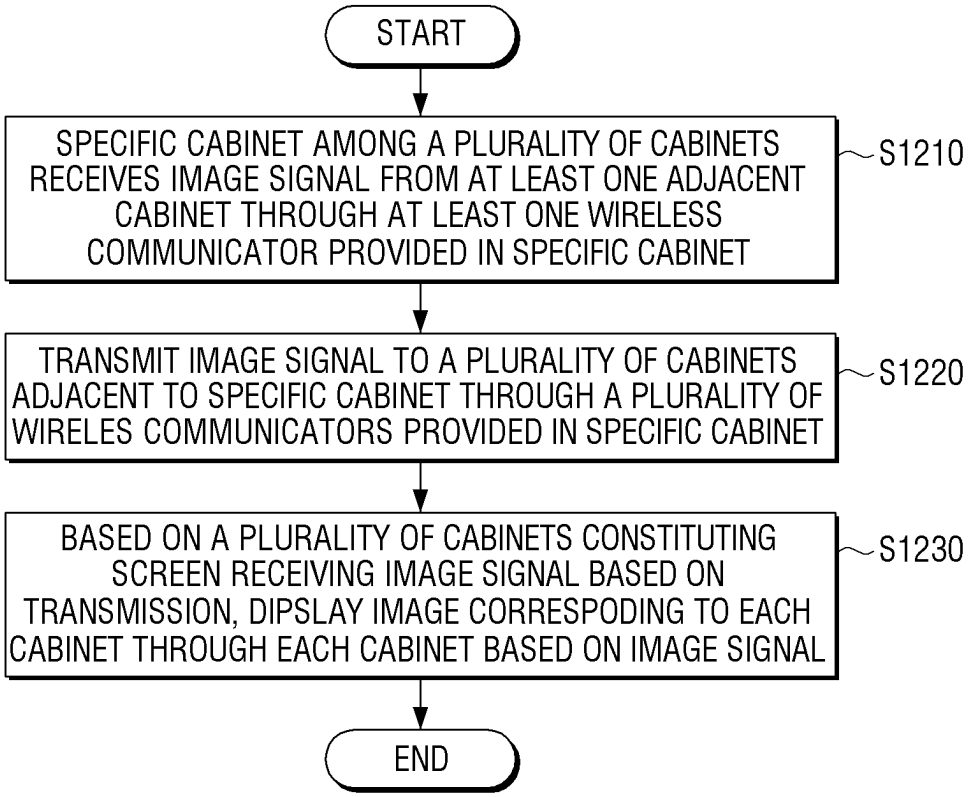

100'
1150-1
1140-1
FIRST SUB PROCESSOR
FIRST WIRELESS COMMUNICATOR
1150
1150-2
1140-2
PROCESSOR
SECOND SUB PROCESSOR
SECOND WIRELESS COMMUNICATOR
1150-n
1140-n
NTH SUB PROCESSOR
NTH WIRELESS COMMUNICATOR

FIG. 12


START
SPECIFIC CABINET AMONG A PLURALITY OF CABINETS RECEIVES IMAGE SIGNAL FROM AT LEAST ONE ADJACENT CABINET THROUGH AT LEAST ONE WIRELESS COMMUNICATOR PROVIDED IN SPECIFIC CABINET
S1210
TRANSMIT IMAGE SIGNAL TO A PLURALITY OF CABINETS ADJACENT TO SPECIFIC CABINET THROUGH A PLURALITY OF WIRELES COMMUNICATORS PROVIDED IN SPECIFIC CABINET
S1220
BASED ON A PLURALITY OF CABINETS CONSTITUTING SCREEN RECEIVING IMAGE SIGNAL BASED ON TRANSMISSION, DIPSLAY IMAGE CORRESPODING TO EACH CABINET THROUGH EACH CABINET BASED ON IMAGE SIGNAL
S1230
END

DISPLAY APPARATUS AND METHOD FOR CONTROLLING THEREOF

CROSS-REFERENCE TO RELATED APPLICATION(S)

[0001] This application is a Continuation Application of U.S. application Ser. No. 17/688,254, filed on Mar. 7, 2022, which is a continuation of U.S. application Ser. No. 16/458,667, filed on Jul. 1, 2019, which issued as U.S. Pat. No. 11,269,578, which is based on and claims priority from Korean Patent Application No. 10-2018-0076571, filed on Jul. 2, 2018, in the Korean Intellectual Property Office, the disclosures of which are incorporated by reference herein in their entirety.

BACKGROUND

1. Field

[0002] The disclosure relates to a display apparatus and a controlling method thereof, and more particularly, to a display apparatus for performing wireless communication and a controlling method thereof.

2. Description of Related Art

[0003] With advances in electronic technology, various types of electronic apparatuses that live up to user's needs have been developed. Particularly, the development on a modular display apparatus with a plurality of display apparatuses combined to display an image as a single screen has been ongoing.

[0004] In the case of a modular display apparatus in the related art, a plurality of display apparatuses are connected to one another through wired cables.

[0005] For example, in the case of a modular display apparatus in which first to fourth display apparatuses are combined in a 2×2 arrangement, the first and second display apparatuses, the second and third display apparatuses, and third and fourth display apparatuses are connected to each other through wired cables, and the modular display apparatus provides an image by sequentially transmitting image signals received through an external device to the display apparatuses connected through wired cables.

[0006] However, when a plurality of display apparatuses are connected through wired cables, if a signal transmission error occurs in any one wired cable, the display apparatus connected to the wired cable, and the other display apparatus connected thereto cannot provide an image.

