US012395584B2

(12) **United States Patent**
Yoon et al.

(10) **Patent No.: US 12,395,584 B2**
(45) **Date of Patent: Aug. 19, 2025**

(54) **ELECTRONIC DEVICE FOR PROVIDING BOTH SHARED SCREEN AND PRIVATE SCREEN, AND CONTROL METHOD THEREFOR**

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

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 421 days.

(21) Appl. No.: **18/099,415**

(22) Filed: **Jan. 20, 2023**

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Related U.S. Application Data

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(30) **Foreign Application Priority Data**

Jul. 22, 2020 (KR) 10-2020-0091298

(51) **Int. Cl.**
H04W 48/18 (2009.01)
G06F 1/16 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***H04M 1/72484*** (2021.01); ***G06F 1/1624*** (2013.01); ***G06F 1/1652*** (2013.01); ***H04M 1/72469*** (2021.01)

(58) **Field of Classification Search**
CPC G06F 1/1677; G06F 3/0443; G06F 3/0412; G06F 1/1652; B64D 11/0015; B64D 45/00; G01N 27/02; G01N 27/046
See application file for complete search history.

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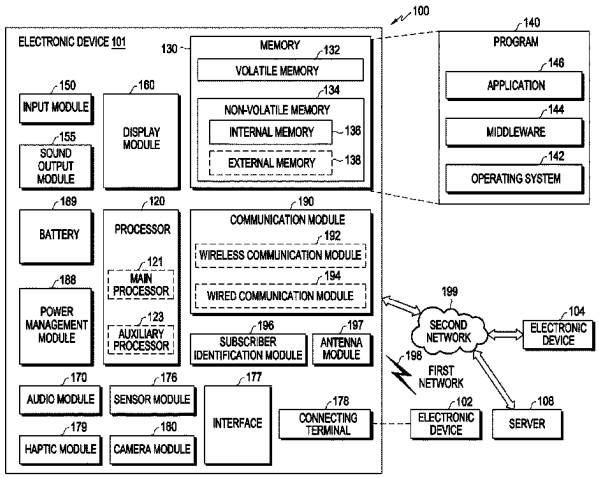
Primary Examiner — Phuoc H Doan
(74) *Attorney, Agent, or Firm* — Nixon & Vanderhye, P.C.

(57) **ABSTRACT**

Disclosed are an electronic device for providing both a shared screen and a private screen, and a control method therefor. The electronic device, according to an embodiment of the present disclosure, may be configured to: display a first screen on a flexible display in a state where the electronic device and an external electronic device are operably connected via a communication module; display a second screen corresponding to the first screen on the external electronic device; detect the occurrence of a first event for expanding the flexible display; according to the detection of the occurrence of the first event, display, along with the first screen, a third screen different from the first screen on the expanded flexible display; and control the
(Continued)



external electronic device so that only the second screen is displayed on the external electronic device.

15 Claims, 62 Drawing Sheets

(51) **Int. Cl.**
H04M 1/72469 (2021.01)
H04M 1/72484 (2021.01)

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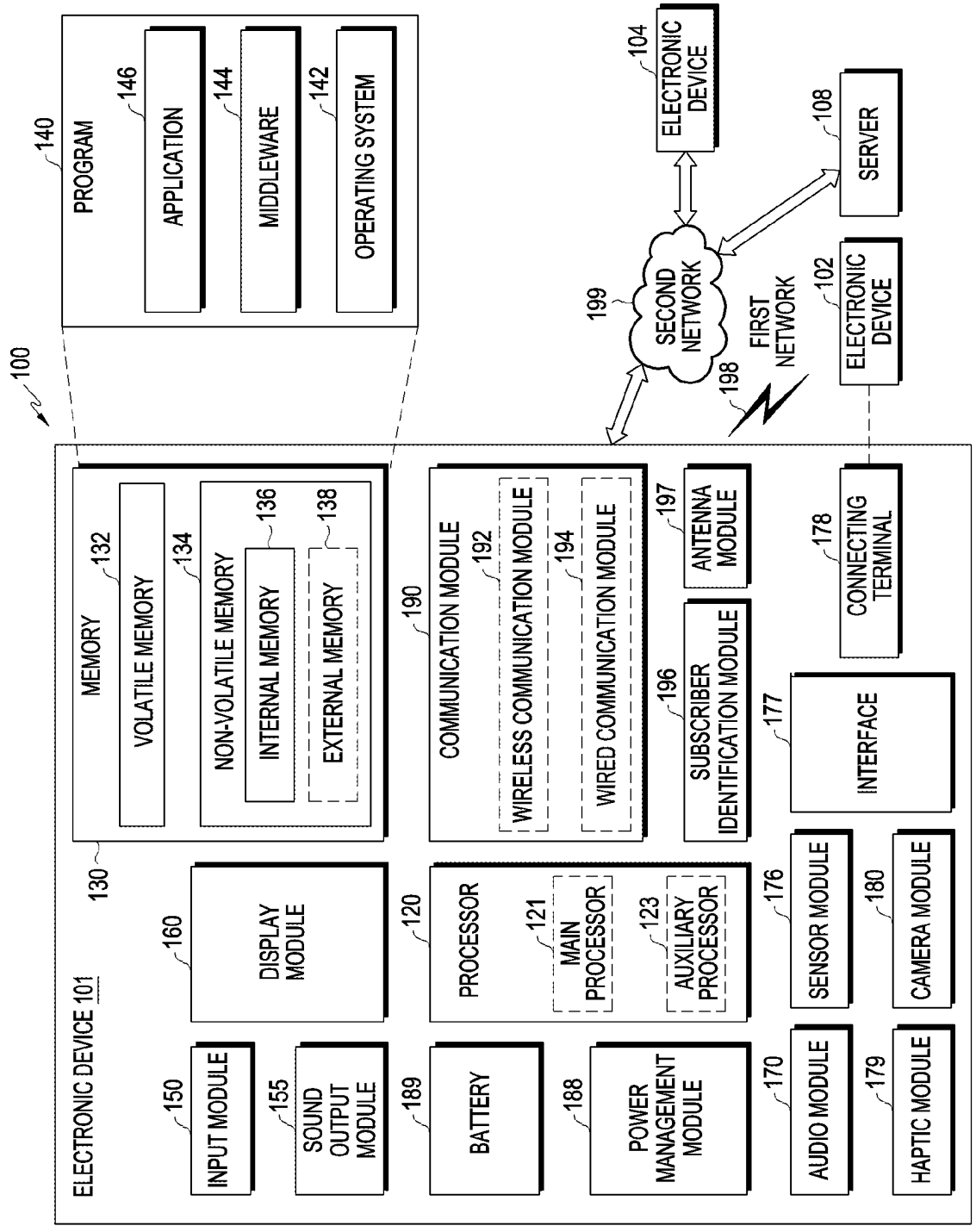
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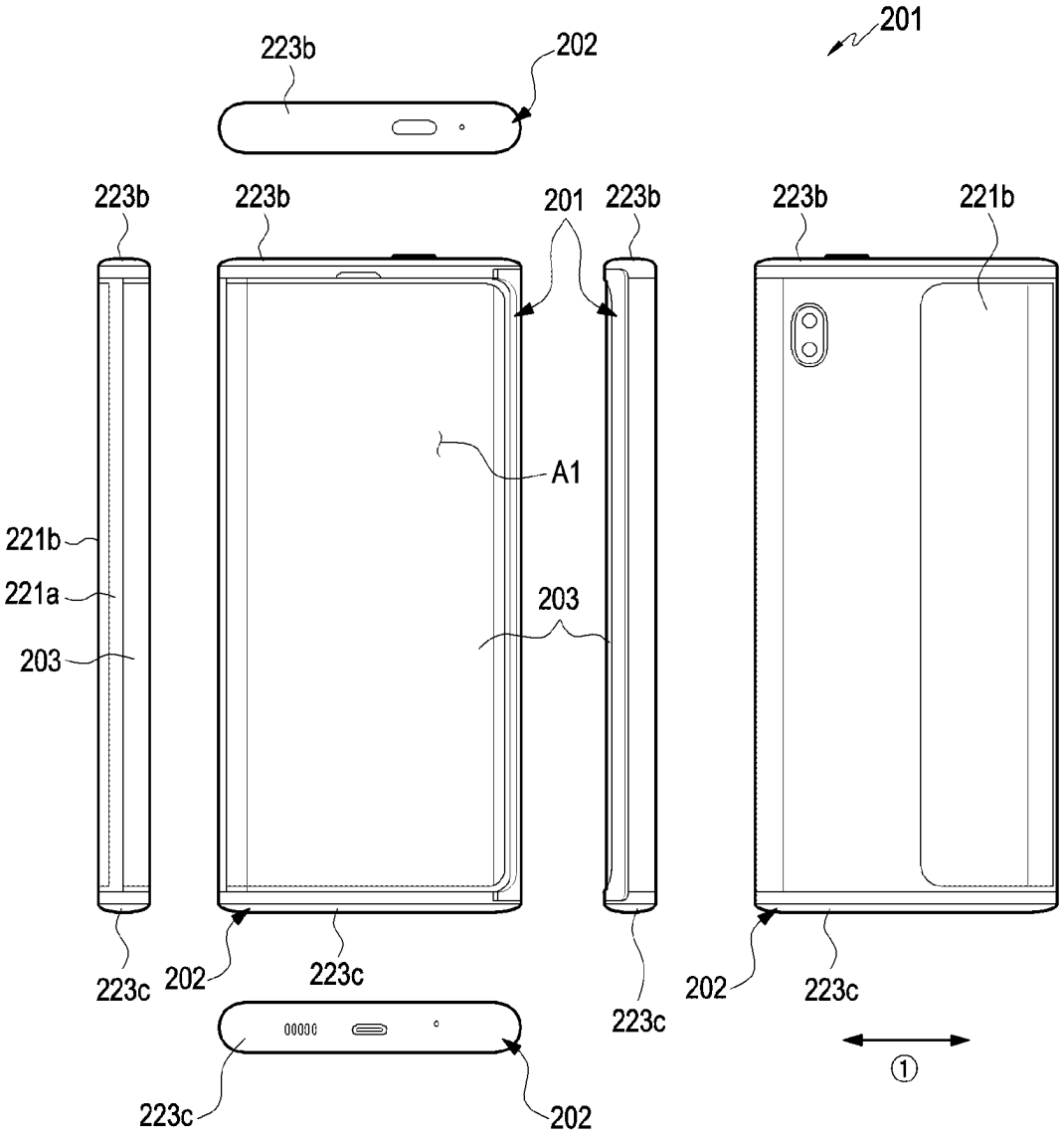
ELECTRONIC DEVICE 101
130
MEMORY
132
VOLATILE MEMORY
134
NON-VOLATILE MEMORY
136
INTERNAL MEMORY
138
EXTERNAL MEMORY
190
COMMUNICATION MODULE
192
WIRELESS COMMUNICATION MODULE
194
WIRED COMMUNICATION MODULE
197
ANTENNA MODULE
196
SUBSCRIBER IDENTIFICATION MODULE
177
INTERFACE
178
CONNECTING TERMINAL
160
DISPLAY MODULE
120
PROCESSOR
121
MAIN PROCESSOR
123
AUXILIARY PROCESSOR
176
SENSOR MODULE
180
CAMERA MODULE
150
INPUT MODULE
155
SOUND OUTPUT MODULE
189
BATTERY
188
POWER MANAGEMENT MODULE
170
AUDIO MODULE
179
HAPTIC MODULE
140
PROGRAM
146
APPLICATION
144
MIDDLEWARE
142
OPERATING SYSTEM
199
SECOND NETWORK
198
FIRST NETWORK
104
ELECTRONIC DEVICE
102
ELECTRONIC DEVICE
108
SERVER

FIG. 1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223b
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203
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223c
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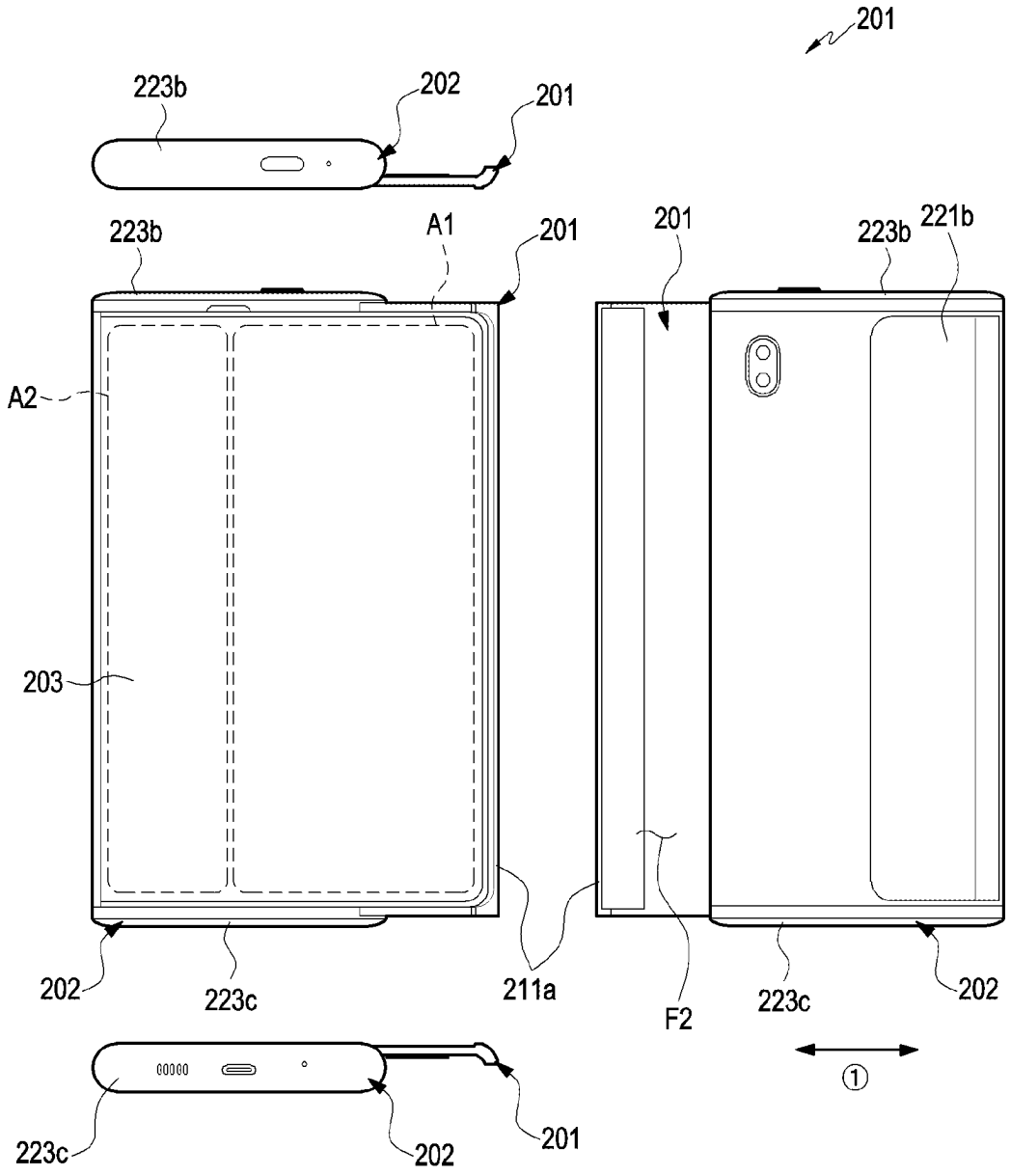
223c
223c
202
223c
223c
202
①

FIG. 2A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202
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223b
A1
201
201
223b
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202
223c
211a
F2
223c
202
①
223c
202
201

FIG. 2B

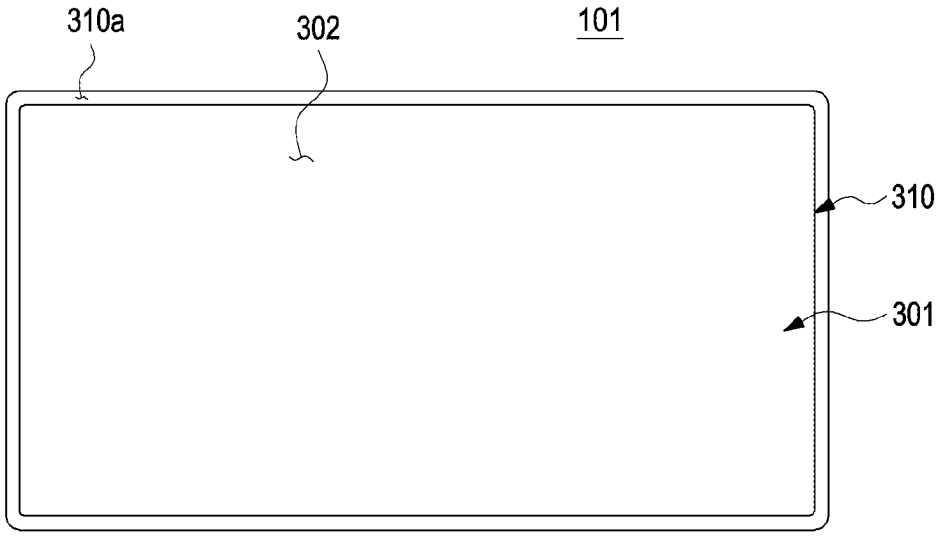


FIG. 3A

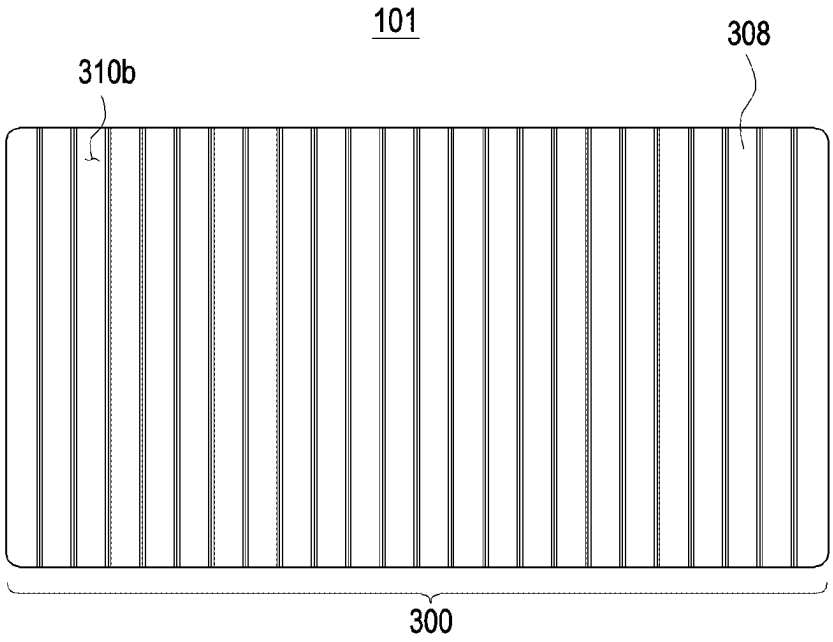


FIG. 3B

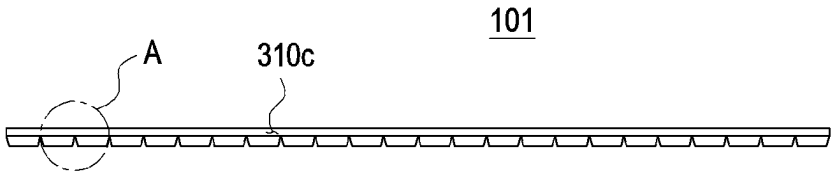


FIG. 3C

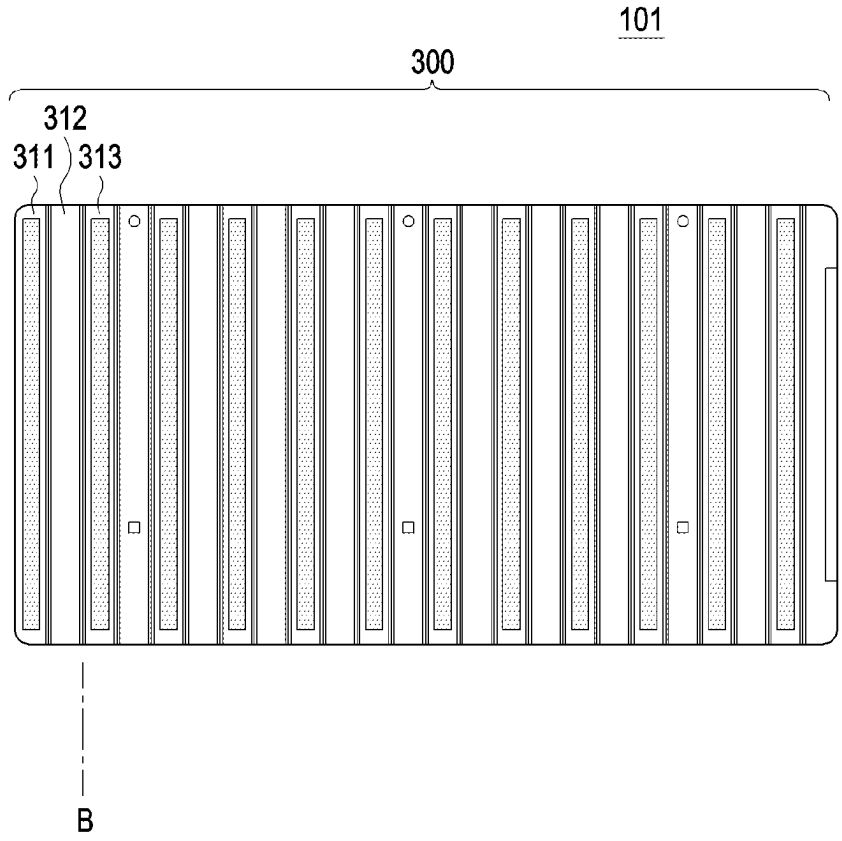


FIG. 3D

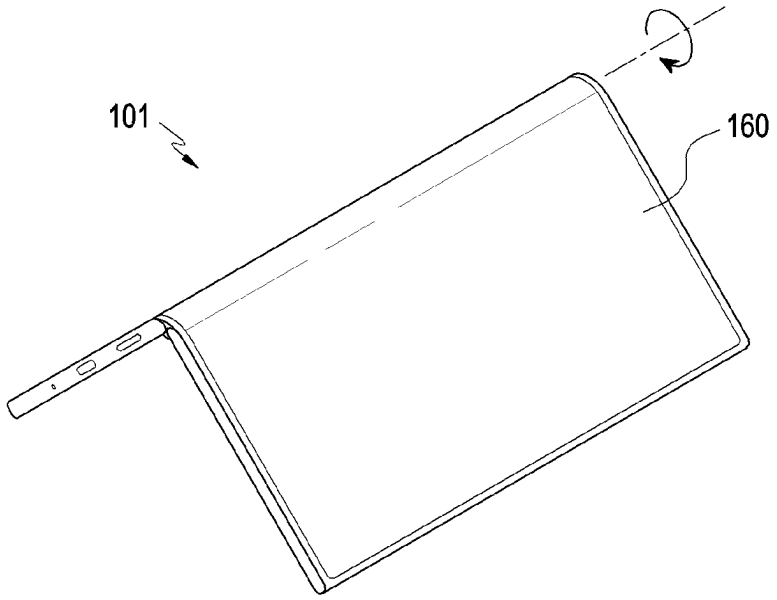


FIG. 4A

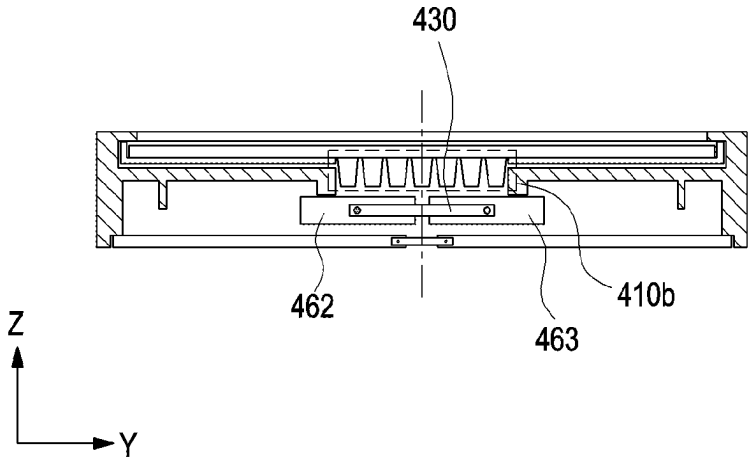


FIG. 4B

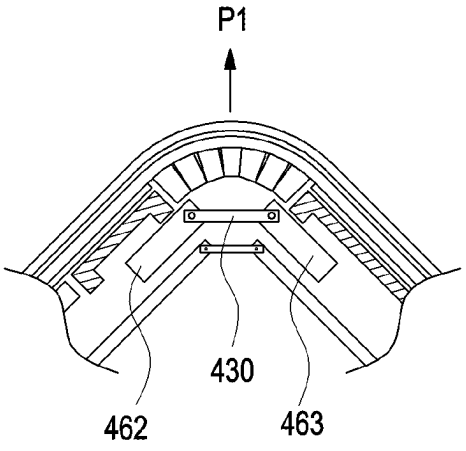
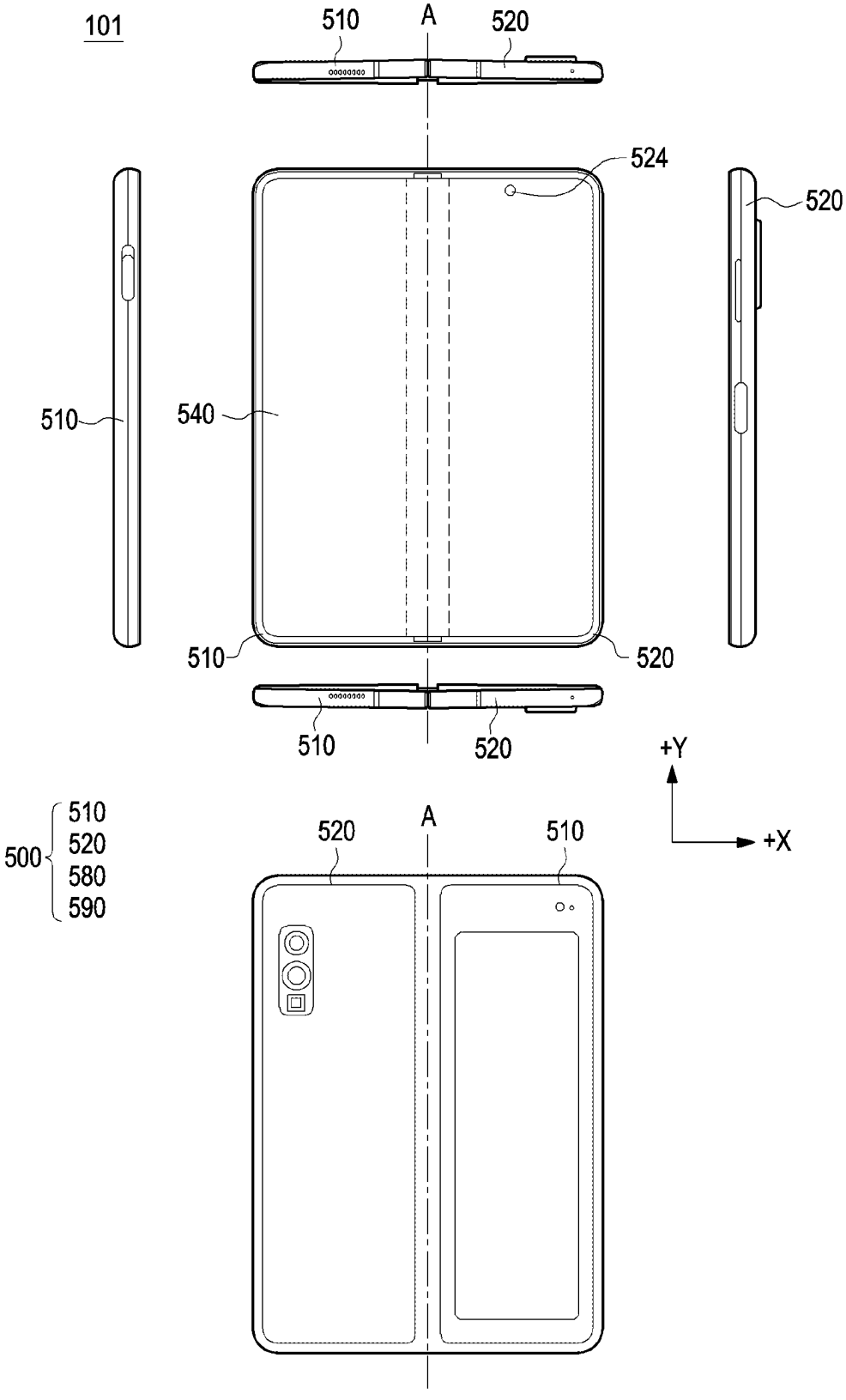


FIG. 4C


101
510
A
520
524
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510
540
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510
520
+Y
+X
500
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580
590
520
A
510

FIG. 5A

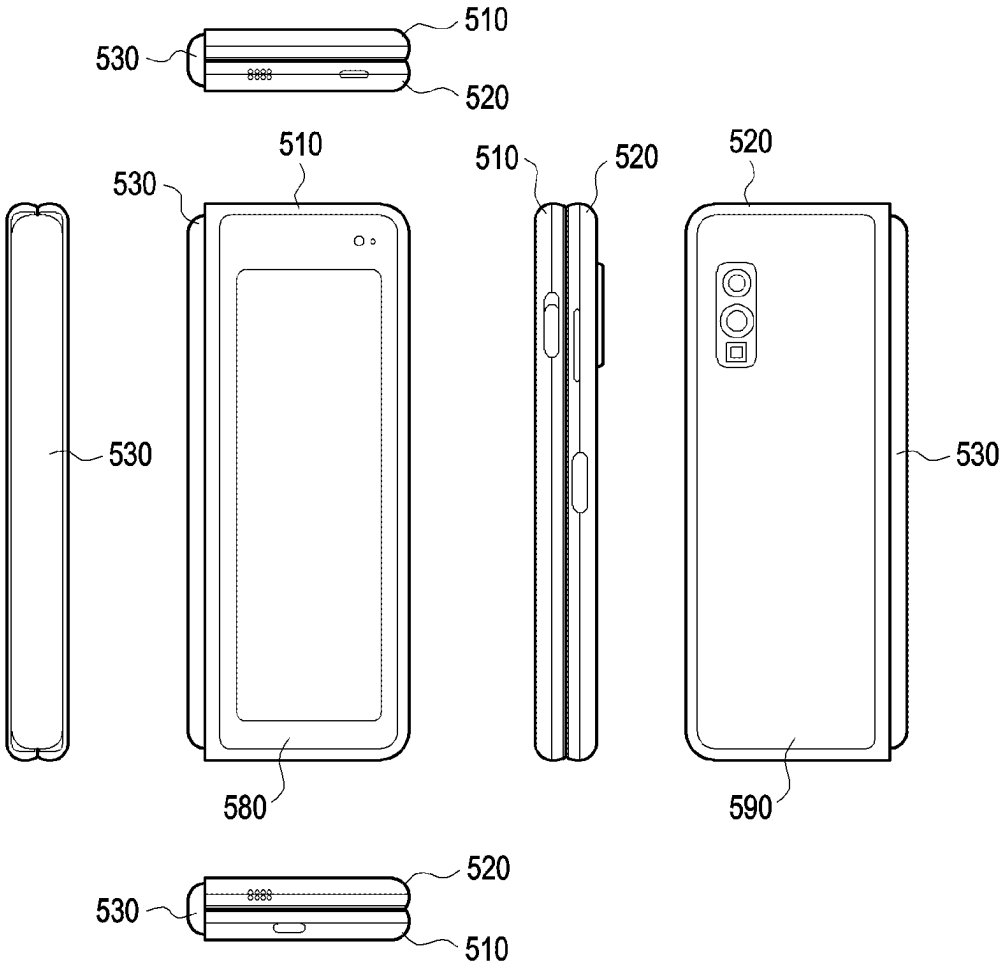


FIG. 5B

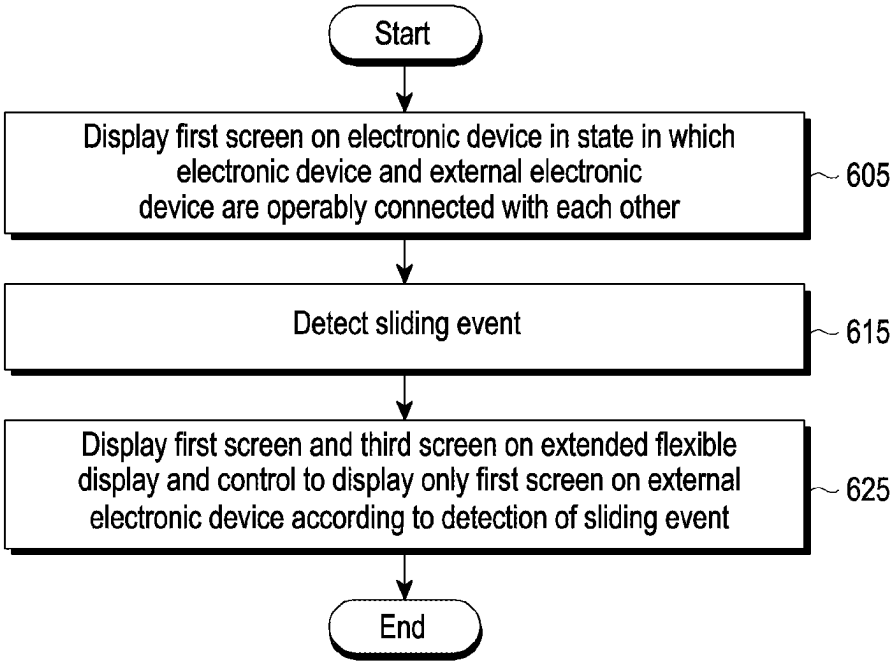

Start
Display first screen on electronic device in state in which electronic device and external electronic device are operably connected with each other
605
Detect sliding event
615
Display first screen and third screen on extended flexible display and control to display only first screen on external electronic device according to detection of sliding event
625
End

FIG. 6A

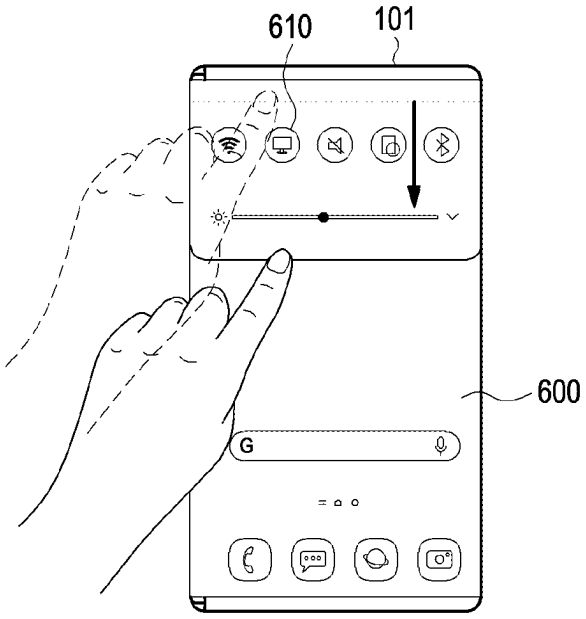


FIG. 6B

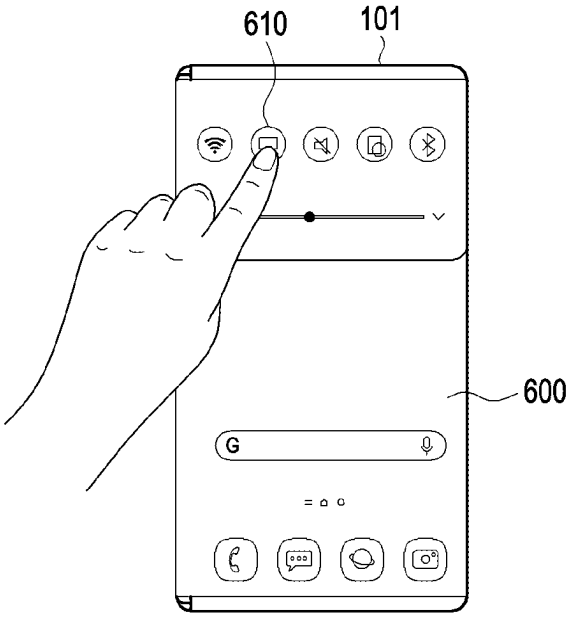


FIG. 6C

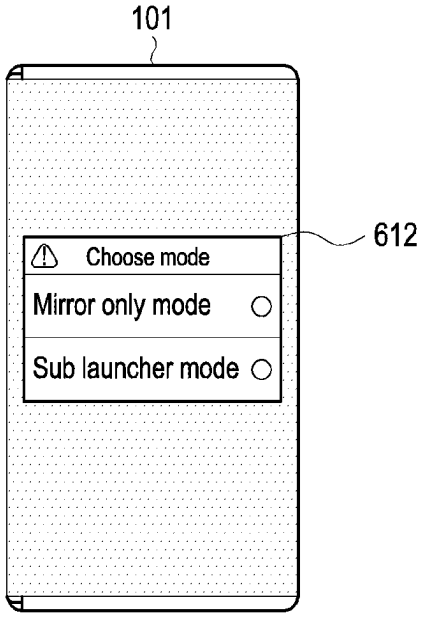

101
612
Choose mode
Mirror only mode
Sub launcher mode

FIG. 6D

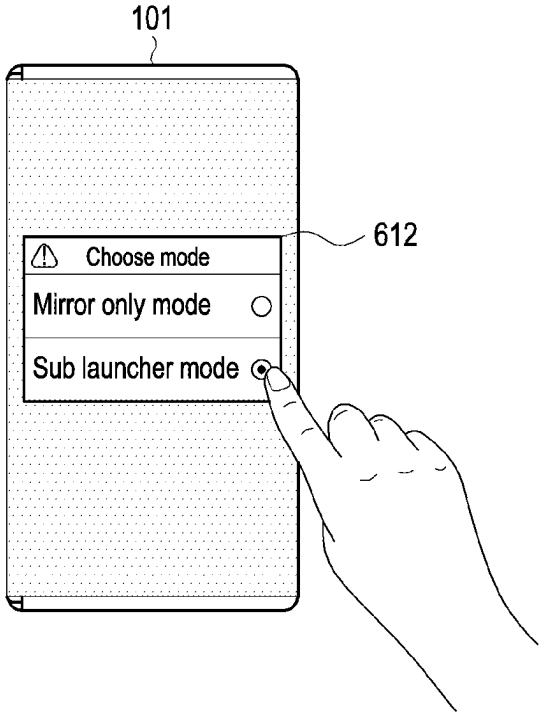
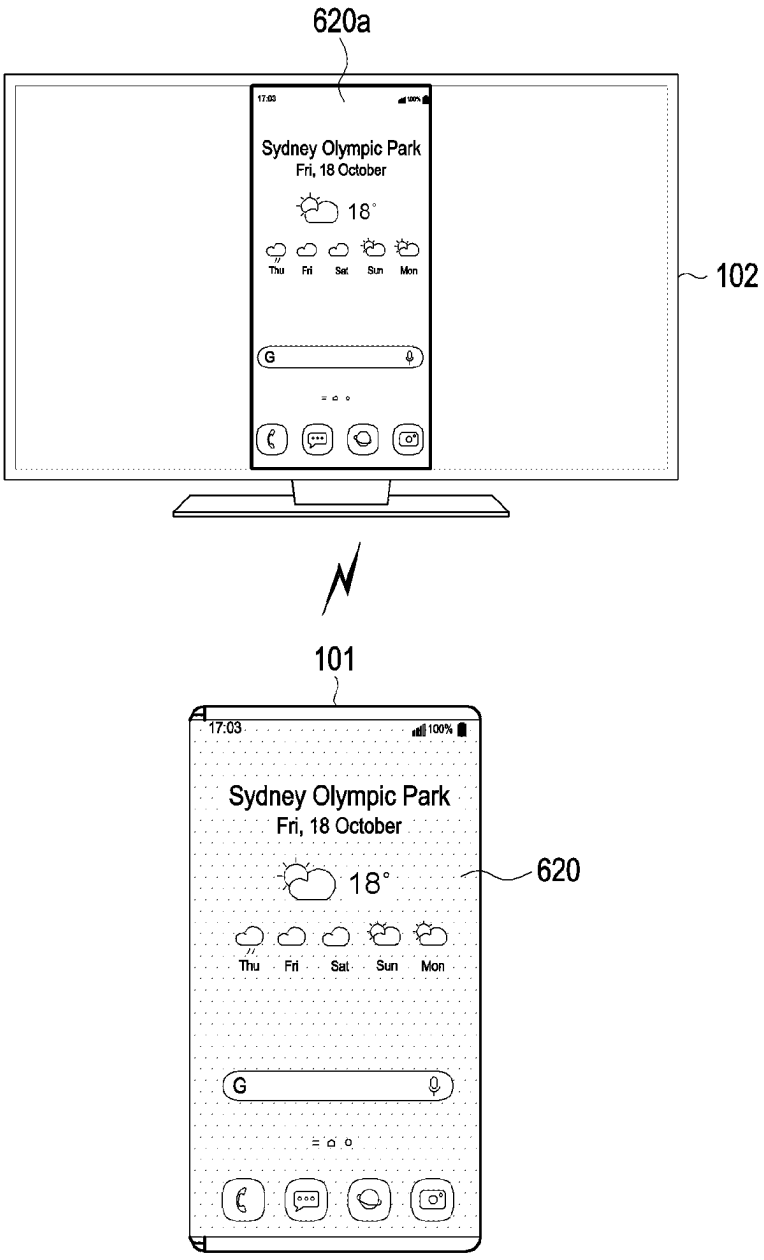