SUMMARY

[0007] Provided is a modular display apparatus that provides an image through an entire screen even if a signal transmission error occurs in any one display apparatus.

[0008] In accordance with an aspect of the disclosure, there is provided a display apparatus including a plurality of cabinets configured to be arranged to form a screen of the display apparatus, each cabinet of the plurality of cabinets including at least one display module; a plurality of wireless communicators provided in each cabinet of the plurality of cabinets; and a processor configured to: based on a first cabinet of the plurality of cabinets receiving a signal from at least one adjacent cabinet that is adjacent to the first cabinet via at least one wireless communicator provided in the first cabinet, transmit the signal to adjacent cabinets that are adjacent to the first cabinet via a plurality of wireless communicators provided in the first cabinet, and based on the plurality of cabinets receiving the signal according to the transmission, control a display module of each cabinet of the plurality of cabinets to display an image corresponding to each cabinet through each cabinet based on the signal.

[0009] The processor may be further configured to, based on one cabinet of the plurality of cabinets receiving the signal from an external device, transmit the signal to adjacent cabinets that are adjacent to the one cabinet via a plurality of wireless communicators provided in the one cabinet.

[0010] The processor may be further configured to: divide an image frame included in the signal into a plurality of image frames based on identification information of each cabinet, and control each cabinet to display each divided image frame among the plurality of divided image frames.

[0011] The processor may be further configured to: based on one cabinet of the plurality of cabinets being supplied with power from an adjacent cabinet that is adjacent to the one cabinet, identify a cabinet to which power is supplied from among adjacent cabinets that are adjacent to the one cabinet based on a sensing result of a sensor provided in the one cabinet, and control the one cabinet to supply the power to the identified cabinet.

[0012] The processor may be further configured to: based on a second cabinet of the plurality of cabinets being supplied with power from an external source, identify a cabinet to which power is supplied from among adjacent cabinets that are adjacent to the second cabinet based on a sensing result of a sensor provided in the second cabinet, and control the second cabinet to supply the power to the identified cabinet.

[0013] The processor may be further configured to: set identification information of the second cabinet being supplied with power from the external source to a first value; and set identification information of the plurality of cabinets by sequentially increasing identification values in an order from the second cabinet to the cabinet to which power is supplied.

[0014] The processor may be further configured to, based on the signal being received at the first cabinet via the plurality of wireless communicators provided in the first cabinet, control the display module to display the image based on a signal received via a wireless communicator located in a first direction according to a predetermined priority.

[0015] The processor may be further configured to, based on identification that the signal is not received via the wireless communicator located in the first direction, control the display module to display the image based on a signal received via a wireless communicator located in a second direction according to the predetermined priority.

[0016] The processor may be further configured to: generate information related to a transmission error of the wireless communicator located in the first direction, and control the display to display the generated information through at least one cabinet.

[0017] The plurality of wireless communicators may be provided at positions where the plurality of cabinets are coupled to one another.

[0018] In accordance with an aspect of the disclosure, there is provided a method for controlling a display apparatus comprising a plurality of cabinets configured to be

arranged to form a screen of the display apparatus, the method including: receiving a signal at a first cabinet of the plurality of cabinets from at least one adjacent cabinet that is adjacent to the first cabinet via at least one wireless communicator provided in the first cabinet; transmitting the signal to adjacent cabinets that are adjacent to the first cabinet via a plurality of wireless communicators provided in the first cabinet; and based on the plurality of cabinets receiving the signal according to the transmission, displaying an image corresponding to each cabinet of the plurality of cabinets through each cabinet based on the signal.

[0019] The transmitting may include, based on one cabinet of the plurality of cabinets receiving the signal from an external device, transmitting the signal to adjacent cabinets that are adjacent to the one cabinet via a plurality of wireless communicators provided in the one cabinet.

[0020] The displaying may include dividing an image frame included in the signal into a plurality of image frames based on identification information on each cabinet, and displaying each divided image frame of the plurality of divided image frames.

[0021] The method may include based on one cabinet of the plurality of cabinets being supplied with power from an adjacent cabinet that is adjacent to the one cabinet, identifying a cabinet to which power is supplied from among adjacent cabinets that are adjacent to the one cabinet based on a sensing result of a sensor provided in the one cabinet, and controlling the one cabinet to supply the power to the identified cabinet.

[0022] The method may include based on a second cabinet of the plurality of cabinets being supplied with power from an external source, identifying a cabinet to which power is supplied from among a plurality of adjacent cabinets that are adjacent to the second cabinet based on a sensing result of a sensor provided in the second cabinet, and controlling the second cabinet to supply the power to the identified cabinet.

[0023] The method may include based on setting identification information on the second cabinet being supplied with power from the external source to a first value; and setting identification information on the plurality of cabinets by sequentially increasing identification values in an order from the second cabinet to the cabinet to which power is supplied.

[0024] The displaying may include, based on the signal being received at the first cabinet via a plurality of wireless communicators provided in the first cabinet, displaying the image based on a signal received via a wireless communicator located in a first direction according to a predetermined priority.

[0025] The displaying may include, based on identification that the signal is not received via the wireless communicator located in the first direction, displaying the image based on a signal received via a wireless communicator located in a second direction according to the predetermined priority.

[0026] The method may include generating information related to a transmission error of the wireless communicator located in the first direction, and displaying the generated information through at least one cabinet.