101
612
Choose mode
Mirror only mode
Sub launcher mode

FIG. 6E


620a
17:03
Sydney Olympic Park
Fri, 18 October
18°
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Fri, 18 October
18°
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Mon
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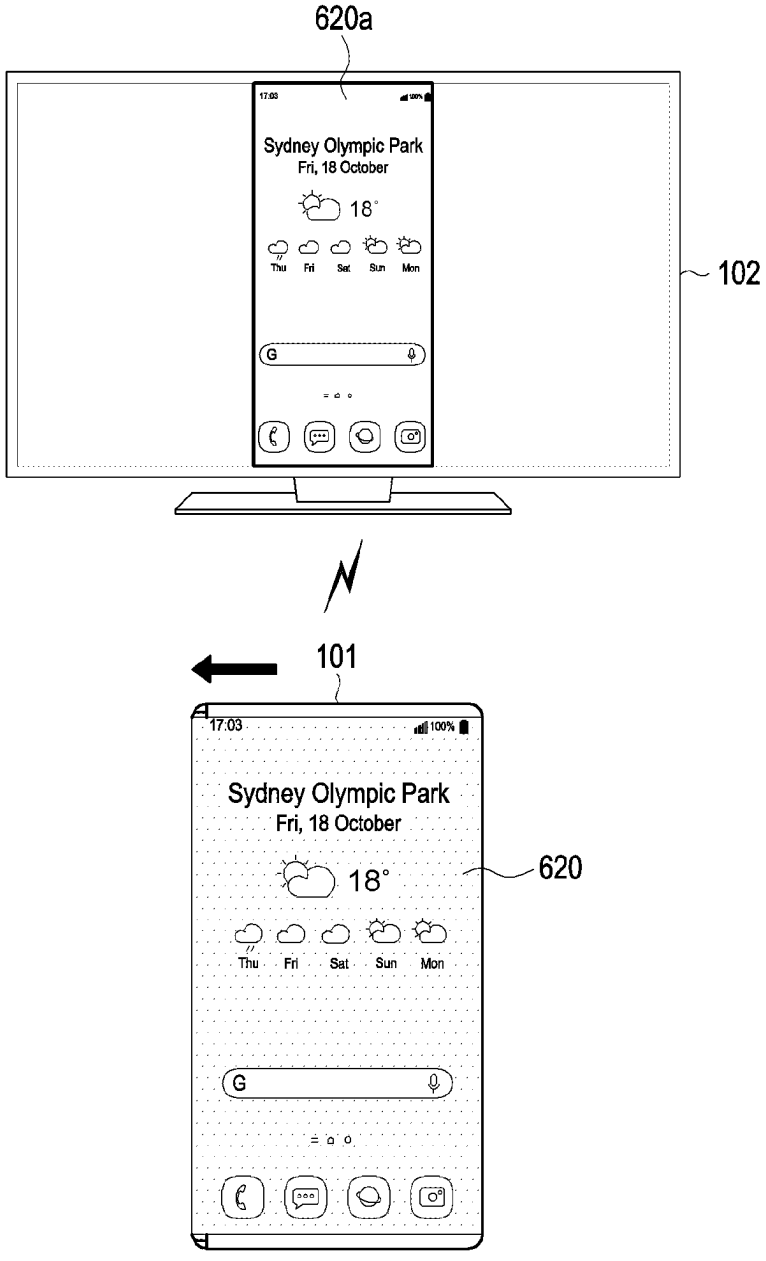
FIG. 6F


620a
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Sydney Olympic Park
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Sydney Olympic Park
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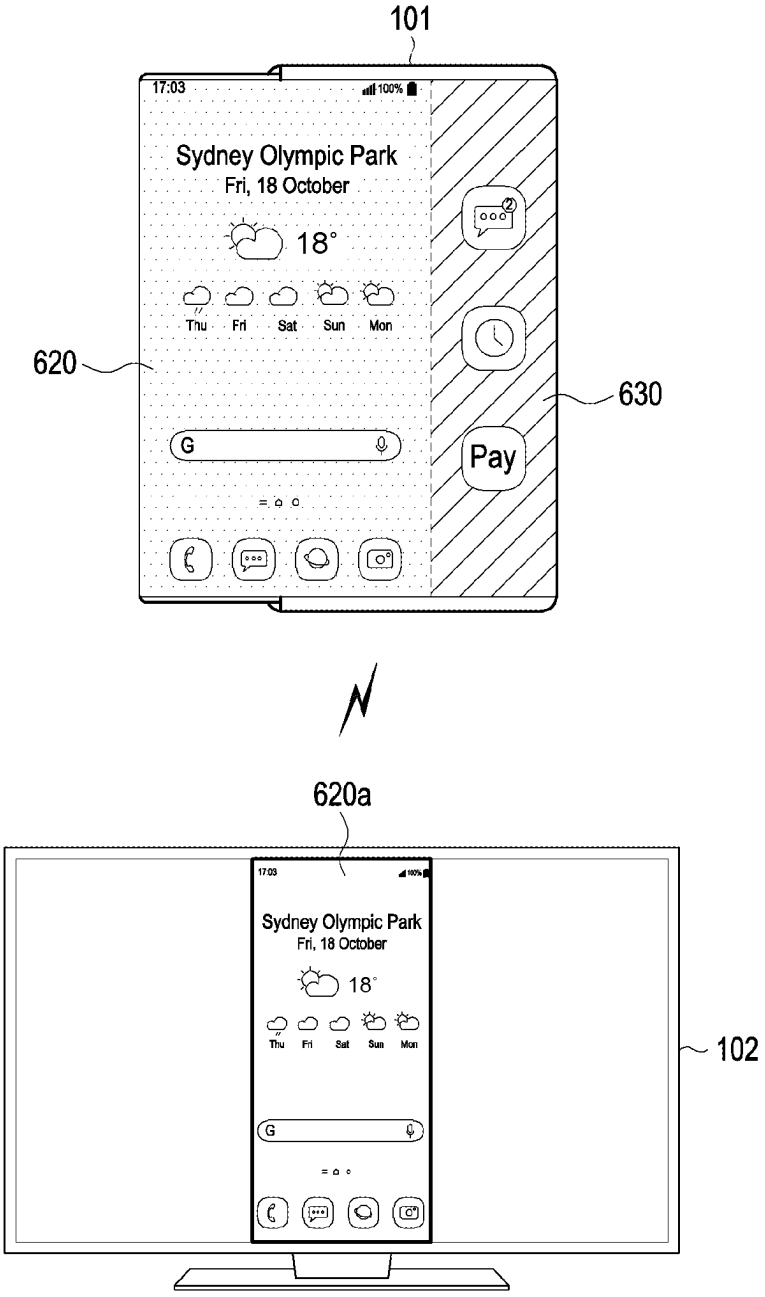
FIG. 6G


101
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Sydney Olympic Park
Fri, 18 October
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FIG. 6H

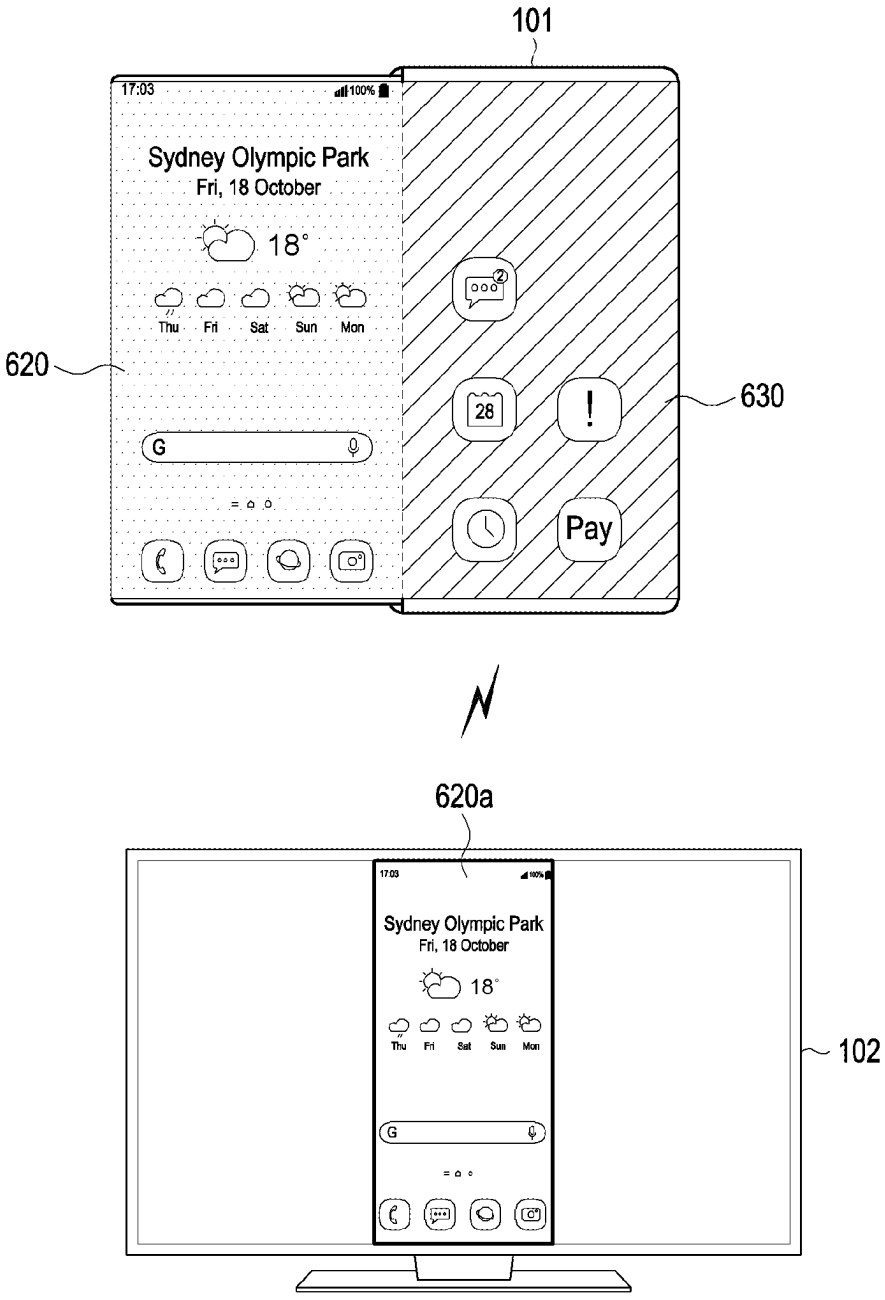
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FIG. 6I

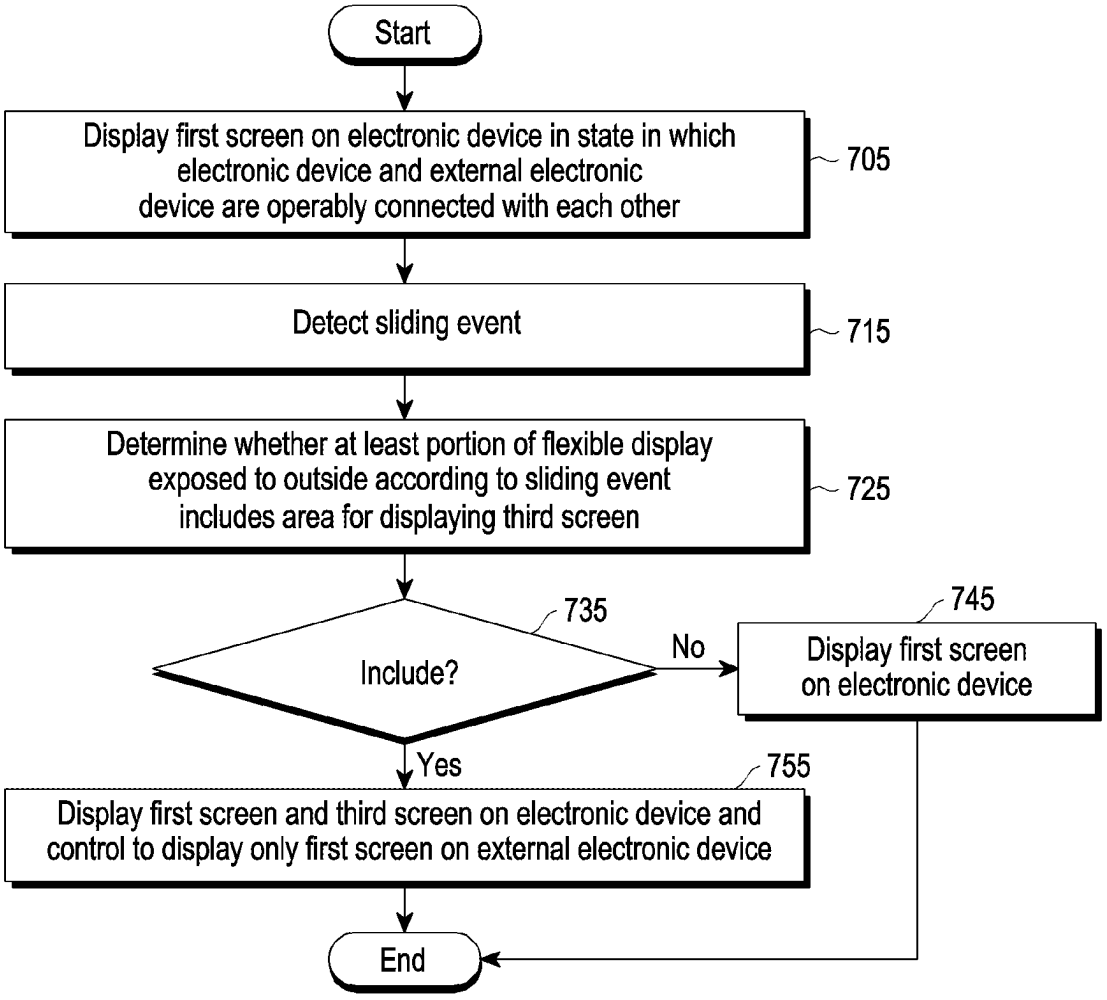

Start
Display first screen on electronic device in state in which electronic device and external electronic device are operably connected with each other
705
Detect sliding event
715
Determine whether at least portion of flexible display exposed to outside according to sliding event includes area for displaying third screen
725
735
Include?
No
745
Display first screen on electronic device
Yes
755
Display first screen and third screen on electronic device and control to display only first screen on external electronic device
End

FIG. 7A

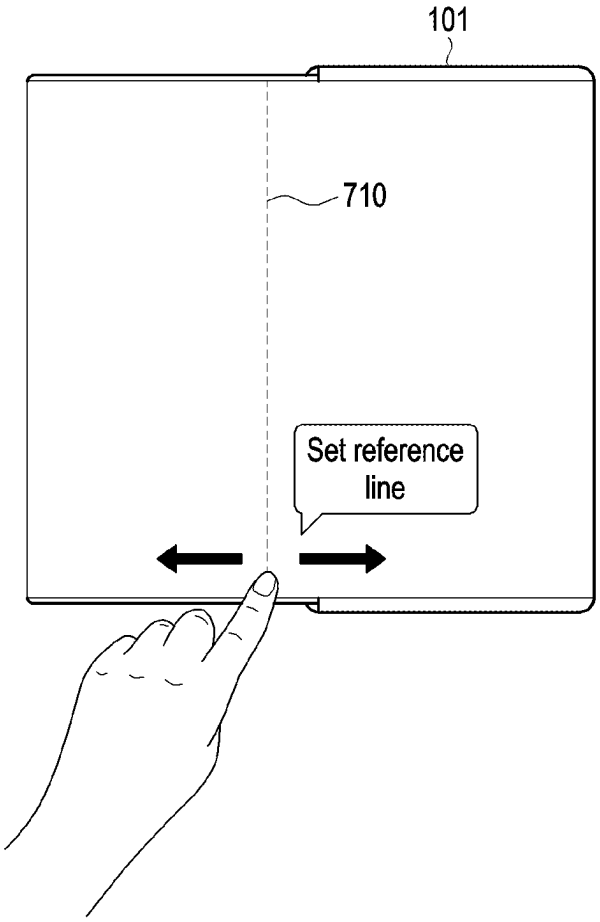
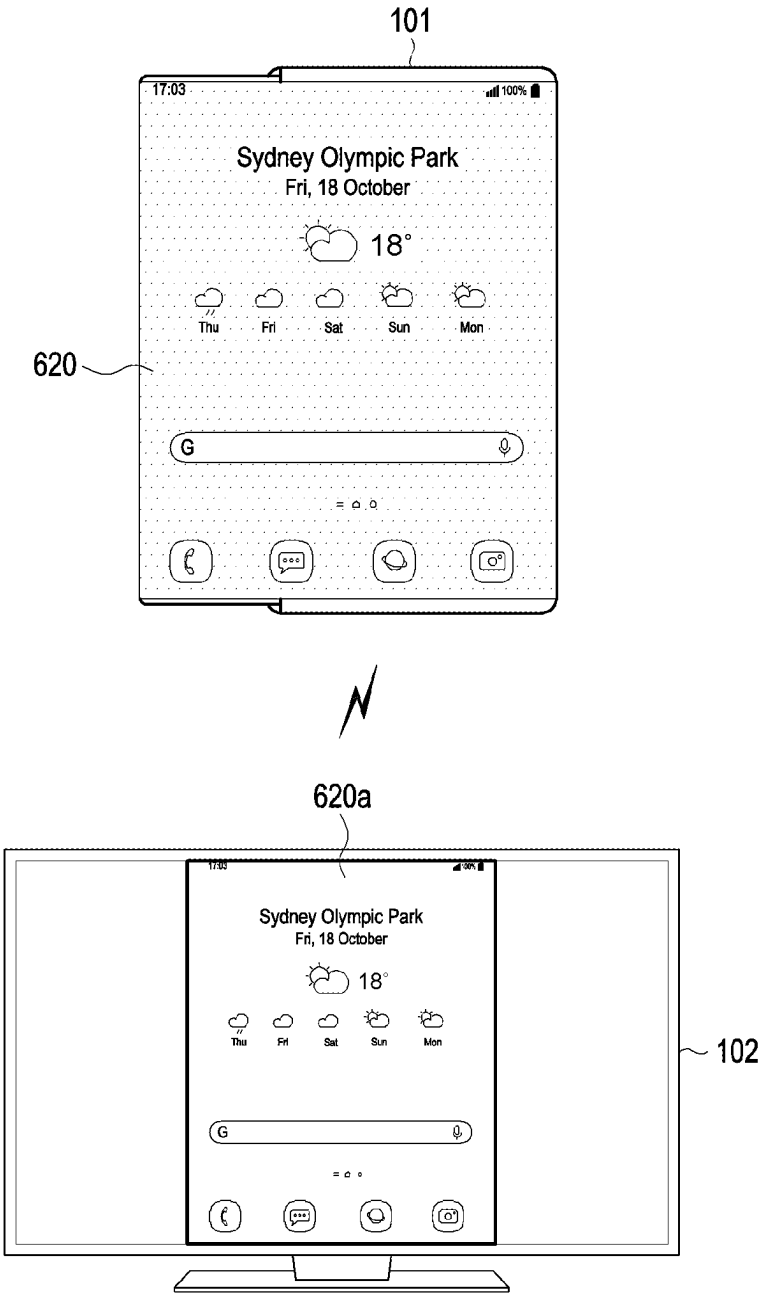


FIG. 7B


101
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Sydney Olympic Park
Fri, 18 October
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102

FIG. 7C

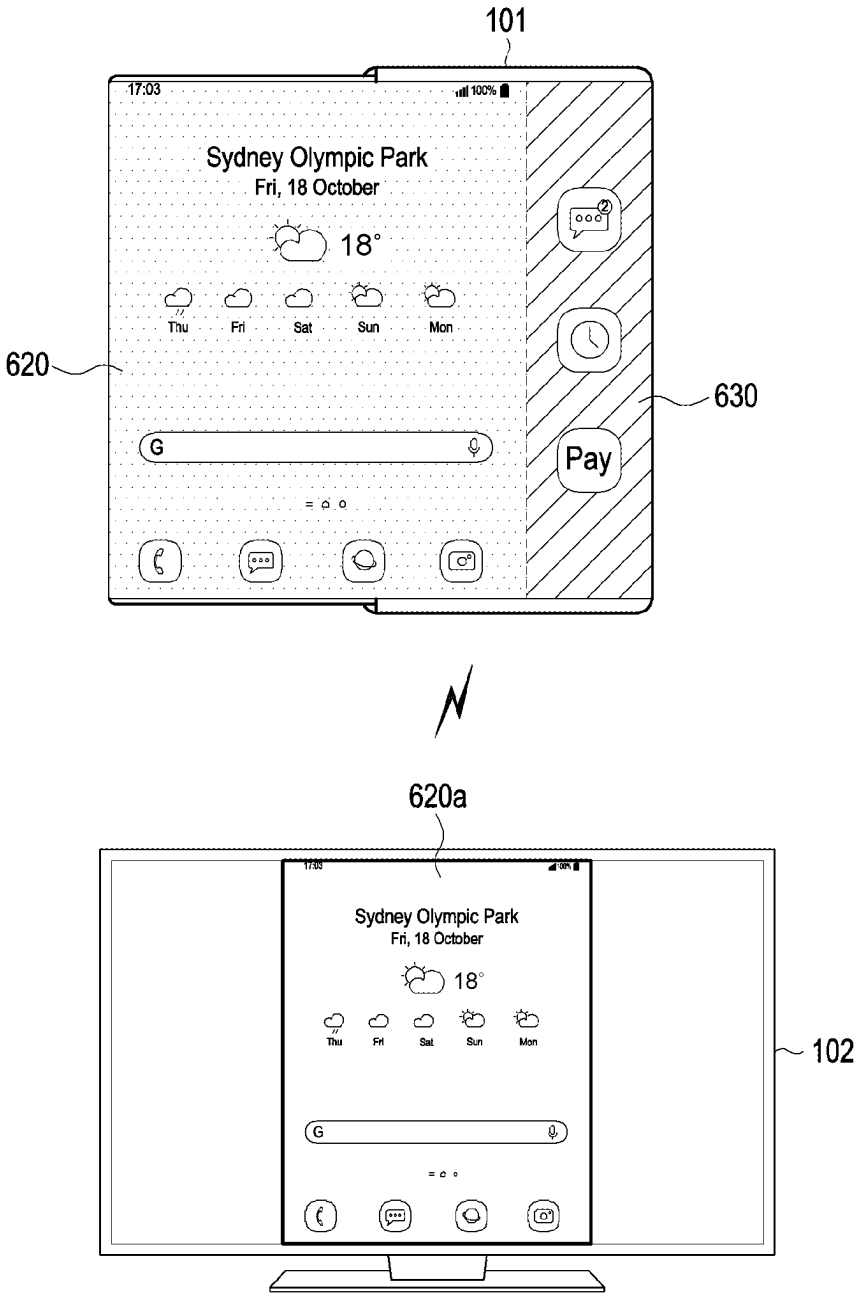
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FIG. 7D

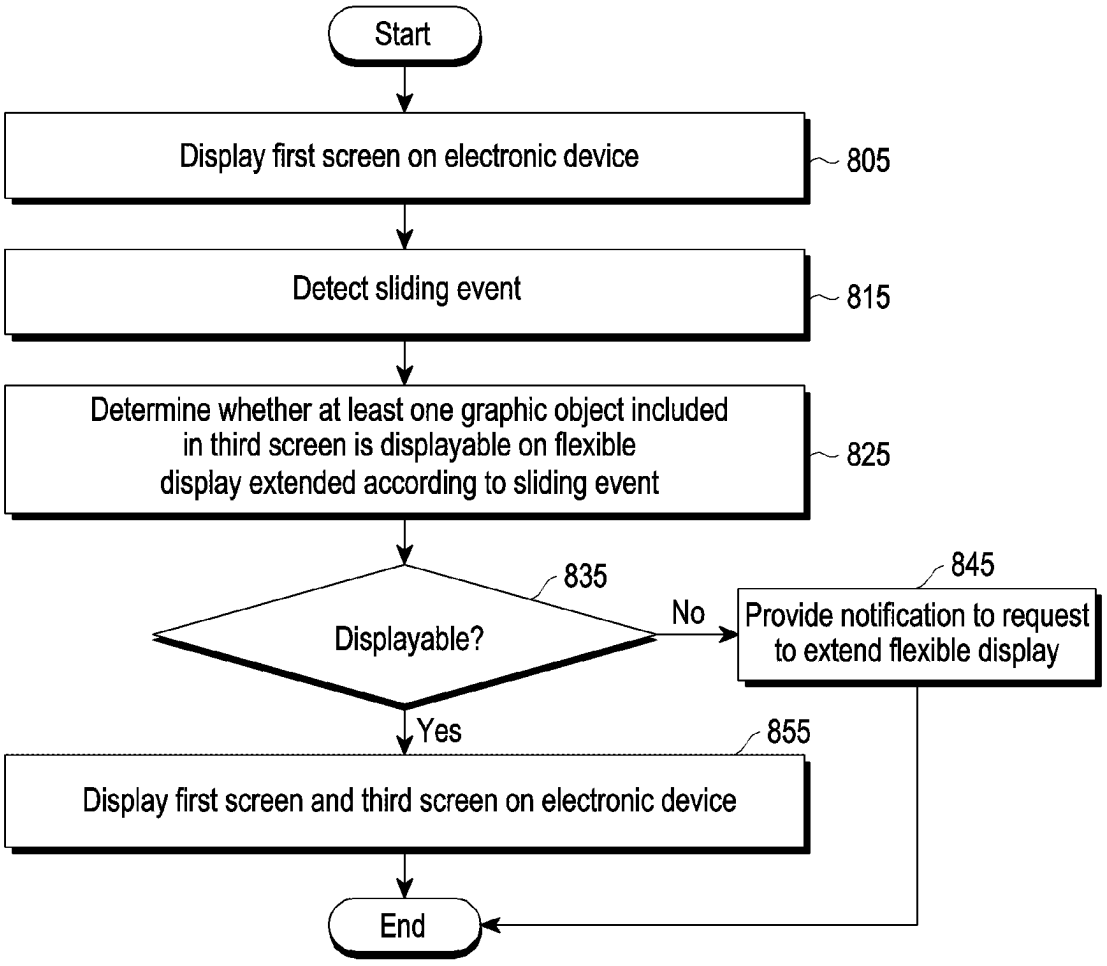
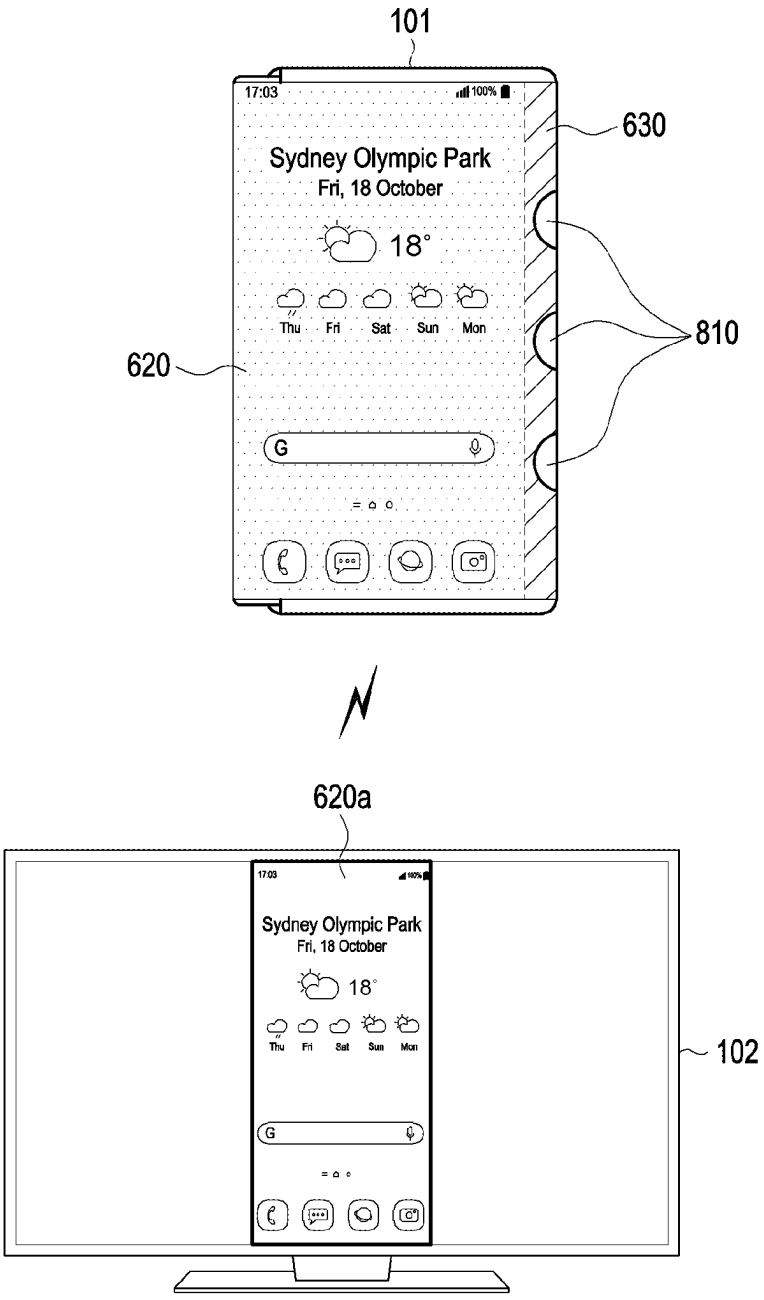

Start
Display first screen on electronic device
805
Detect sliding event
815
Determine whether at least one graphic object included in third screen is displayable on flexible display extended according to sliding event
825
835
Displayable?
No
845
Provide notification to request to extend flexible display
Yes
855
Display first screen and third screen on electronic device
End

FIG. 8A


101
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Sydney Olympic Park
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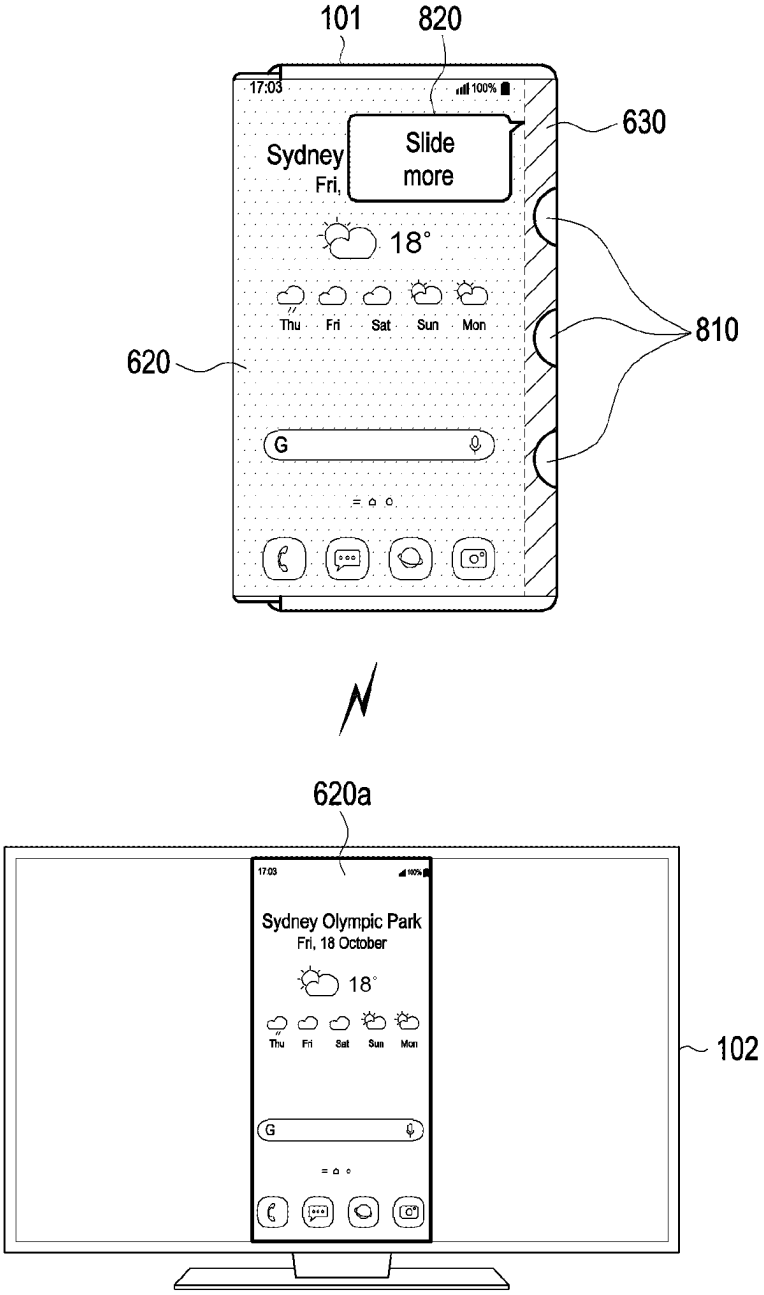
FIG. 8B


101
820
17:03
100%
Sydney
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Slide
more
630
18°
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17:03
Sydney Olympic Park
Fri, 18 October
18°
Thu
Fri
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102

FIG. 8C

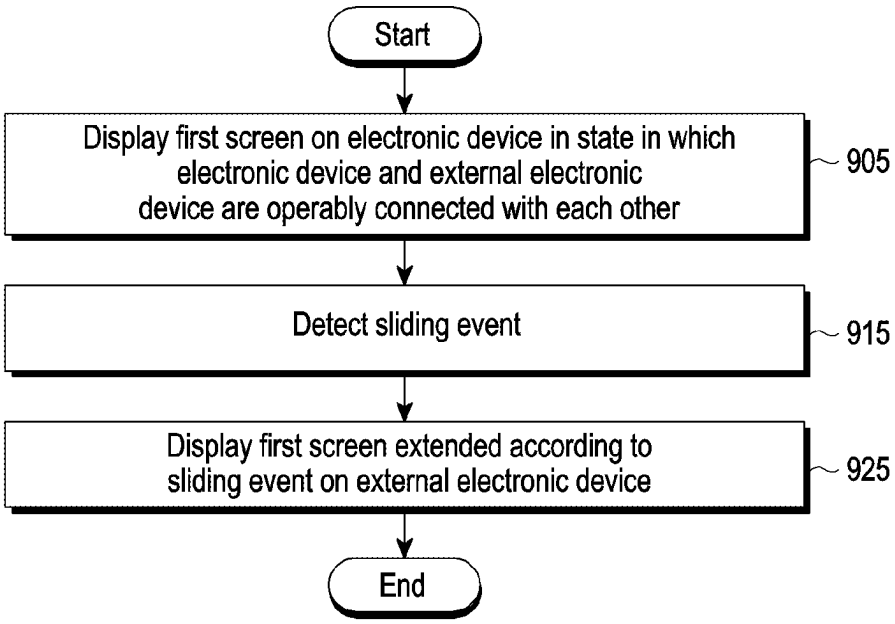
Start
Display first screen on electronic device in state in which electronic device and external electronic device are operably connected with each other
905
Detect sliding event
915
Display first screen extended according to sliding event on external electronic device
925
End

FIG. 9A

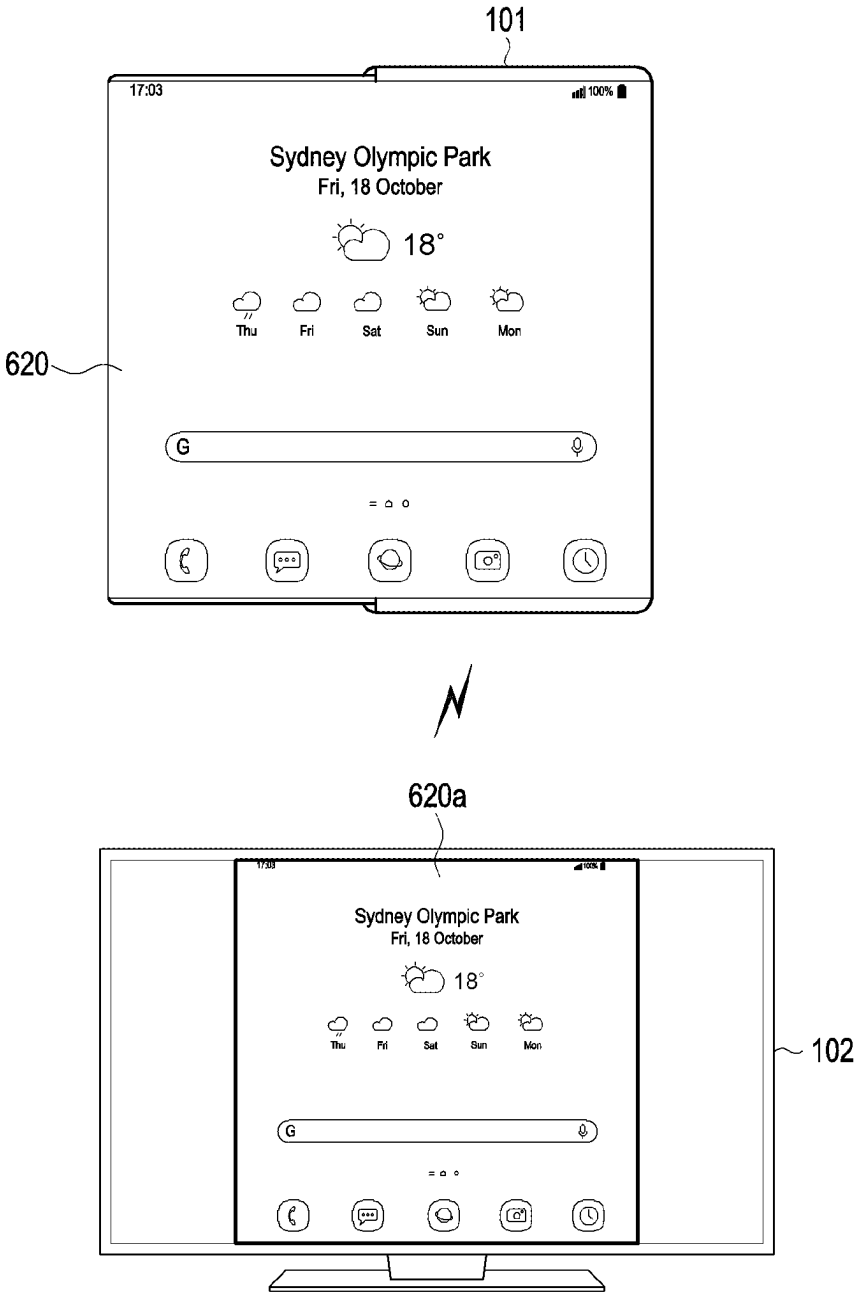
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FIG. 9B