[0027] The plurality of wireless communicators may be provided at positions where the first cabinet is coupled to the adjacent cabinets.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] The above and other aspects, features, and advantages of certain embodiments of the present disclosure will be more apparent from the following description taken in conjunction with the accompanying drawings, in which:

[0029] FIGS. **1**A, **1**B, and **1**C are views illustrating a cabinet according to an embodiment;

[0030] FIG. **2** is a block diagram illustrating a display apparatus according to an embodiment;

[0031] FIG. **3** is a view illustrating a wireless communicator according to an embodiment;

[0032] FIG. **4** is a view illustrating an arrangement structure of a wireless communicator according to an embodiment;

[0033] FIG. **5** is a view illustrating a display apparatus combined in a 3×3 arrangement according to an embodiment;

[0034] FIG. **6** is a view illustrating a method for signal processing of a display apparatus according to an embodiment;

[0035] FIG. **7** is a view illustrating an embodiment for displaying a transmission error message by a display apparatus according to an embodiment;

[0036] FIG. **8** is a view illustrating a sensor of a cabinet according to an embodiment;

[0037] FIGS. **9** and **10** are views illustrating a method for setting identification information of each cabinet according to an embodiment;

[0038] FIG. **11** is a flowchart illustrating a method for controlling a display apparatus according to an embodiment; and

[0039] FIG. **12** is a flow chart illustrating a method for controlling a display apparatus according to an embodiment.

DETAILED DESCRIPTION

[0040] The terms used in the specification and the claims are general terms selected in consideration of the functions of the various embodiments of the disclosure. However, these terms may vary depending on intention, legal or technical interpretation, emergence of new technologies, and the like of those skilled in the related art. Further, some of the terms may be ones arbitrarily selected by the applicant. Unless there is a specific definition of a term, the term may be construed based on the overall contents and technological common sense of those skilled in the related art.

[0041] In describing embodiments, detailed description of relevant known functions or components may be omitted if it would obscure the description of the subject matter.

[0042] Embodiments of the disclosure will be described in detail with reference to the accompanying drawings, but the features of the disclosure are not limited thereto.

[0043] FIGS. **1**A, **1**B, and **1**C are views illustrating a cabinet according to an embodiment.

[0044] A cabinet **110** according to an embodiment may include at least one display module.

[0045] For example, referring to FIG. **1**A, the cabinet **110** according to an embodiment may include three display modules **120-1**, **120-2**, and **120-3**. Each of three display modules **120-1**, **120-2** and **120-3** may be physically connected one another.

[0046] Each of the display modules **120-1**, **120-2**, and **120-3** may be embodied as an LED display module including a light emitting diode (LED).

[0047] To be specific, referring to FIG. **1**B, each of the display modules **120-1**, **120-2**, and **120-3** may be embodied as an LED display module including a plurality of LEDs **121**, each of which realizes sub-pixels, i.e., red LED, green LED, and blue LED as one pixel.

[0048] The plurality of pixels may be arranged in a matrix arrangement (e.g., M×N, M and N are natural numbers). To be specific, the matrix arrangement (e.g., M×N, M and N are natural numbers, 16×16 arrangement, 24×24 arrangement, etc.), may have the same arrangement in addition to a different arrangement (e.g., M #N, M and N are natural numbers).

[0049] An LED of the LED display module according to an embodiment may be embodied with a micro LED. The micro LED may be an LED of approximately 5~100 micro size, and may refer to a micro size light emitting element that emits light itself without a color filter.

[0050] However, embodiments are not limited thereto, and the LED display module may be implemented as an organic LED (OLED), an active matrix OLED (AMOLED), a Plasma Display Panel (PDP) or the like. Hereinafter, for convenience of explanation, it is assumed that the display module according to an embodiment of the disclosure is an LED display module.

[0051] Referring to FIG. **1**A, the cabinet **110** according to an embodiment may be embodied in 1×3 arrangement including the plurality of display modules **120-1**, **120-2**, and **120-3**.

[0052] However, the LED display module in the arrangement of 1×3 is only an embodiment, but the arrangement and number of the LED display modules may vary.

[0053] The cabinet **110** may include a base plate for mounting each of the display modules **120-1**, **120-2**, and **120-3**. The base plate may be embodied such that each display module may be attached to a front surface of the base plate. Accordingly, the cabinet **110** according to an embodiment may be embodied as being bezel-less, and in the case of a modular display apparatus with a plurality of cabinets combined, a seamless image between cabinets may be displayed in displaying an image.

[0054] The cabinet **110** according to an embodiment may include a plurality of engaging units **130-1** and **130-2** that can be engaged with another cabinet. Therefore, the cabinet **110** according to an embodiment may be embodied as a modular display apparatus by being engaged with another cabinet.

[0055] For example, referring to FIG. **1**C, the cabinet **110** according to an embodiment may be combined with a plurality of other cabinets **110-1**, **110-2**, and **110-3** in the arrangement of 4×1 to realize a modular display apparatus **100** such as a video wall. The modular display apparatus in the arrangement of 4×1 is only an example, but the arrangement and the number of cabinets may vary.

[0056] FIG. **2** is a block diagram illustrating a display apparatus according to an embodiment.

[0057] Referring to FIG. **2**, a display apparatus **100** according to an embodiment may include a cabinet **110**, a wireless communicator **140**, and a processor **150**.

[0058] For ease of explanation, the description will be made with reference to FIG. **3** to FIG. **5**.

[0059] The cabinet **110** may include at least one display module. For example, the cabinet **110** may include a plurality of display modules connected in the arrangement of 1×3. However, embodiments are not limited thereto, and the arrangement and the number of display modules may vary.