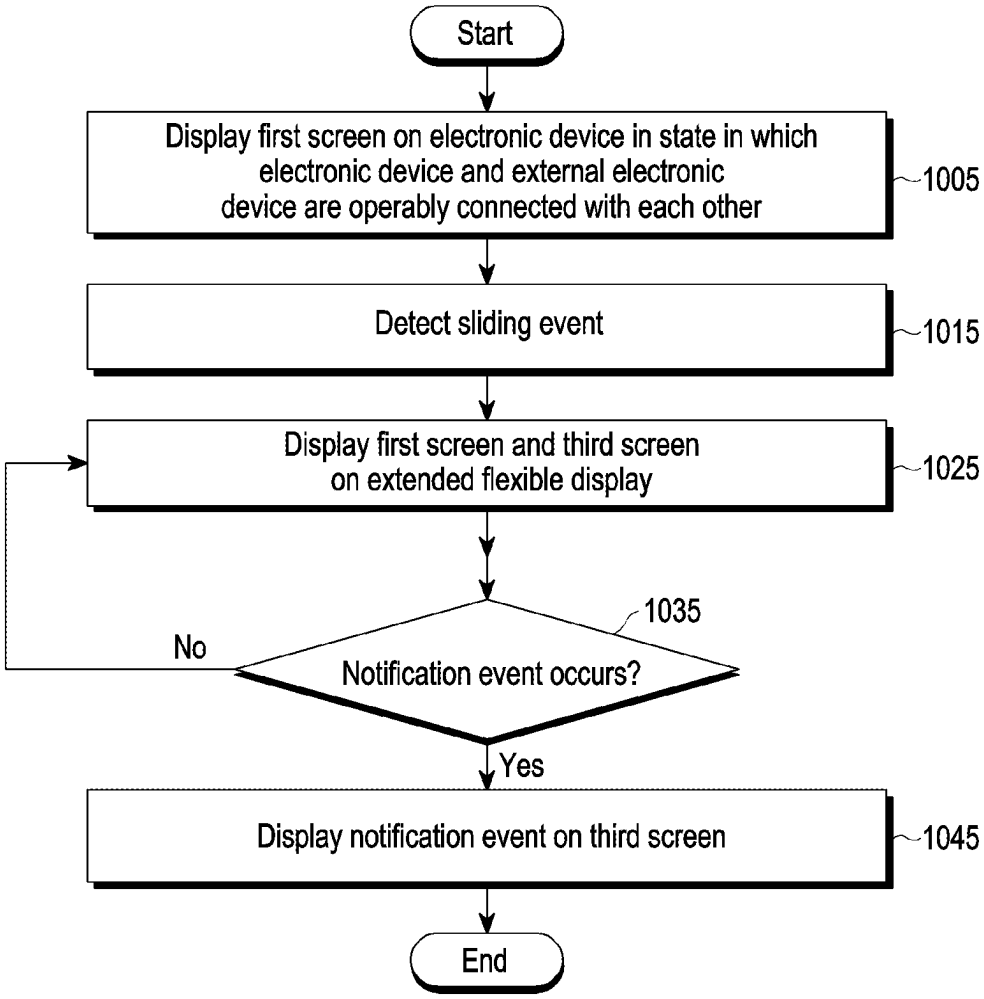
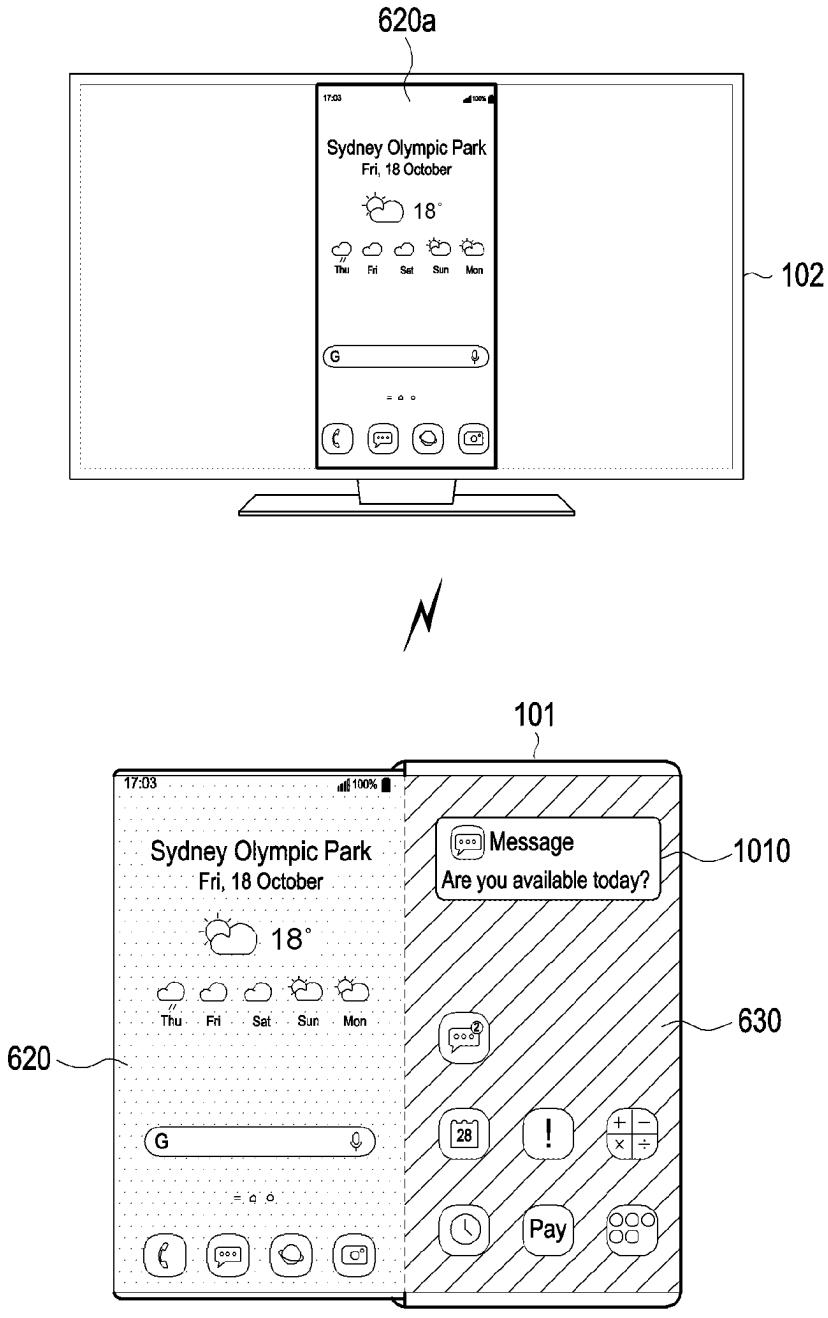

Start
Display first screen on electronic device in state in which electronic device and external electronic device are operably connected with each other
1005
Detect sliding event
1015
Display first screen and third screen on extended flexible display
1025
1035
Notification event occurs?
No
Yes
Display notification event on third screen
1045
End

FIG. 10A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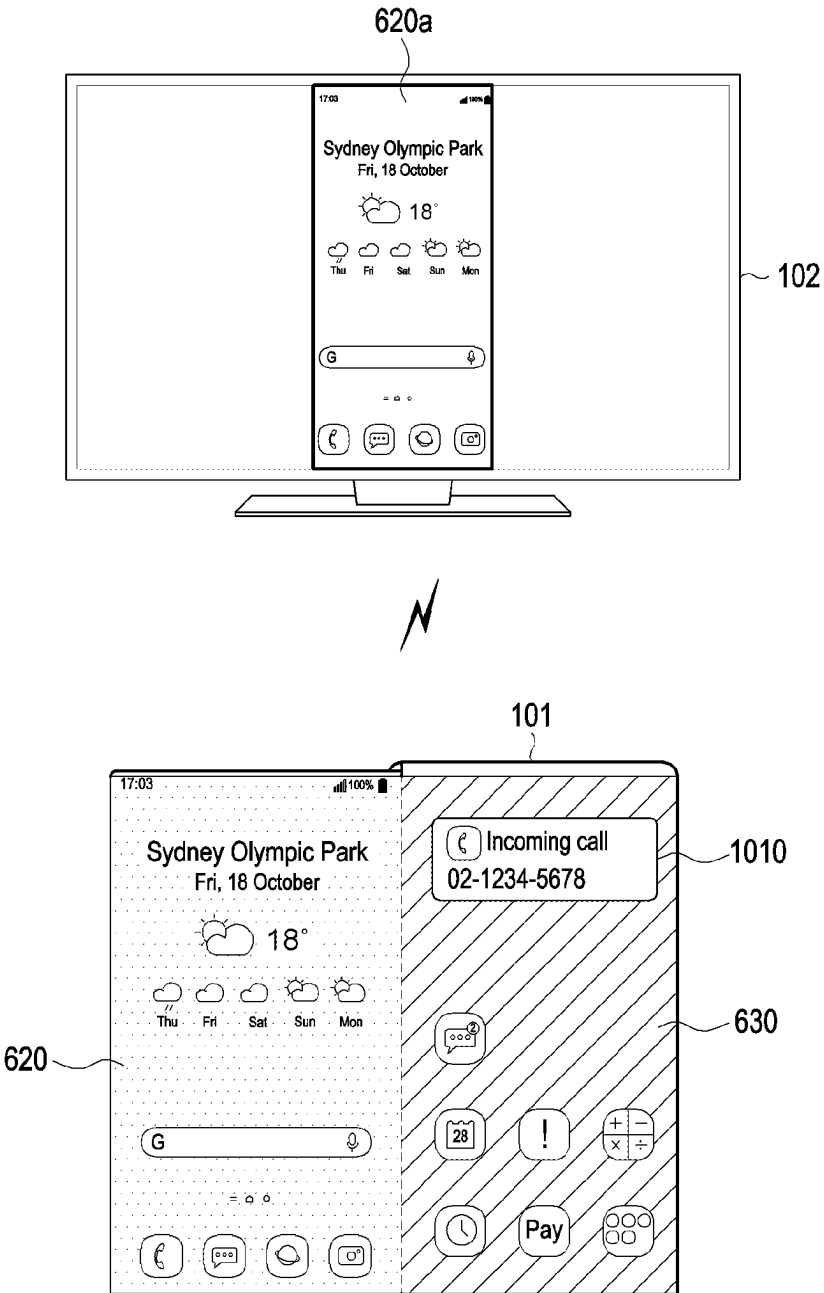
101
17:03
100%
Sydney Olympic Park
Fri, 18 October
18°
Thu
Fri
Sat
Sun
Mon
620
Message
Are you available today?
1010
630
28
Pay

FIG. 10B


620a
17:03
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18°
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102
101
17:03
100%
Sydney Olympic Park
Fri, 18 October
18°
Thu
Fri
Sat
Sun
Mon
G
620
Incoming call
02-1234-5678
1010
630
28
!
Pay

FIG. 10C

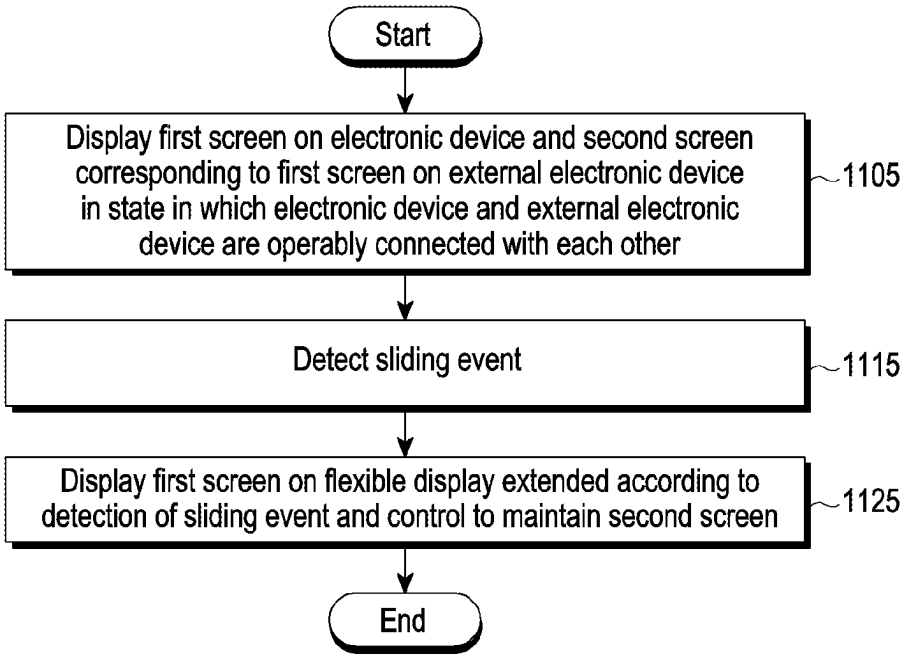

Start
Display first screen on electronic device and second screen corresponding to first screen on external electronic device in state in which electronic device and external electronic device are operably connected with each other
1105
Detect sliding event
1115
Display first screen on flexible display extended according to detection of sliding event and control to maintain second screen
1125
End

FIG. 11A

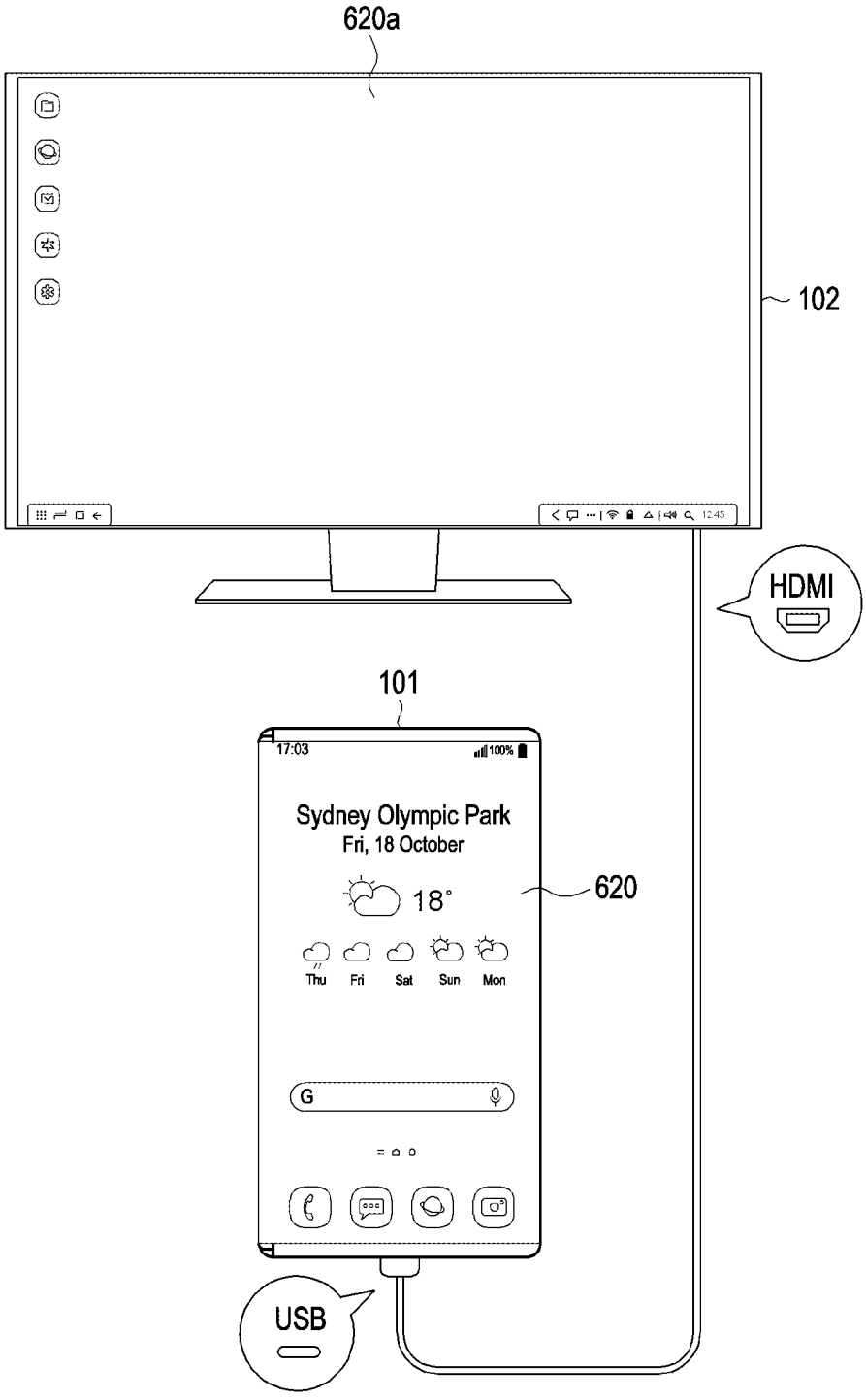

620a
102
HDMI
101
17:03
100%
Sydney Olympic Park
Fri, 18 October
18°
620
Thu
Fri
Sat
Sun
Mon
G
USB

FIG. 11B

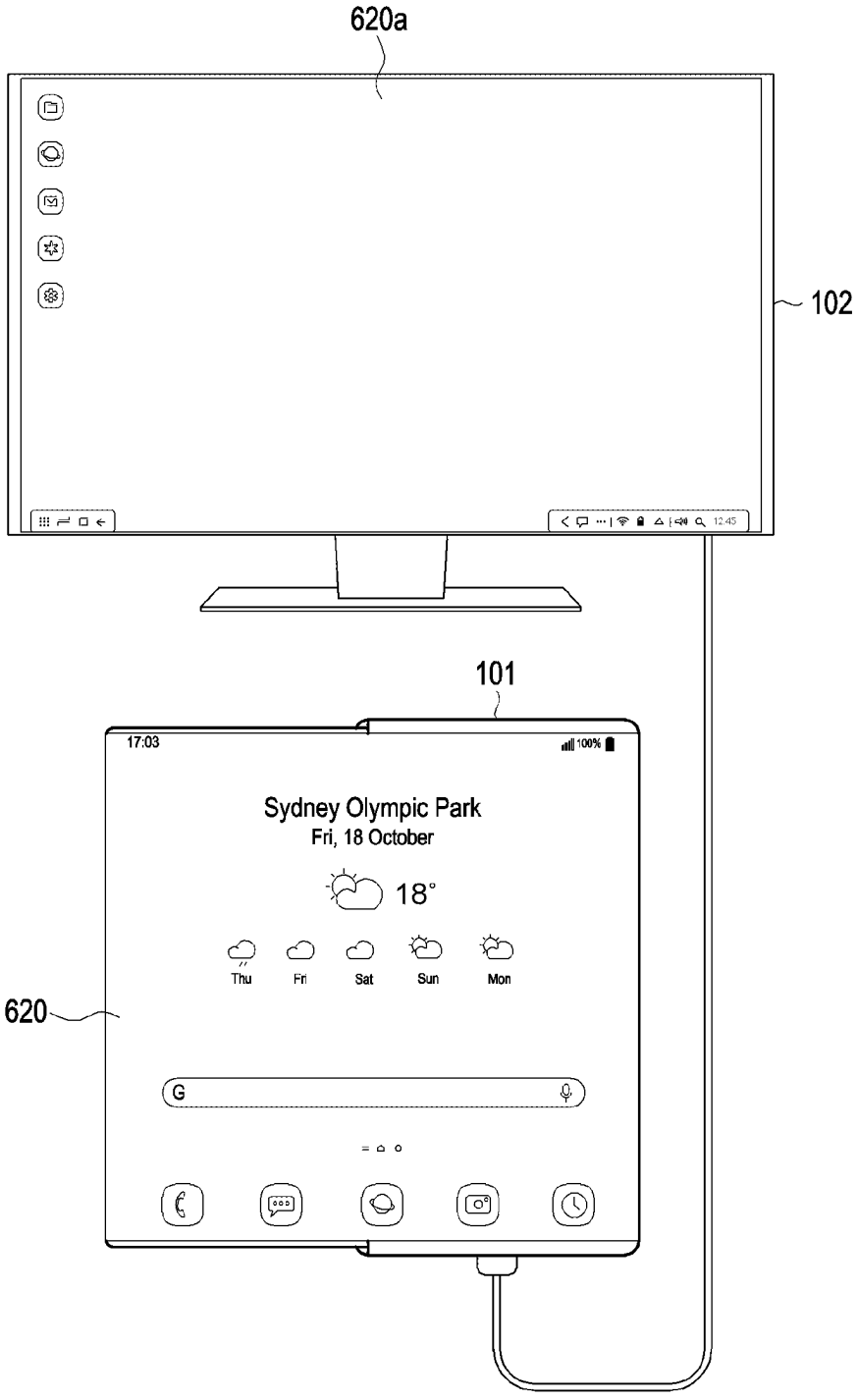

620a
102
101
17:03
100%
Sydney Olympic Park
Fri, 18 October
18°
Thu
Fri
Sat
Sun
Mon
620
G