[0060] The cabinet **110** may be engaged with other cabinets. For example, the cabinet **110** may be engaged with a plurality of other cabinets in the arrangement of 4×1.

[0061] Accordingly, the cabinet **110** according to an embodiment may be embodied as a modular display apparatus **100** such as a video wall by being engaged with other cabinets.

[0062] However, the engagement arrangement of the cabinets is not limited thereto, but could vary. That is, a plurality of cabinets may be disposed to be adjacent to each other and embodied in various forms to constitute a screen of the display apparatus **100**.

[0063] The wireless communicator **140** may be provided in each cabinet. To be specific, the wireless communicator **140** may be provided on different sides of the cabinet **110**.

[0064] For example, referring to FIG. **3**, the wireless communicator **140** may include a first wireless communicator **141** provided on the upper side of the cabinet **110**, a second wireless communicator **142** provided on the right side of the cabinet **110**, a third wireless communicator **143** provided at the bottom of the cabinet **110**, and a fourth wireless communicator **144** provided on the left side of the cabinet **110**. **150**

[0065] The wireless communicator **140** may transmit various signals to another cabinet adjacent thereto. The wireless communicator **140** may transmit image signals and control signals to another cabinet adjacent thereto.

[0066] The first wireless communicator **141** may transmit a signal to another cabinet combined with the upper side of the cabinet **110**, and the second wireless communicator **142** may transmit a signal to another cabinet combined with the right side of the cabinet **110**. The third wireless communicator **144** may transmit a signal to another cabinet combined with the lower side of the cabinet **110**, and the fourth wireless communicator **144** may transmit a signal to another cabinet combined with the left side of the cabinet **110**.

[0067] The wireless communicator **140** may be provided in a position to transmit a signal to a cabinet adjacent thereto. The wireless communicator **140** may be provided in a position where a plurality of cabinets are combined with one another.

[0068] Specifically, referring to FIG. **4**, the second wireless communicator **142** provided on the right side of the cabinet **110** may be provided in a positon that transmits and receives a signal to and from the first wireless communicator **144-1** of another cabinet **110-1** combined with the cabinet **110**. In the similar manner, the first, third, and fourth wireless communicators **141**, **143**, and **144** of the cabinet **110** may be provided in a position that transmits and receives a signal to and from a wireless communicator of the another cabinet combined with the cabinet **110** (e.g., wireless communicators **141-1**, **142-1**, **143-1**, and **144-1**).

[0069] However, the arrangement as shown in FIG. **4** is only an example, which means that the arrangement of the wireless communicator **140** is not limited thereto.

[0070] The wireless communicator **140** may transmit power to another adjacent cabinet. The wireless communicator **140** may transmit power in a predetermined direction.

[0071] The predetermined direction may be a direction passing through a plurality of cabinets included in the display apparatus **100**. The detailed description thereof will made below.

[0072] The processor **150** may control the overall operation of the modular display apparatus **100**. The processor **150** may include one or more of a central processing unit (CPU), an application processor (AP), or a communication processor (CP). The processor **150** may be included in each cabinets **110**, **110-1**, **110-2**, **110-3**, and so on.

[0073] When the cabinet **110** receives a signal, the processor **150** may control the wireless communicator **140** to transmit the signal to each of a plurality of cabinets combined the cabinet **110** at which the signal is received.

[0074] The processor **150**, when a specific cabinet, among a plurality of cabinets, receives a signal from at least one adjacent cabinet via at least one wireless communicator provided in the specific cabinet, may transmit the signal to a plurality of cabinets adjacent to the specific cabinet via a plurality of wireless communicators provided in the specific cabinet.

[0075] The signal may be a signal received from an external device or a signal for the image stored in a storage. The external device may be various electronic apparatuses connected to the module display apparatus **100** such as a server, a set-top box, a USB storage, a PC, a smartphone, etc.

[0076] For example, referring to FIG. **5**, it is exemplified that first to ninth cabinets **501**, **502**, **503**, **504**, **505**, **506**, **507**, **508**, and **509** are combined in the arrangement of 3×3.

[0077] Referring to FIG. **5**, the first cabinet **501** may receive a signal from the external device.

[0078] The processor **150** may transmit a signal to each of the second cabinet **502** and the sixth cabinet **506** combined with the first cabinet **501** via a plurality of wireless communicators provided in the first cabinet **501**.

[0079] The processor **150** may transmit the signal transmitted to the second cabinet **502** to each of the first, third, and fifth cabinets **501**, **503** and **505** combined with the second cabinet **502**, and transmit the signal transmitted to the sixth cabinet **506** to each of the first, fifth, and seventh cabinets **501**, **505**, and **507** combined with the sixth cabinet **506**.

[0080] In the similar manner, the processor **150** may transmit the signal transmitted to the third cabinet **503** to each of the second and fourth cabinets **502** and **504** combined with the third cabinet **503**, the signal transmitted to the fifth cabinet **505** to each of the second, fourth, sixth and eighth cabinets **502**, **504**, **506**, and **508**, and the signal transmitted to the seventh cabinet **507** to each of the sixth and eighth cabinets **506** and **508** combined with the seventh cabinet **507**.

[0081] The processor **150** may transmit the signal transmitted to the fourth cabinet **504** to the fifth and ninth cabinets **505** and **509** combined with the fourth cabinet **504**, and the signal transmitted to the eighth cabinet **508** to each of fifth, seventh, and ninth cabinets **505**, **507**, and **509** combined with the eighth cabinet **508**.

[0082] When the signal is received at a plurality of cabinets constituting the screen of the display apparatus **100**, the processor **150** may display an image corresponding to each cabinet through each cabinet based on the signal.

[0083] The processor **150** may divide an image frame included in the signal into a plurality of image frames based on identification information of each cabinet, and control each cabinet to display each divided frame.

[0084] For example, referring to FIG. **5**, when the signal is transmitted to each of the first, second, third, fourth, fifth, sixth, seventh, eighth, and ninth cabinets **501**, **502**, **503**, **504**, **505**, **506**, **507**, **508**, and **509**, the processor **150** may divide the image frame included in the signal into nine sub-frames based on identification information of each of the first, second, third, fourth, fifth, sixth, seventh, eighth, and ninth cabinets **501**, **502**, **503**, **504**, **505**, **506**, **507**, **508**, and **509**. The description on the identification information will be described below.

[0085] The processor **150** may display the divided image frame through each cabinet corresponding to identification information.

[0086] By transmitting the signal received at a specific signal to each of a plurality of cabinets, the display apparatus **100** according to an embodiment may provide an image through an entire screen even if a signal transmission error occurs in any one of cabinets.

[0087] For example, referring to FIG. **5**, even if a signal transmission error occurs between the fourth and fifth cabinets **504**, and **505**, and the fifth cabinet **505** fails to receive a signal from the fourth cabinet **504**, the fifth cabinet **505** may provide an image using the signals received from the second, sixth, and eighth cabinets **502**, **506**, and **508**.

[0088] FIG. **6** is a view illustrating a method for signal processing of a display apparatus according to an embodiment.

[0089] As described above, the cabinet **110** may transmit a signal to another adjacent cabinet via a plurality of wireless communicators provided in the cabinet **110**. The specific cabinet of the display apparatus may receive a plurality of signals from another adjacent cabinet via a plurality of wireless communicators.

[0090] For example, referring to FIG. **6**, when first, second, third, fourth, fifth, sixth, seventh, eighth and ninth cabinets **601**, **602**, **603**, **604**, **605**, **606**, **607**, **608**, and **609** are combined in the arrangement of 3×3, the fifth cabinet **605** may receive a signal from each of the second, fourth, sixth and eighth cabinets **602**, **604**, **606**, and **608**.

[0091] The processor **150** may provide an image based on the signal received via a wireless communicator disposed in a first direction according to a predetermined priority.

[0092] The predetermined priority may be determined variously depending on a user command. For example, referring to FIG. **6**, the priority of each wireless communicator that transmits a signal to each of the first, second, third, . . . , and eighth, and ninth cabinets may be set to be higher than the priority of another wireless communicator.

[0093] The processor **150** may provide an image based on the signal received from the fourth cabinet **604** among the signals transmitted from the second, fourth, sixth, and eighth cabinets **602**, **604**, **606**, and **608** to the fifth cabinet **605**.

[0094] Although a single cabinet receives a plurality of signals, a single signal may be processed by a predetermined priority, and thus a modular display apparatus according to an embodiment may reduce the load of the processor.

[0095] The processor **150**, when it is identified that no signal is received via the wireless communicator in the first direction, may provide an image based on the signal received via the wireless communicator provided in a second direction according to the predetermined priority.

[0096] The processor **150**, when it is identified that no signal is received via a wireless communicator having higher priority, may provide the image through the signal received via a wireless communicator in a following priority.

[0097] Accordingly, the modular display apparatus **100** according to an embodiment may provide an image through an entire screen even if a signal transmission error occurs in any one of the cabinets.

[0098] The processor **150**, when it is identified that no signal is received via the wireless communicator disposed in the first direction, may generate information on the transmission error of the wireless communicator disposed in the first direction, and provide the generated information through at least one cabinet.

[0099] For example, when it is identified that no signal transmission is performed between the fourth and fifth cabinets **404**, and **405**, the processor **150** may display a message that the signal transmission error occurs between the fourth cabinet and the fifth cabinet on one area of the display apparatus **100** as shown in FIG. **7**.

[0100] As shown in FIG. **7**, even if the signal transmission error occurs in the fifth cabinet **605**, the fifth cabinet **605** may provide an image based on the signal received from each of the second, sixth and eighth cabinets **602**, **606**, and **608** other than the fourth cabinet **604**. Therefore, the display apparatus **100** may provide an image through an entire screen.

[0101] FIG. **8** is a view illustrating a sensor of a cabinet according to an embodiment.

[0102] The cabinet **110** according to an embodiment may include a sensor that detects an adjacent cabinet. The sensor may be a magnetic sensor as well as various sensors capable of detecting an adjacent cabinet such as an infrared sensor.

[0103] FIG. **8** is a view illustrating an example embodiment in which a sensor is a magnetic sensor.

[0104] A magnetic body and a magnetic sensor for sensing the magnetic body may be provided on different sides of the cabinet **110**, respectively.

[0105] Referring to FIG. **8**, a first magnetic body **801** and a first sensor **802** may be provided on the upper side of the cabinet **110**, and a second magnetic body **803** and a second sensor **804** may be provided on the right side of the cabinet **110**. A third magnetic body **805** and a third sensor **806** may be provided on the lower side of the cabinet **110**, and a fourth magnetic body **807** and a fourth sensor **808** may be provided on the left side of the cabinet **110**.