FIG. 11C

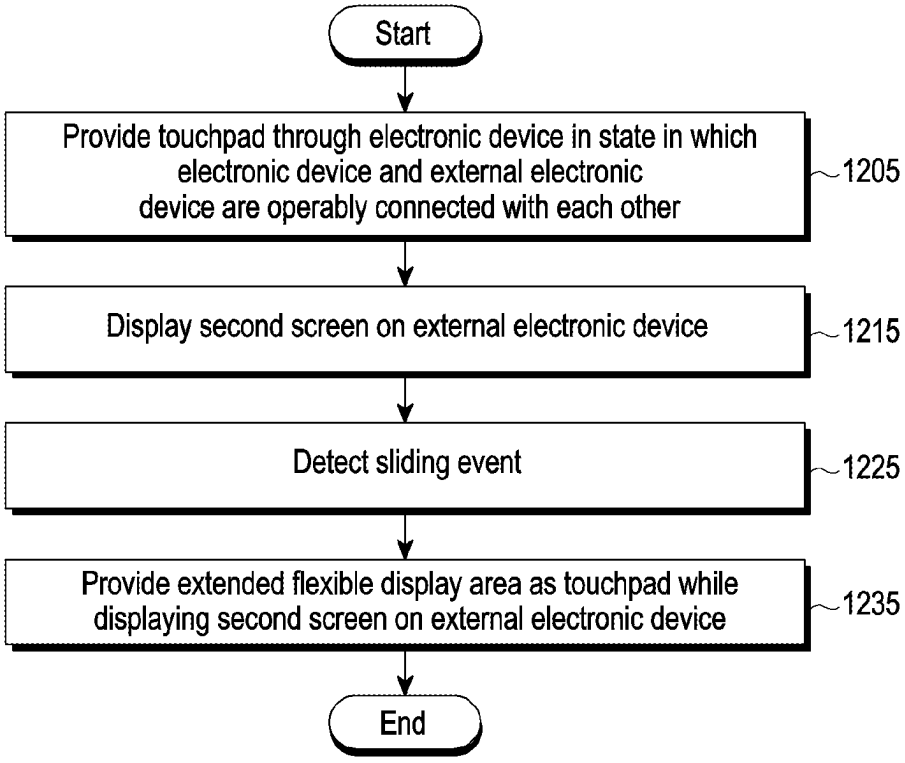

Start
Provide touchpad through electronic device in state in which electronic device and external electronic device are operably connected with each other
1205
Display second screen on external electronic device
1215
Detect sliding event
1225
Provide extended flexible display area as touchpad while displaying second screen on external electronic device
1235
End

FIG. 12A

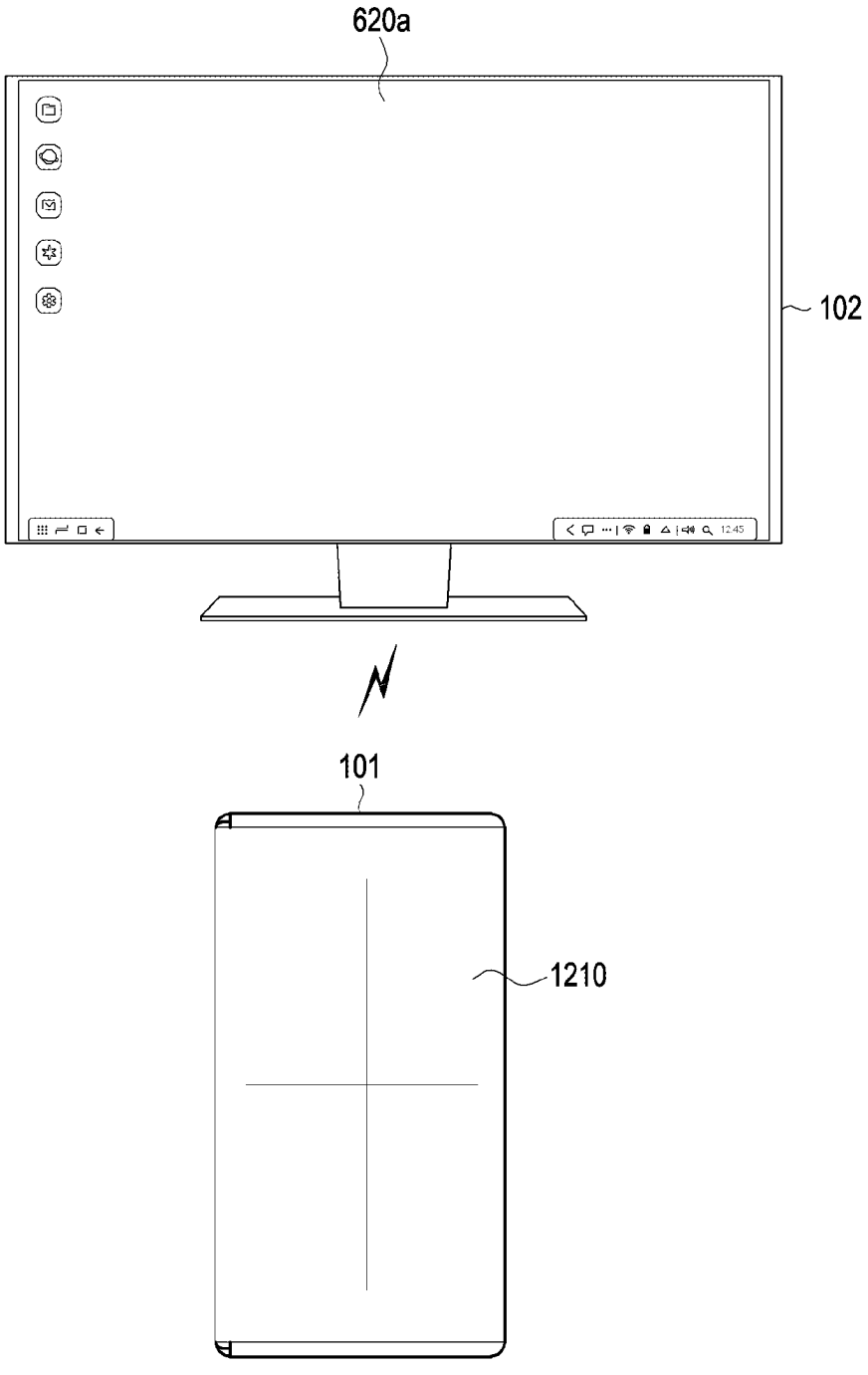


FIG. 12B

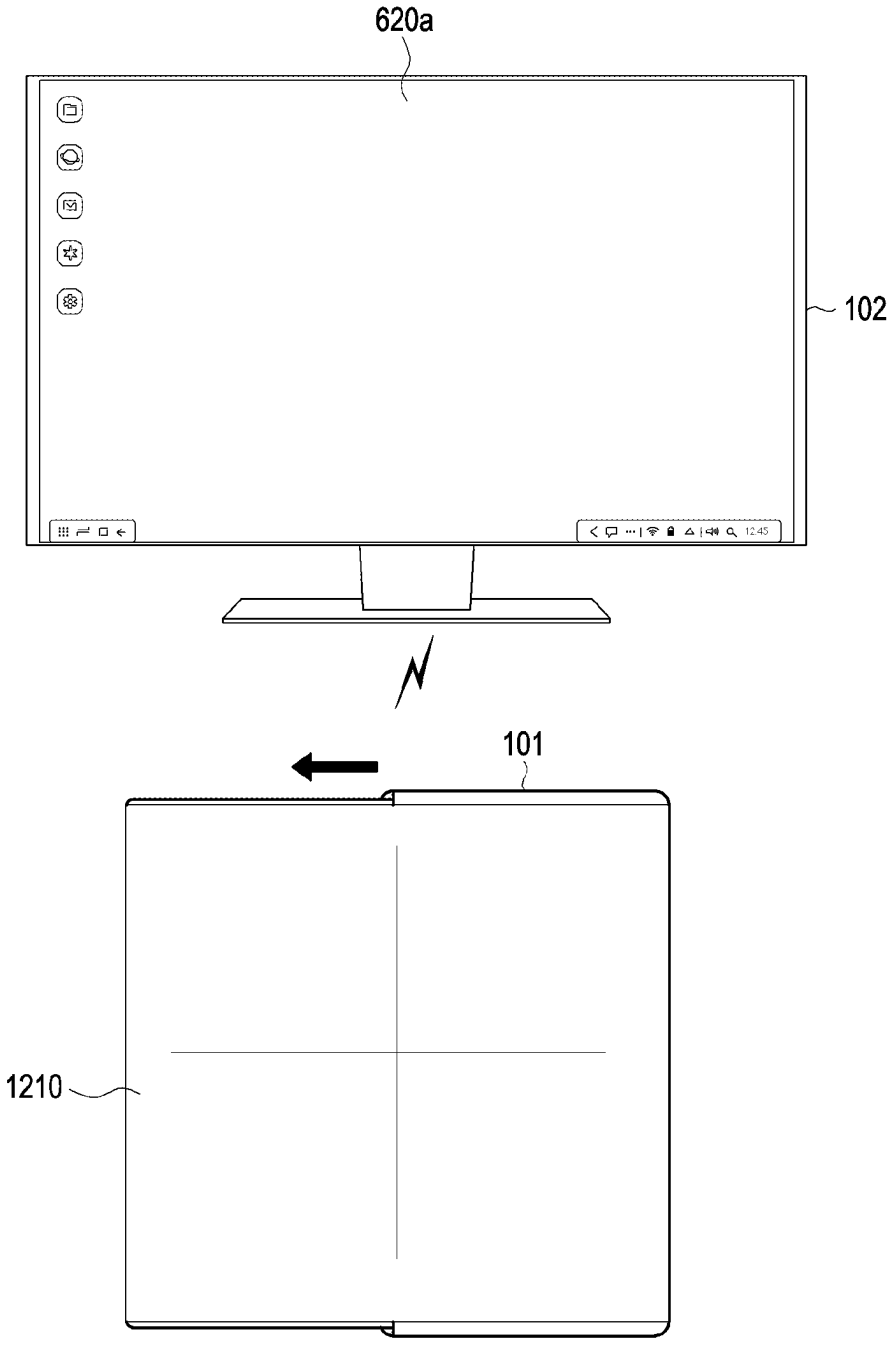


FIG. 12C

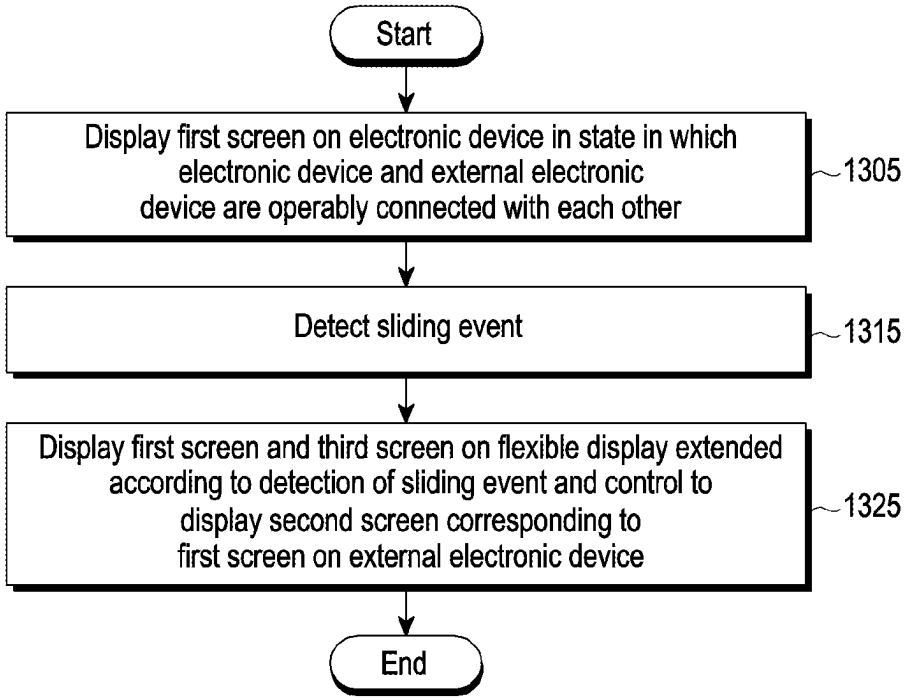

Start
Display first screen on electronic device in state in which electronic device and external electronic device are operably connected with each other
1305
Detect sliding event
1315
Display first screen and third screen on flexible display extended according to detection of sliding event and control to display second screen corresponding to first screen on external electronic device
1325
End

FIG. 13A

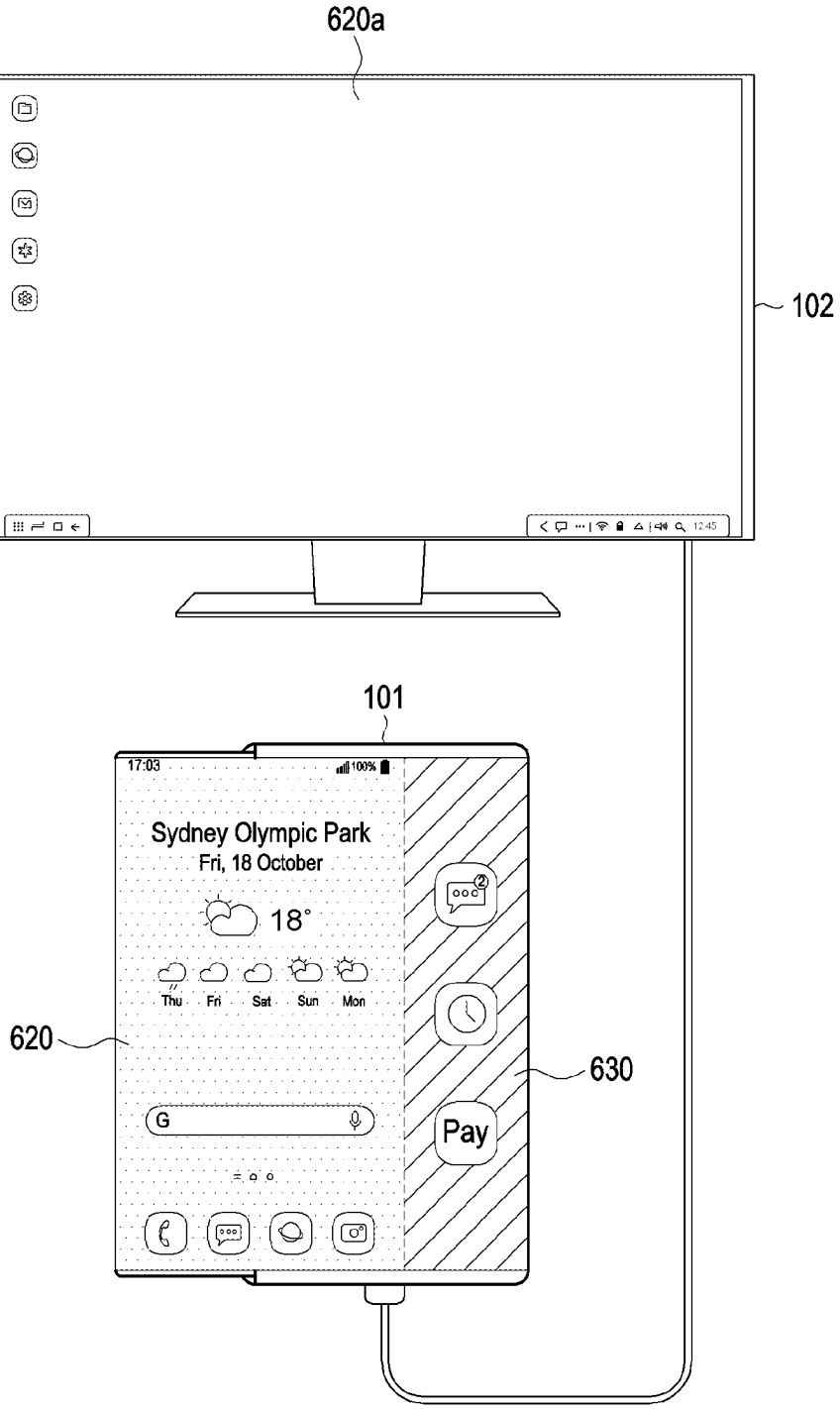

620a
102
101
17:03
100%
Sydney Olympic Park
Fri, 18 October
18°
Thu
Fri
Sat
Sun
Mon
620
630
G
Pay

FIG. 13B

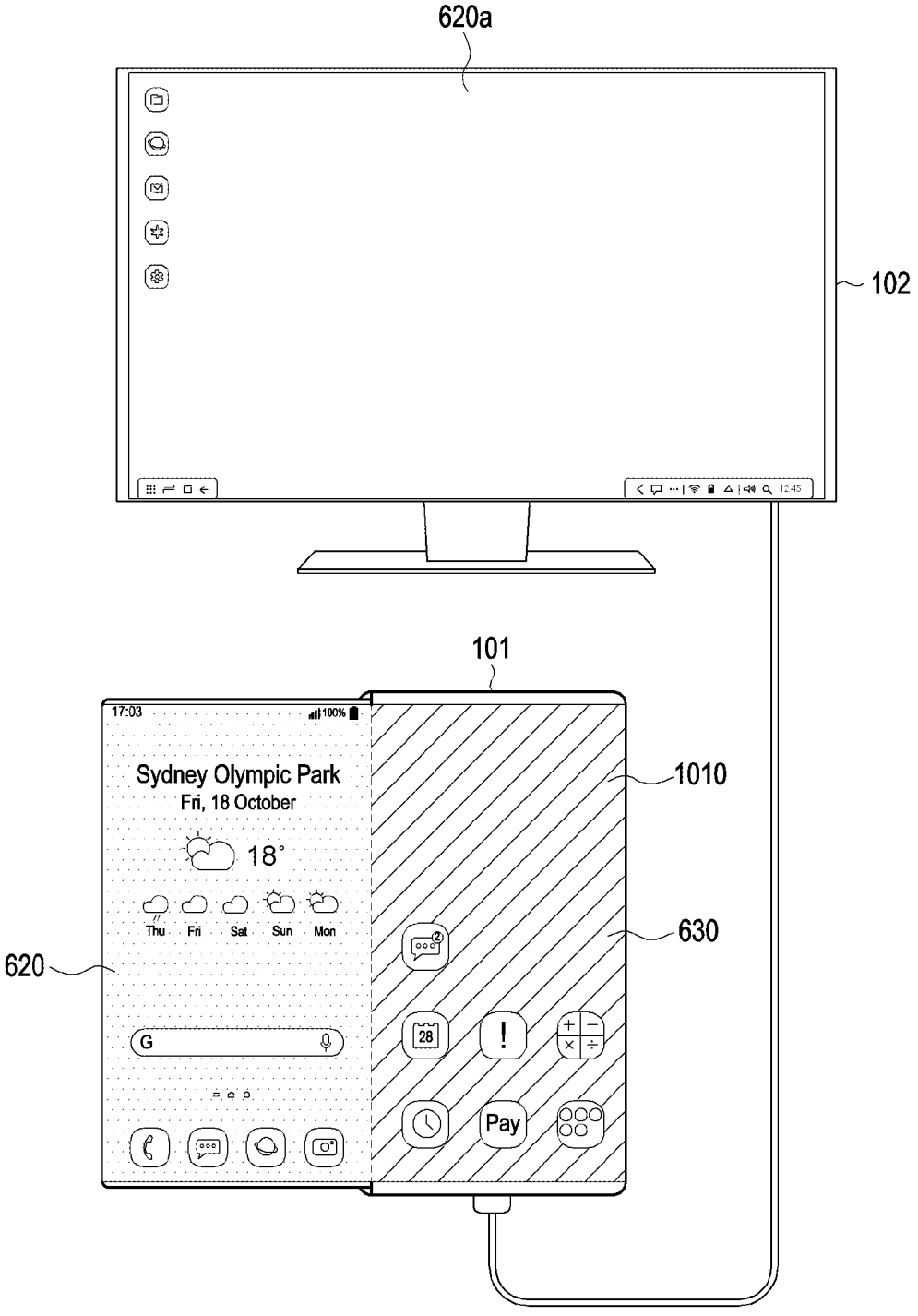

620a
102
101
17:03
100%
Sydney Olympic Park
Fri, 18 October
18°
Thu
Fri
Sat
Sun
Mon
620
1010
630
G
28
!
Pay