[0106] FIG. **9** and FIG. **10** are views illustrating a method for setting identification information of each cabinet according to an embodiment.

[0107] Referring to FIG. **9**, the first, second, third, fourth, fifth, sixth, seventh, eighth and ninth cabinets **901**, **902**, **903**, **904**, **905**, **906**, **907**, **908**, and **909** may be combined in the arrangement of 3×3.

[0108] One of a plurality of cabinets may be supplied with power from an external source. For example, a cabinet **901** disposed at the left bottom may be supplied with power from the external source.

[0109] The processor **150** may sent identification information of a cabinet supplied with power from the external source to a first value. The processor **150** may set identification information of the cabinet **901** disposed at the left bottom to a first identification value.

[0110] The processor **150** may identify a cabinet to which power is supplied among a plurality of cabinets adjacent to the cabinet of the first identification value based on the sensing result of the plurality of sensors provided in the cabinet of the first identification value.

[0111] The processor **150** may identify a cabinet to which power is supplied based on a pre-stored look-up table. The detailed description thereof will be made with reference to FIG. **10**.

[0112] The processor **150** may supply power to the identified cabinet, and set the identification information of the cabinet to which power is supplied to a second identification value.

[0113] In the similar manner, the processor **150** may identify a cabinet to which power is supplied based on the sensing result of the sensor provided in the cabinet of the second identification cabinet, supply power to the identified cabinet, and set the identification information of the cabinet to which the power is supplied to a third identification value.

[0114] The processor **150** may increase the identification values in the order from the cabinet of the first identification value to the cabinet to which power is supplied to set identification information on the plurality of cabinets.

[0115] It has been described that power is supplied and then identification information on the cabinet is set, but the order is not limited thereto. For example, the processor **150** may set the second identification value to the cabinet identified as a cabinet to which power is supplied based on the sensing result of the sensor provided in the cabinet of the first identification cabinet, and supply power to the cabinet of the second identification value.

[0116] FIG. **10** is a view illustrating a method for identifying a cabinet to which power is supplied among a plurality of cabinets adjacent to a cabinet based on a sensing result of a sensor according to an embodiment.

[0117] The processor **150**, when a specific cabinet among a plurality of cabinets receives power from an external source, may identify a cabinet to which power is supplied from among a plurality of cabinets adjacent to the specific cabinet based on the sensing result of the sensor provided in the specific cabinet.

[0118] In the similar manner, the processor **150**, when a specific cabinet among a plurality of cabinets receives power from an adjacent cabinet, may identify a cabinet to which power is supplied from among the plurality of cabinets adjacent to the specific cabinet based on the sensing result of the sensor provided in the specific cabinet.

[0119] The processor **150** may identify a cabinet to which power is supplied according to a look-up table shown in FIG. **10**.

[0120] Referring to FIG. **10**, when an adjacent cabinet is sensed by the first sensor provided on the upper side, and the second sensor provided on the right side among a plurality of sensors provided in the cabinet **110**, the processor **150** may identify the cabinet adjacent to the right side as a cabinet to which power is supplied thorough the second wireless communicator **142**.

[0121] The processor **150**, when the adjacent sensor is sensed by the first sensor provided on the upper side, the second sensor provided on the right side, and the fourth sensor provided on the left side among the plurality of sensors provided in the cabinet **110**, may identify a cabinet adjacent to the right side as a cabinet to which power is supplied via the second wireless communicator **112**.

[0122] The processor **150**, when an adjacent sensor is sensed by the first sensor provided on the upper side, and the fourth sensor provided on the left side among the plurality of sensors provided in the cabinet **110**, may identify a

cabinet adjacent to the upper side as a cabinet to which power is supplied via the first wireless communicator **111**.

[0123] The processor **150**, when an adjacent sensor is sensed by the first sensor provided on the upper side, the third sensor provided on the lower side, and the fourth sensor provided on the left side among the plurality of sensors provided in the cabinet **110**, may identify a cabinet adjacent to the upper side as a cabinet to which power is supplied via the first wireless communicator **111**, or a cabinet adjacent to the left side as a cabinet to which power is supplied via the fourth wireless communicator **144**.

[0124] The processor **150** may determine one of the first and fourth wireless communicators based on the wireless communicator that receives power. The processor **150**, when power is received via the fourth wireless communicator **144**, may identify a cabinet adjacent to the upper side as a cabinet to which power is supplied via the first wireless communicator **111**, and when power is received via the third wireless communicator **143**, may identify a cabinet adjacent to the left side as a cabinet to which power is supplied via the fourth wireless communicator **144**.

[0125] In the same manner, the processor **150** may identify a cabinet to which power is supplied based on the look-up table as shown in FIG. **10**. The above-described technical spirit is applied to the look-up table as shown in FIG. **10**, and thus the detailed description will be omitted.

[0126] The processor **150** may supply power sequentially to the identified cabinet.

[0127] Referring to FIG. **9**, the processor **150** may set identification information of the cabinet **901** to which power is supplied from the external source to a first value.

[0128] When an adjacent cabinet is identified as being sensed through the first and second sensors provided in the cabinet **910** set to be the first identification value, a cabinet **902** adjacent to the right side of the cabinet **901** may be identified as a cabinet to which power is supplied.

[0129] The processor **150** may supply power to the cabinet **902** via the second wireless communicator **142** provided in the cabinet **901**, and set the identification information of the cabinet **902** to which power is supplied as the second identification value.

[0130] In the similar manner, the processor **150** may identify a cabinet to which power is supplied based on the sensing result of the sensor provided in the cabinet **902** of the second identification value, supply power to the identified cabinet, and set the identification information on the cabinet to which power is supplied to a third identification value.

[0131] The processor **150** may set identification information on a plurality of cabinets by sequentially increasing the identification values in the order from the cabinet of the first identification value to the cabinet to which power is supplied.

[0132] Therefore, the identification information of each cabinet may be automatically set.

[0133] FIG. **11** is a block diagram illustrating a display apparatus according to an embodiment.

[0134] Referring to FIG. **11**, a display apparatus **100'** according to an embodiment of the disclosure may include first to nth sub-processors **1150-1** to **1150-*n***, first to nth wireless communicators **1140-1** to **1140-*n***, and a processor **1150**.

[0135] The first to nth sub-processors **1150-1** to **1150-*n*** and the first to nth wireless communicators **1140-1** to **1140-*n*** may be included in the first to nth cabinets, respectively.

[0136] For example, the first sub-processor **1150-1** and the first wireless communicator **1140-1** may be included in the first cabinet. The first wireless communicator **1140-1** may be provided on the upper side, the lower side, the left side, and the right side of the first cabinet.

[0137] The second sub-processor **1150-2** and the second wireless communicator **1140-2** may be included in the second cabinet. The second wireless communicator **1140-2** may be provided on the upper side, the lower side, the left side, and the right side of the second cabinet.

[0138] Similarly, the nth sub-processor **1150-*n*** and the nth wireless communicator **1140-*n*** may be included in the nth cabinet.

[0139] The processor **1150** may control the overall operation of the display apparatus **100'**.

[0140] The processor **1150**, when a signal is received at a specific cabinet, may transmit a signal to each of a plurality of cabinets combined with the specific cabinet that receives the signal.

[0141] When the signal is received at the first cabinet, the processor **1150** may control the first sub-processor **1150-1** to transmit the signal to each of the plurality of cabinets combined with the first cabinet.

[0142] The first sub-processor **1150-1** may control the first wireless communicator **1140-1** to transmit the received signal to each of the plurality of cabinets combined with the first cabinet.

[0143] When the signal is received at the second cabinet, the processor **1150** may control the second sub-processor **1150-2** to transmit the signal to each of the plurality of cabinets combined with the second cabinet.

[0144] The second sub-processor **1150-2** may control the second wireless communicator **1140-2** to transmit the received signal to each of the plurality of cabinets combined with the second cabinet.

[0145] In the similar manner, the processor **1150**, when the signal is received at the nth cabinet, may control the nth sub-processor **1150-*n*** to transmit the signal to each of the plurality of cabinets combined with the nth cabinet.

[0146] The nth sub-processor **1150-*n*** may control the nth wireless communicator **1140-*n*** to transmit the received signal to each of the plurality of cabinets combined with the nth cabinet.

[0147] In the similar manner, when the signal is received at the plurality of cabinets constituting the screen of the display apparatus **100'**, the processor **1150** may display an image corresponding to each cabinet through each cabinet based on the received signal.

[0148] To be specific, the processor **1150**, when the signal is received at the plurality of cabinets, may control each sub-processor to divide an image frame included in the signal based on identification information of each cabinet.

[0149] For example, when the signal is received at the plurality of cabinets, the processor **1150** may control the first sub-processor **1150-1** to divide the image frame included in the signal based on the identification information of the first cabinet, and the second sub-processor **1150-2** to divide the image frame included in the signal based on the identification information of the second cabinet.

[0150] In the similar manner, the processor **1150** may control the nth sub-processor **1150**-*n* to divide the image frame included in the signal based on the identification information on the nth cabinet.

[0151] Each sub-processor may divide the image frame included in the signal based on the identification information of each cabinet, and display the divided image frame through each cabinet.

[0152] FIG. **12** is a flow chart illustrating a method for controlling a display apparatus according to an embodiment.

[0153] A display apparatus according to an embodiment may include a plurality of cabinets constituting a screen of a display apparatus disposed adjacent to one another.

[0154] A specific cabinet (e.g., first cabinet) among a plurality of cabinets of the display apparatus may receive a signal from at least one adjacent cabinet via at least one wireless communicator provided in the specific cabinet at step S**1210**.

[0155] The specific cabinet that receives the signal may transmit the signal to a plurality of cabinets adjacent to the specific cabinet via a plurality of wireless communicators provided in the specific cabinet at step S**1220**.

[0156] When a plurality of cabinets constituting a screen of the display apparatus receives the signal, the display apparatus may display an image corresponding to each cabinet through each cabinet based on the signal at step S**1230**.

[0157] The display apparatus **100** according to an embodiment may transmit the signal received at a specific cabinet to each of a plurality of cabinets to thereby provide an image through an entire screen despite the signal transmission error occurrence of any one of cabinets.

[0158] According to another embodiment, a non-transitory computer readable medium may be provided in which a program for sequentially executing a control method of an electronic apparatus according to the disclosure is stored.

[0159] The non-transitory computer readable medium refers to a medium that stores data semi-permanently rather than storing data for a very short time, such as a register, a cache, and a memory, and is readable by an apparatus. Specifically, the above-described various applications or programs may be stored in a non-transitory computer readable medium such as a compact disc (CD), a digital versatile disk (DVD), a hard disk, a Blu-ray disk, a universal serial bus (USB) memory stick, a memory card, and a read only memory (ROM), and may be provided.

[0160] According to an aspect of one or more embodiments, a modular display apparatus provides an image through an entire screen even if a signal transmission error occurs in any one display apparatus.