FIG. 13C

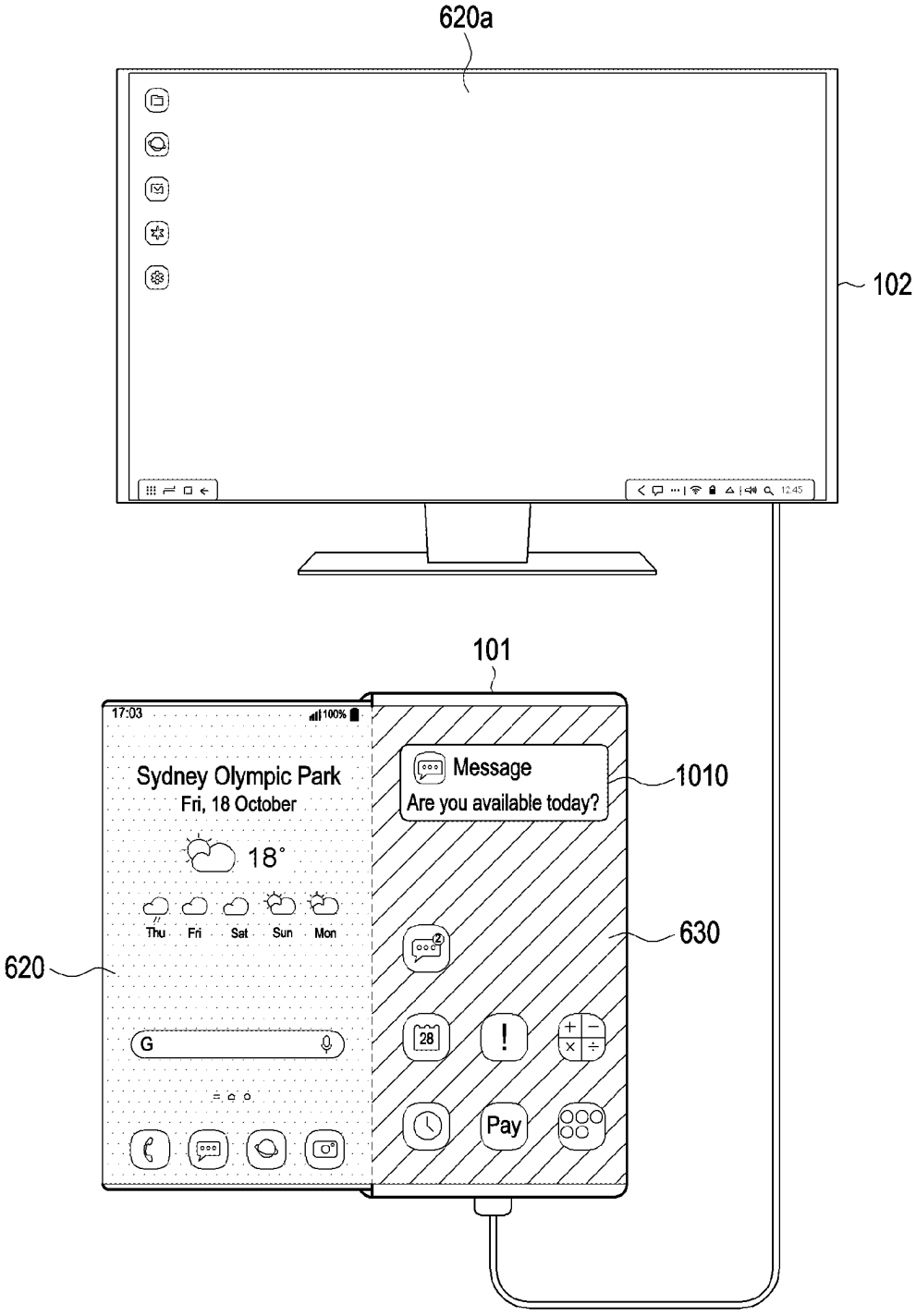

620a
102
101
17:03
100%
Sydney Olympic Park
Fri, 18 October
18°
Thu
Fri
Sat
Sun
Mon
620
Message
Are you available today?
1010
630
G
28
!
Pay

FIG. 13D

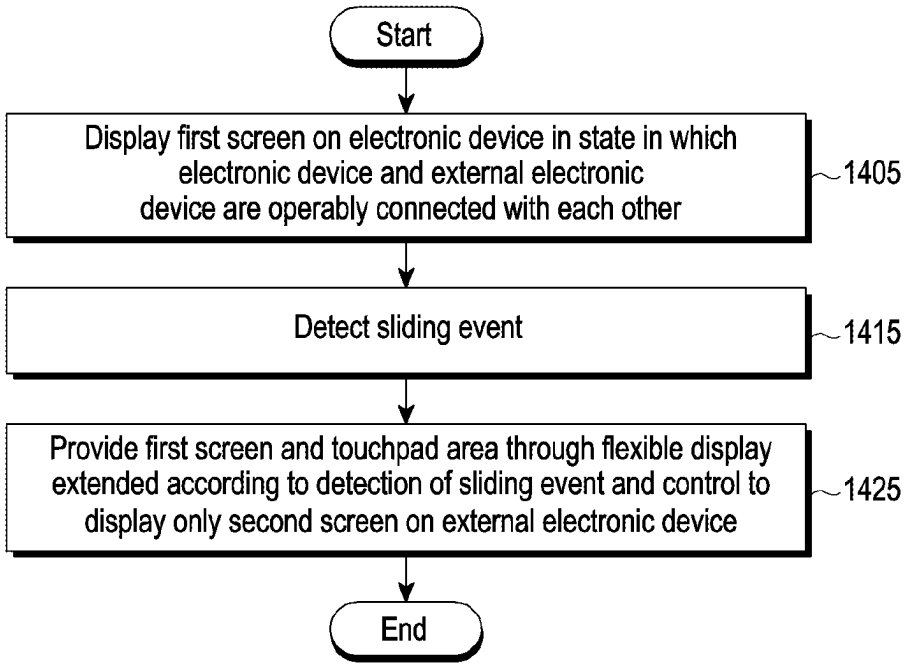
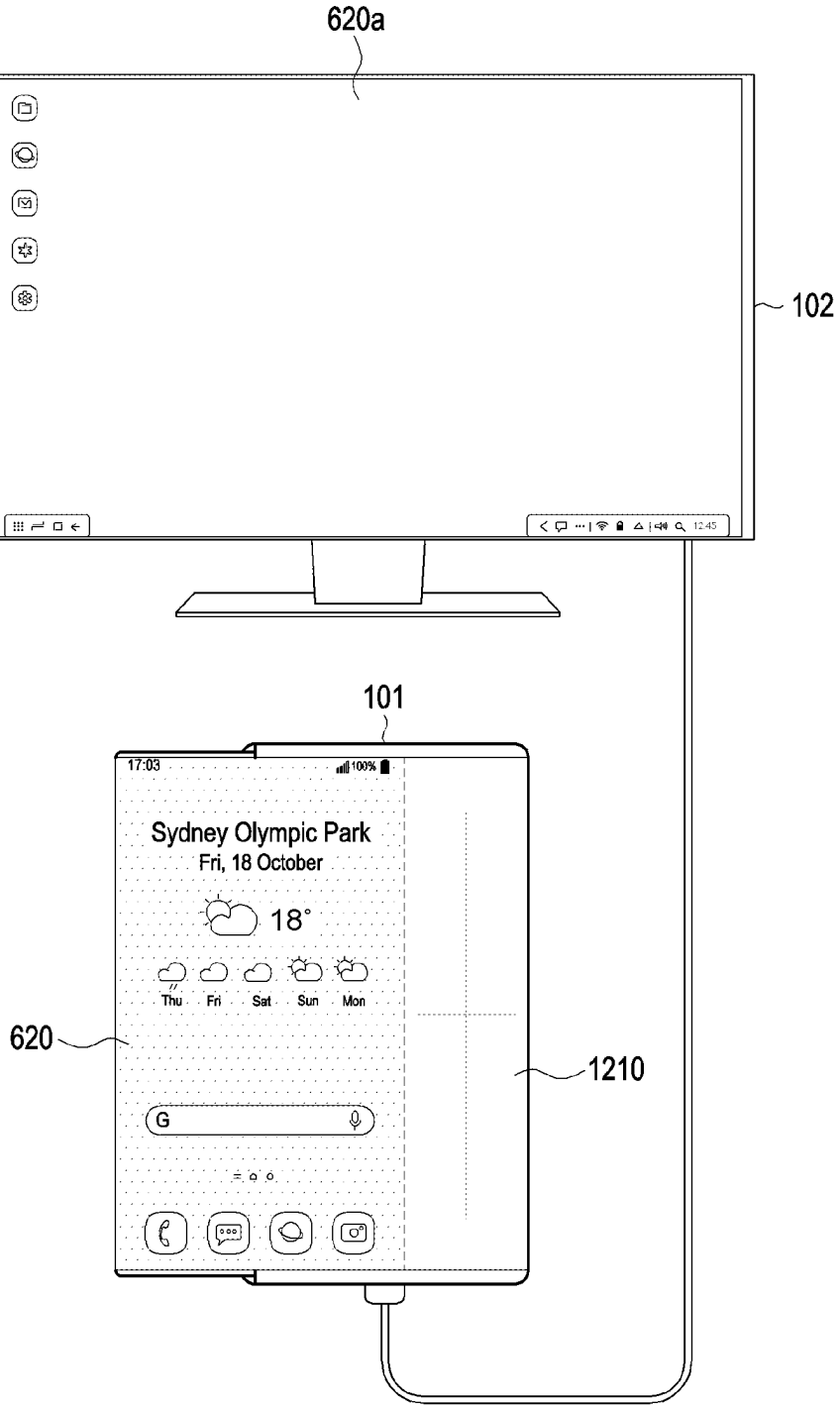

Start
Display first screen on electronic device in state in which electronic device and external electronic device are operably connected with each other
1405
Detect sliding event
1415
Provide first screen and touchpad area through flexible display extended according to detection of sliding event and control to display only second screen on external electronic device
1425
End

FIG. 14A


620a
102
101
17:03
100%
Sydney Olympic Park
Fri, 18 October
18°
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Fri
Sat
Sun
Mon
620
1210
G

FIG. 14B

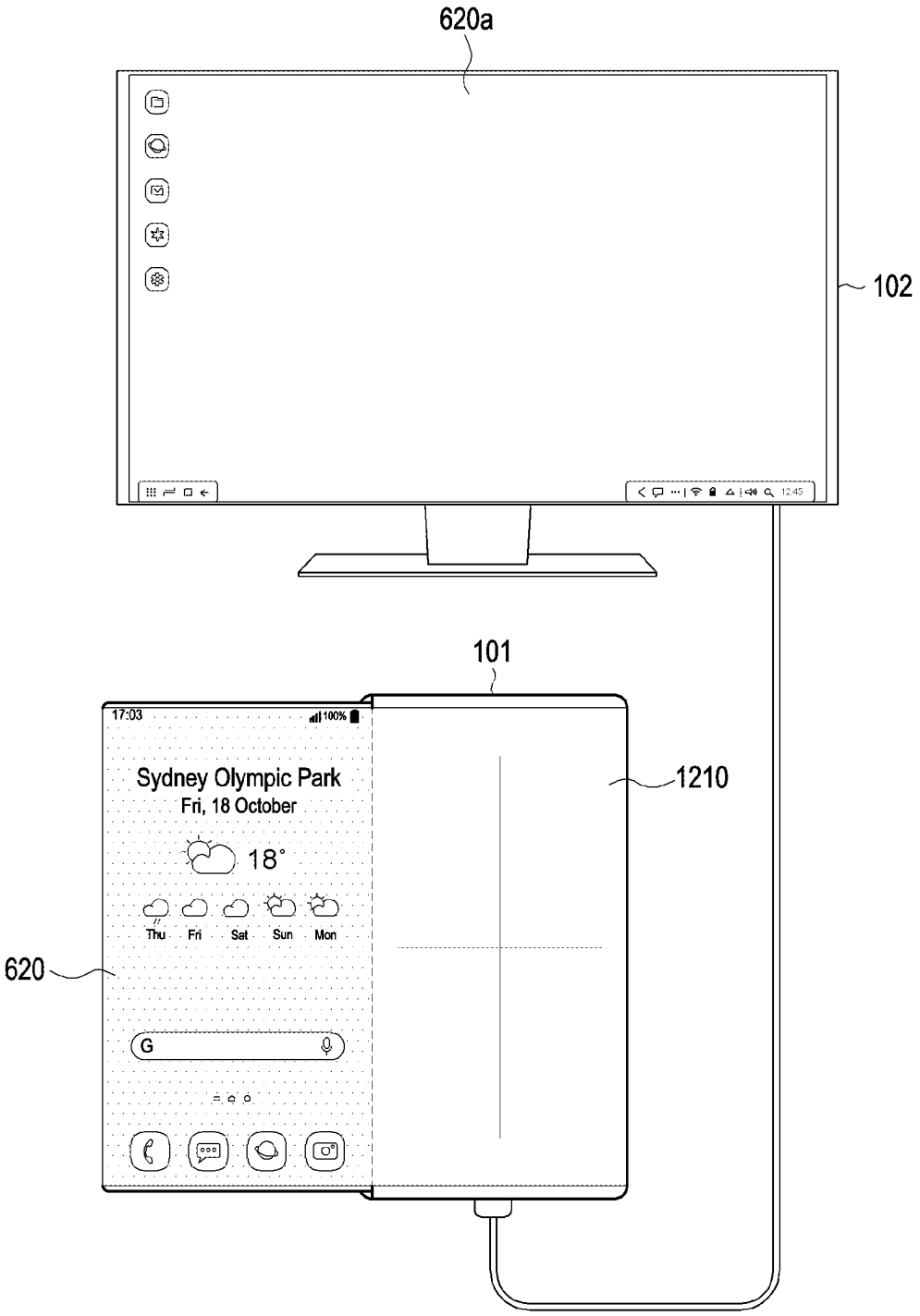
620a
102
101
17:03
100%
Sydney Olympic Park
Fri, 18 October
18°
Thu
Fri
Sat
Sun
Mon
620
1210
G

FIG. 14C

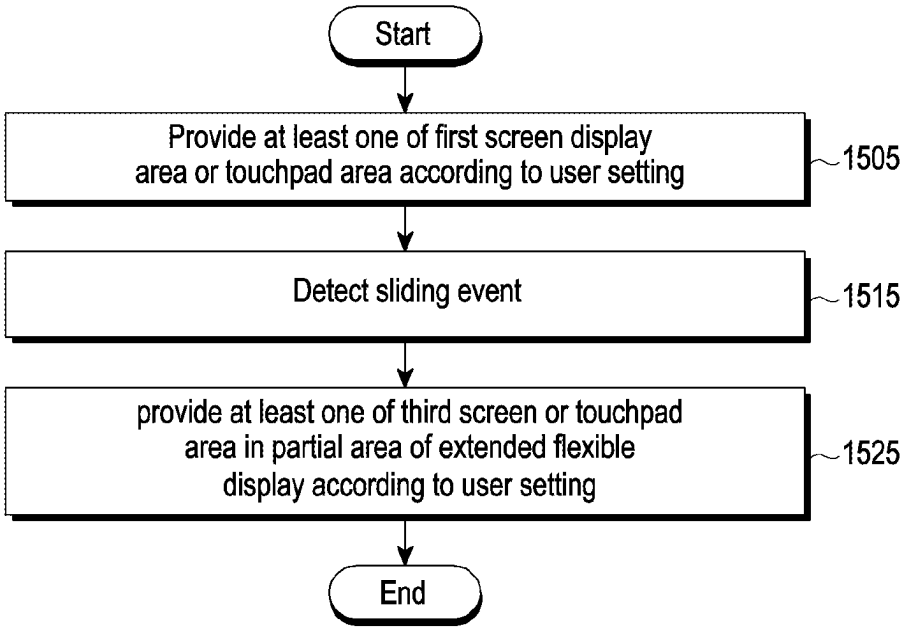
Start
Provide at least one of first screen display area or touchpad area according to user setting
1505
Detect sliding event
1515
provide at least one of third screen or touchpad area in partial area of extended flexible display according to user setting
1525
End

FIG. 15A

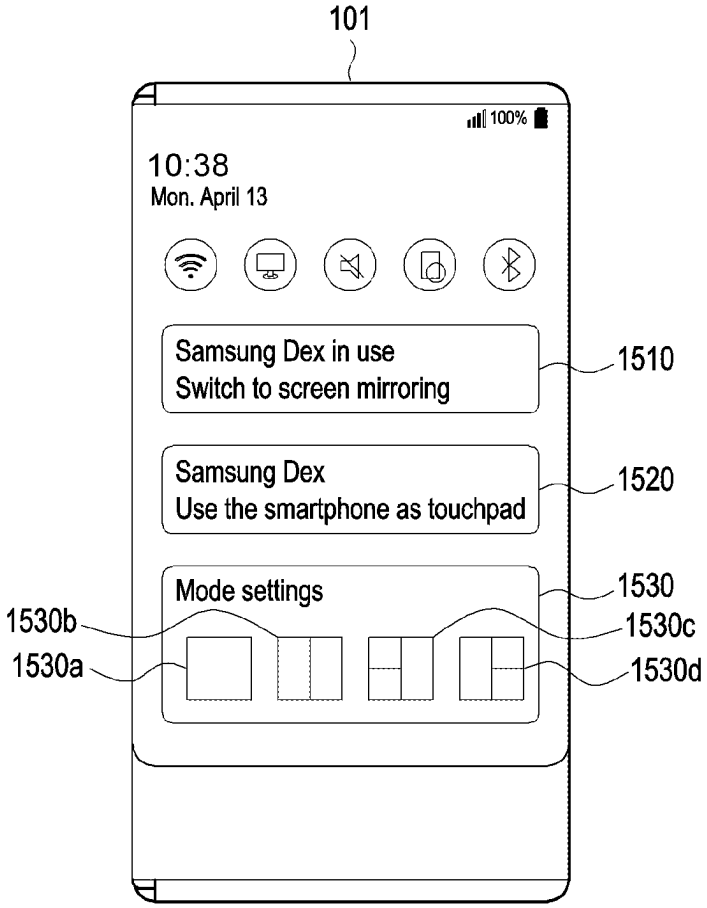
101
100%
10:38
Mon. April 13
Samsung Dex in use
Switch to screen mirroring
1510
Samsung Dex
Use the smartphone as touchpad
1520
Mode settings
1530
1530b
1530c
1530a
1530d

FIG. 15B

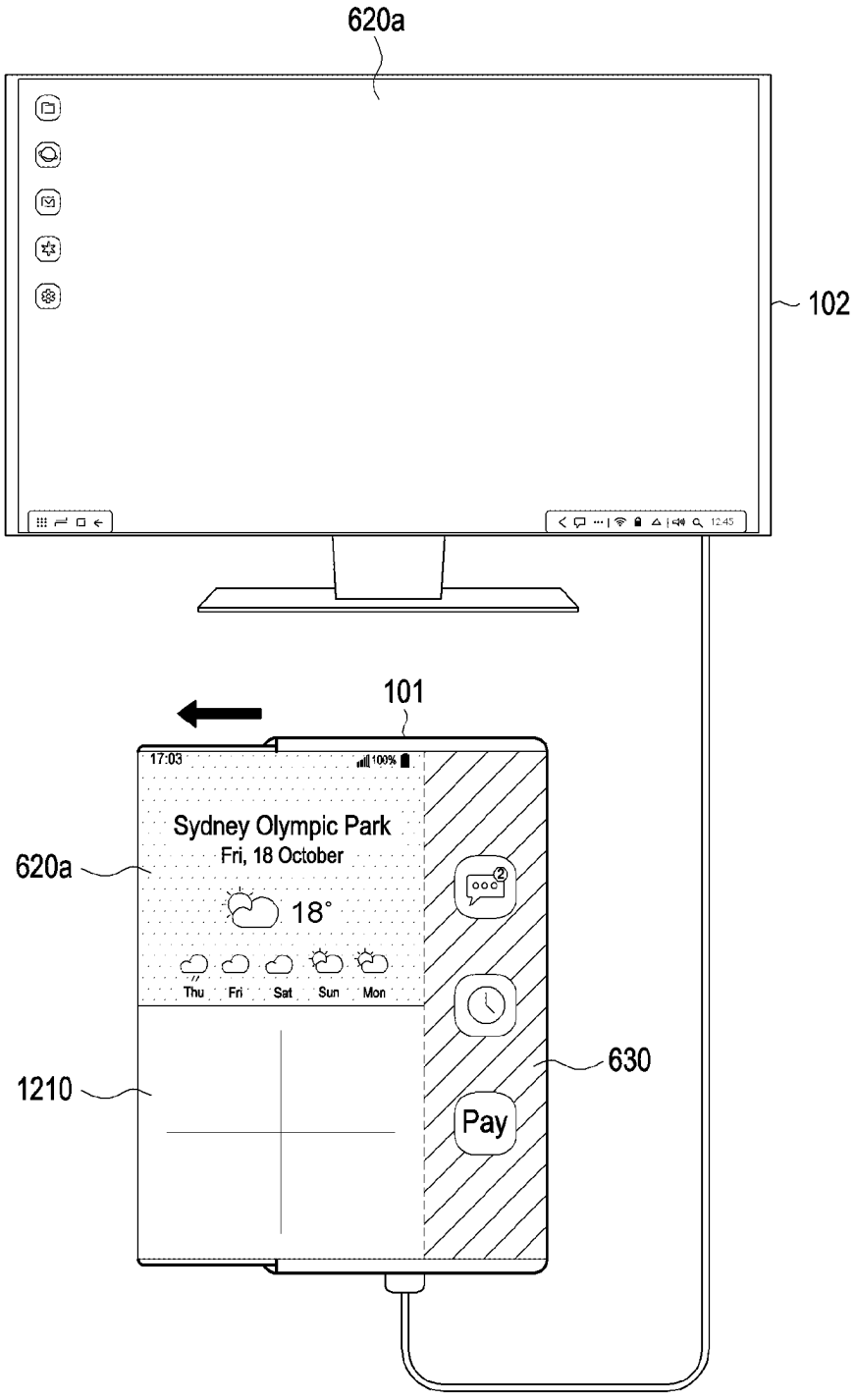
620a
102
101
17:03
100%
Sydney Olympic Park
Fri, 18 October
620a
18°
Thu
Fri
Sat
Sun
Mon
630
1210
Pay