[0161] Although embodiments have been shown and described, it will be appreciated by those skilled in the art that changes may be made to these embodiments without departing from the principles and spirit of the disclosure. Accordingly, the scope of the disclosure is not limited to the described embodiments, but is defined by the appended claims as well as equivalents thereto.

What is claimed is:

1. A display module of a plurality of display modules included in a display apparatus, the display module comprising:

a wireless communicator;

a plurality of sensors;

one or more processors;

wherein the one or more processors are configured to:

receive a power from an external source,

obtain a sensing result from at least one sensor among the plurality of sensors,

identify a target display module among at least one display module adjacent to the display module based on the sensing result, and

provide the power to the target display module through the wireless communicator.

2. The display module according to claim **1**, further comprising:

a memory configured to store a look-up table for indicating an arrangement of the plurality of display modules in a matrix form,

wherein the one or more processors are configured to:

identify at least one target sensor that identifies another display module adjacent to the display module based on the sensing result,

identify identification information of the at least one target sensor, and

identify the target display module corresponding to the identification information based on the look-up table.

3. The display module according to claim **1**, wherein the wireless communicator includes a plurality of wireless communicators, and

wherein the one or more processors are configured to:

identify a target wireless communicator adjacent to the target display module among the plurality of wireless communicators.

4. The display module according to claim **1**, wherein a number of the plurality of sensors is same as a number of the plurality of wireless communicators.

5. The display module according to claim **1**, wherein each of the plurality of sensors is disposed at each position adjacent to each of the plurality of wireless communicators.

6. The display module according to claim **1**, wherein the plurality of sensors include a first sensor, a second sensor, a third sensor and a fourth sensor,

wherein the first sensor is disposed at an upper side of the display module,

wherein the second sensor is disposed at a right side of the display module,

wherein the third sensor is disposed at a lower side of the display module, and

wherein the fourth sensor is disposed at a left side of the display module.

7. The display module according to claim **6**, wherein the one or more processors are configured to:

based on at least one adjacent display module being sensed by the first sensor and the second sensor, provide the power to a display module adjacent to a first direction as the target display module, and

based on at least one adjacent display module being sensed by the first sensor, the second sensor and the fourth sensor, provide the power to a display module adjacent to the first direction as the target display module.

8. The display module according to claim **7**, wherein the one or more processors are configured to:

based on at least one adjacent display module being sensed by the first sensor and the fourth sensor, provide the power to a display module adjacent to a second direction as the target display module.

9. The display module according to claim 8, wherein the one or more processors are configured to:

based on at least one adjacent display module being sensed by the first sensor, the third sensor and the fourth sensor, provide the power to a display module adjacent to a third direction as the target display module, and

based on at least one adjacent display module being sensed by the first sensor, the second sensor, the third sensor and the fourth sensor, provide the power to a display module adjacent to the third direction as the target display module.

10. The display module according to claim 9, wherein the one or more processors are configured to:

based on at least one adjacent display module being sensed by the first sensor, the second sensor and the third sensor, provide the power to a display module adjacent to the second direction as the target display module.

11. The display module according to claim 10, wherein the one or more processors are configured to:

based on at least one adjacent display module being sensed by the second sensor and the third sensor, provide the power to a display module adjacent to the first direction as the target display module, and

based on at least one adjacent display module being sensed by the second sensor, the third sensor and the fourth sensor, provide the power to a display module adjacent to the first direction as the target display module.

12. The display module according to claim 11, wherein the one or more processors are configured to:

based on at least one adjacent display module being sensed by the third sensor and the fourth sensor, do not provide the power to an adjacent display module.

13. The display module according to claim 12, wherein the second direction is perpendicular to the first direction, and

wherein the third direction is opposite to the first direction.

14. The display module according to claim 12, wherein the first direction is a right direction,

wherein the second direction is an upper direction, and

wherein the third direction is a left direction.

15. A method of controlling a display module of a plurality of display modules included in a display apparatus, wherein the display module comprises a wireless communicator, and a plurality of sensors,

the method comprising:

receiving a power from an external source,

obtaining a sensing result from at least one sensor among the plurality of sensors,

identifying a target display module among at least one display module adjacent to the display module based on the sensing result, and

providing the power to the target display module through the wireless communicator.

16. The method as claimed in claim 15, wherein the display module further comprises a memory storing a look-up table for indicating an arrangement of the plurality of display modules in a matrix form,

wherein the identifying the target display module comprises:

identifying at least one target sensor that identifies another display module adjacent to the display module based on the sensing result,

identifying identification information of the at least one target sensor, and

identifying the target display module corresponding to the identification information based on the look-up table.

17. The method as claimed in claim 15, wherein the wireless communicator includes a plurality of wireless communicators, and

wherein the method further comprising:

identifying a target wireless communicator adjacent to the target display module among the plurality of wireless communicators.

18. The method as claimed in claim 15, wherein a number of the plurality of sensors is same as a number of the plurality of wireless communicators.

19. The method as claimed in claim 15, wherein each of the plurality of sensors is disposed at each position adjacent to each of the plurality of wireless communicators.

20. The method as claimed in claim 15, wherein the plurality of sensors include a first sensor, a second sensor, a third sensor and a fourth sensor,

wherein the first sensor is disposed at an upper side of the display module,

wherein the second sensor is disposed at a right side of the display module,

wherein the third sensor is disposed at a lower side of the display module, and

wherein the fourth sensor is disposed at a left side of the display module.

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