FIG. 15C

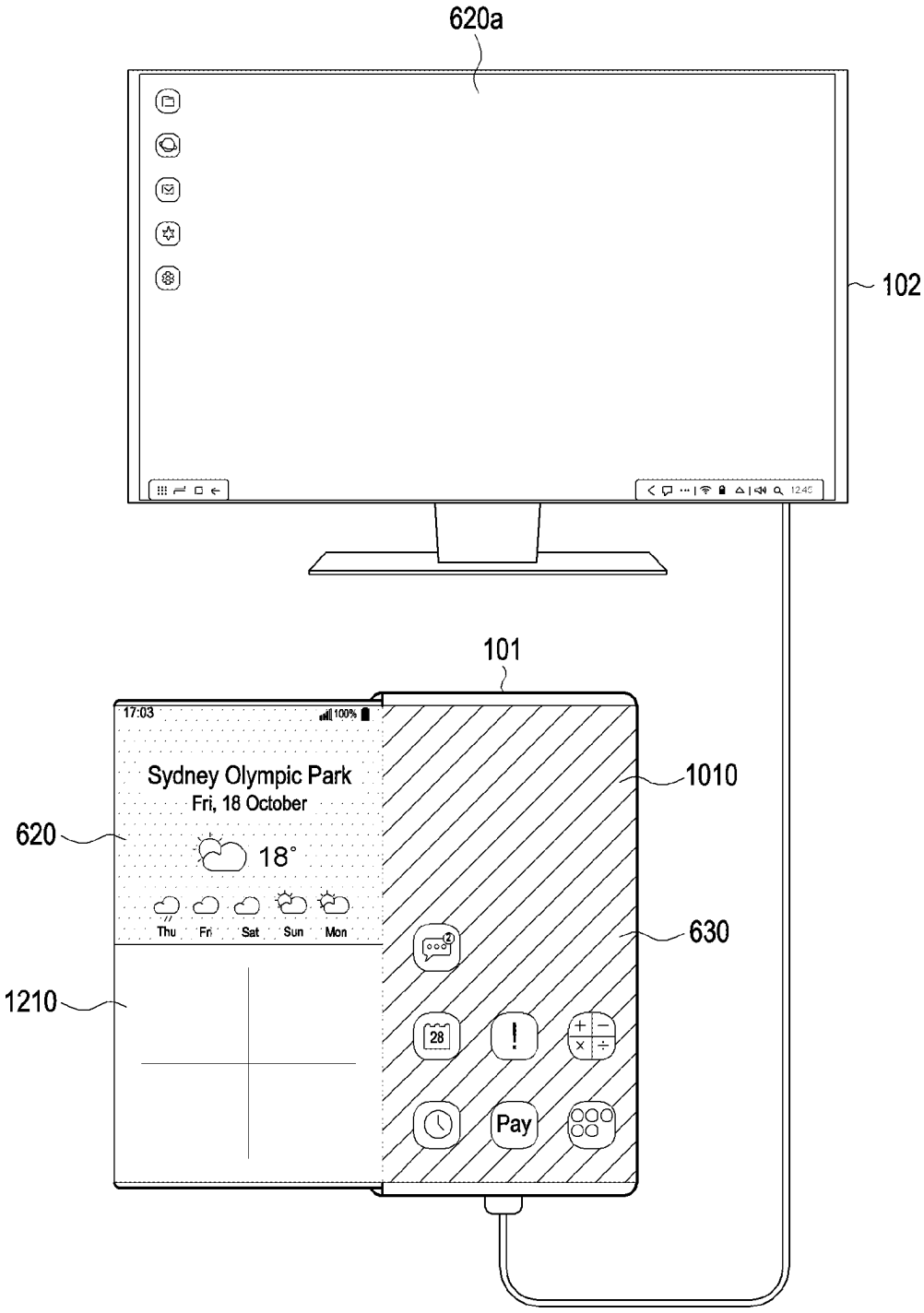
620a
102
101
17:03
100%
Sydney Olympic Park
Fri, 18 October
620
18°
Thu
Fri
Sat
Sun
Mon
1010
630
1210
28
Pay

FIG. 15D

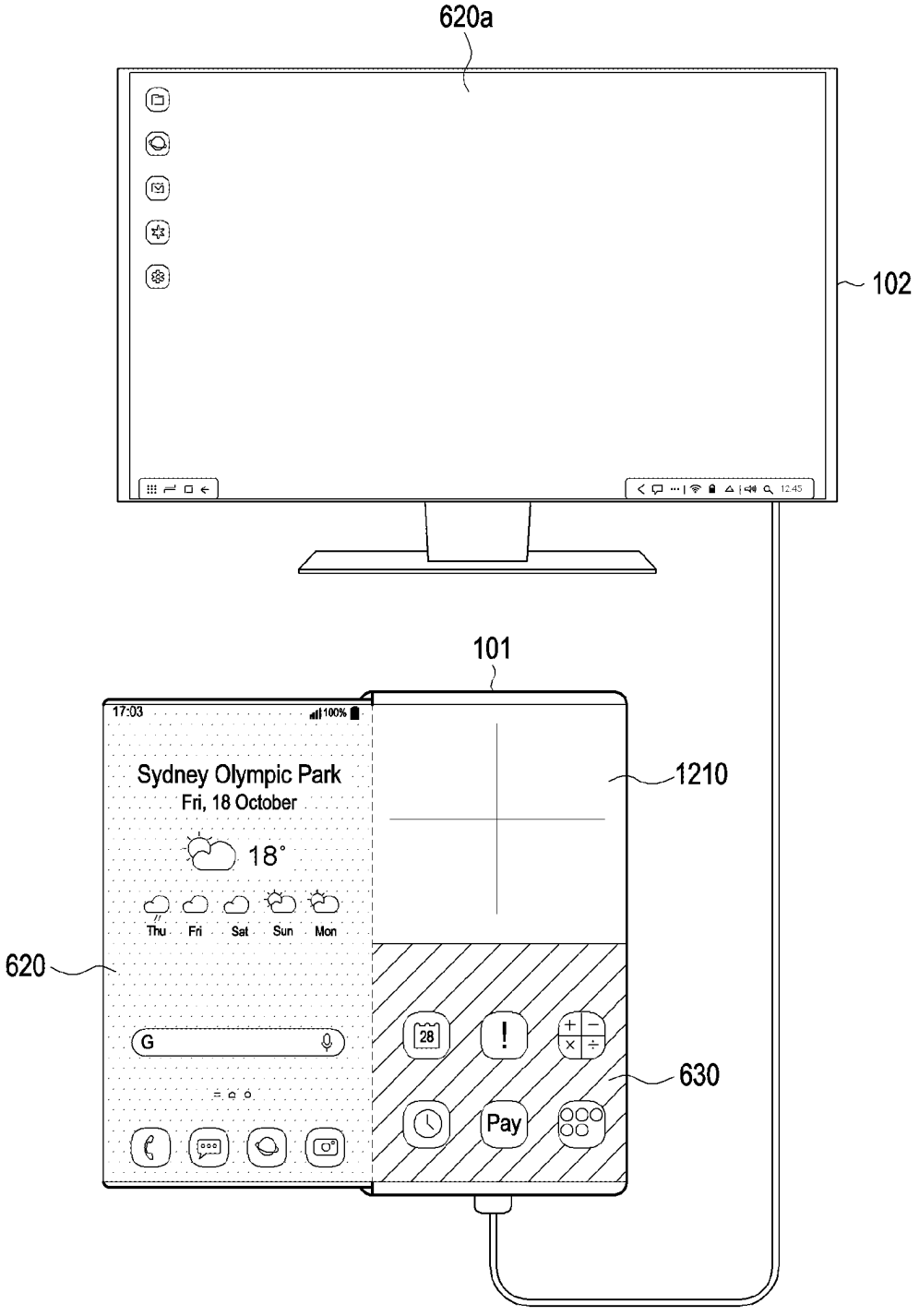
620a
102
101
17:03
100%
Sydney Olympic Park
Fri, 18 October
18°
Thu
Fri
Sat
Sun
Mon
620
1210
630
G
28
!
Pay

FIG. 15E

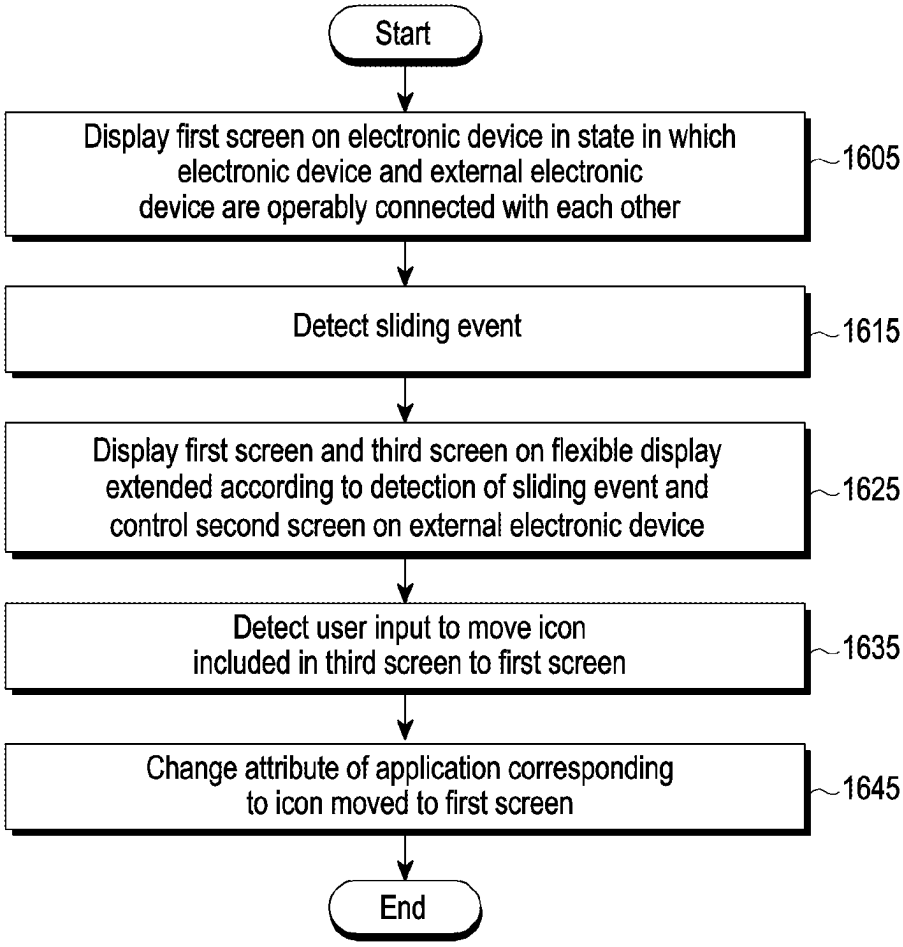
Start
Display first screen on electronic device in state in which electronic device and external electronic device are operably connected with each other
1605
Detect sliding event
1615
Display first screen and third screen on flexible display extended according to detection of sliding event and control second screen on external electronic device
1625
Detect user input to move icon included in third screen to first screen
1635
Change attribute of application corresponding to icon moved to first screen
1645
End

FIG. 16A

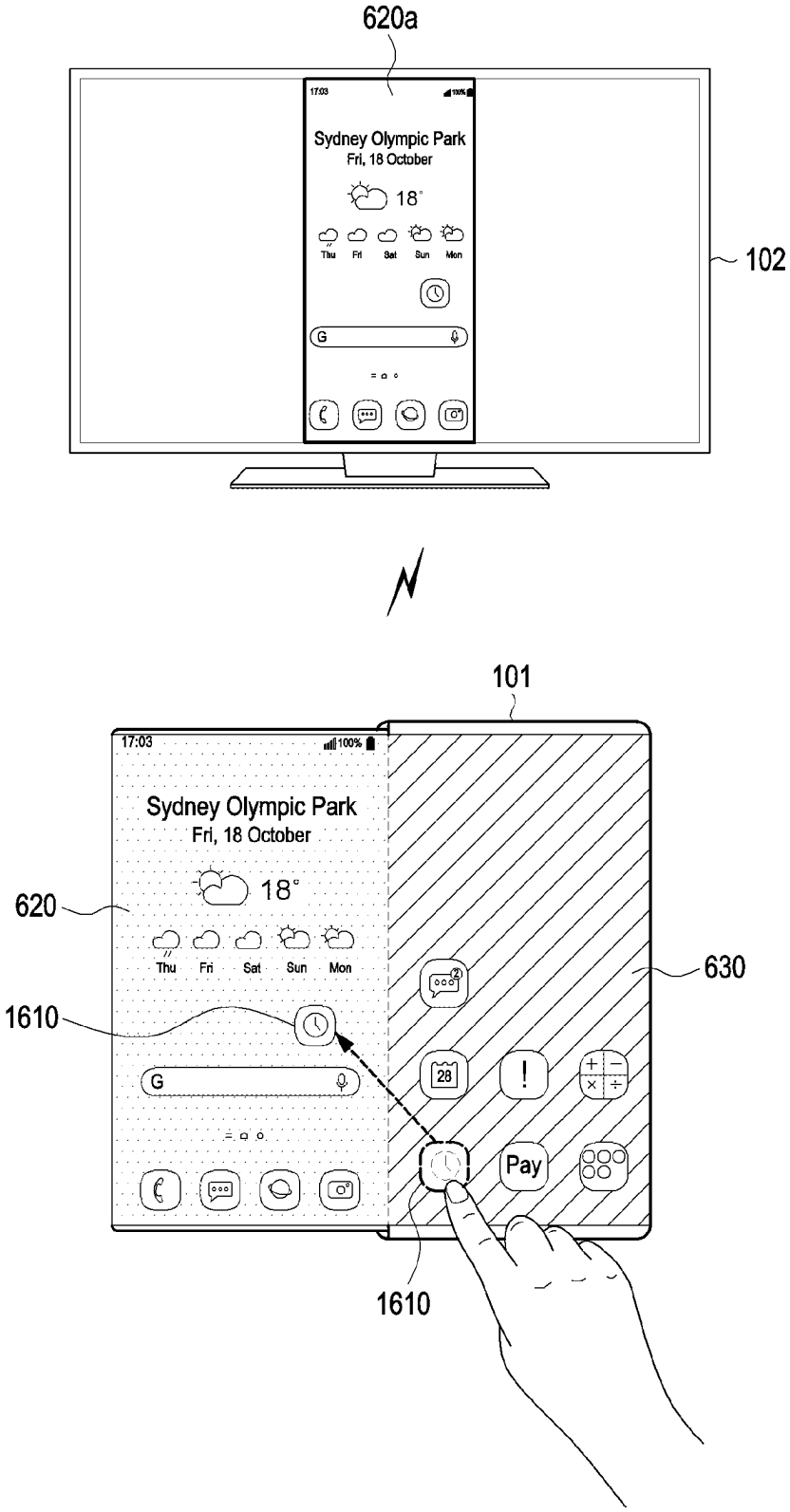
620a
17:03
Sydney Olympic Park
Fri, 18 October
18°
Thu
Fri
Sat
Sun
Mon
102
101
17:03
100%
Sydney Olympic Park
Fri, 18 October
18°
620
Thu
Fri
Sat
Sun
Mon
630
1610
28
Pay
1610

FIG. 16B

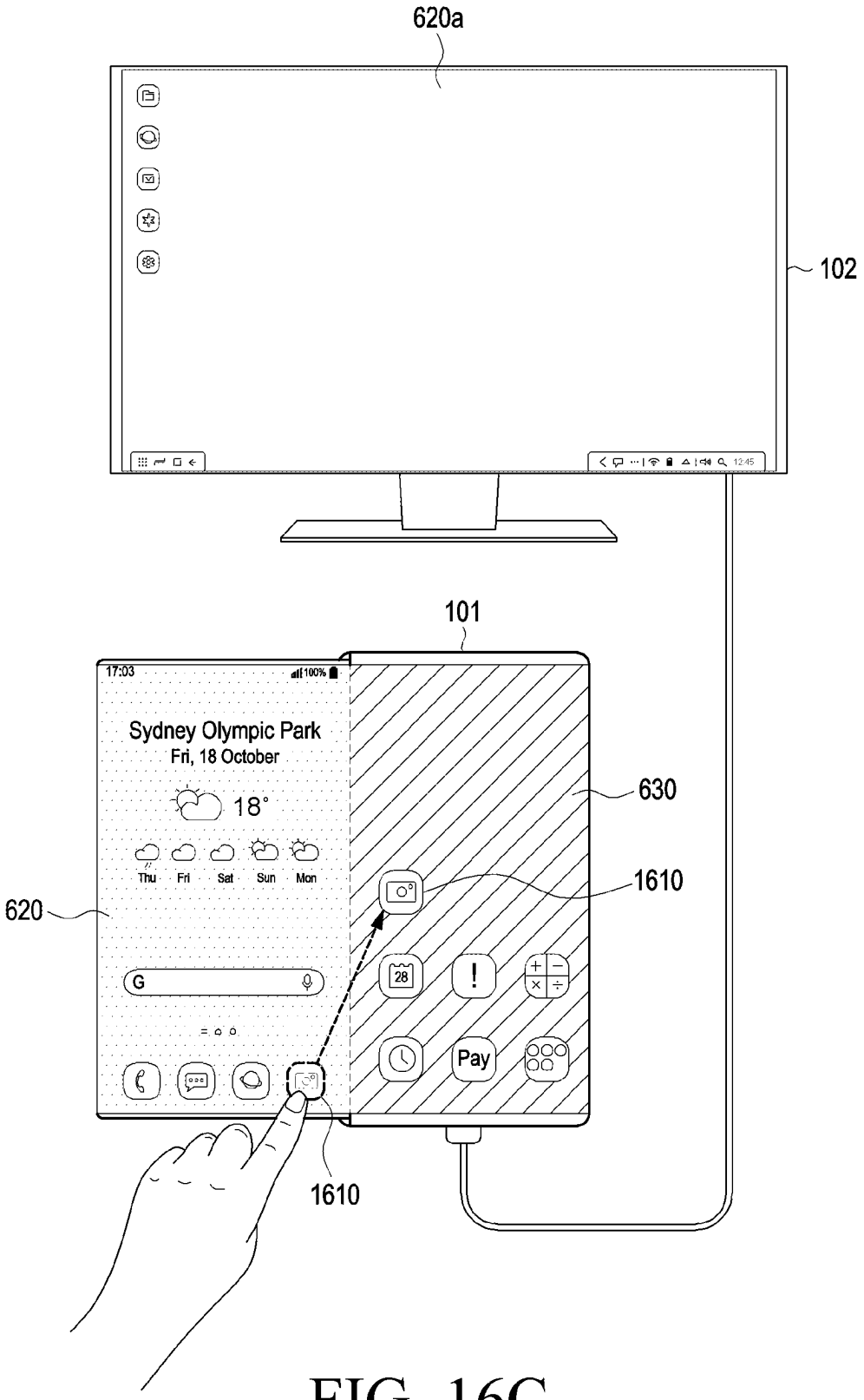
620a
102
101
17:03
100%
Sydney Olympic Park
Fri, 18 October
18°
Thu
Fri
Sat
Sun
Mon
620
630
1610
G
28
!
Pay
1610

FIG. 16C

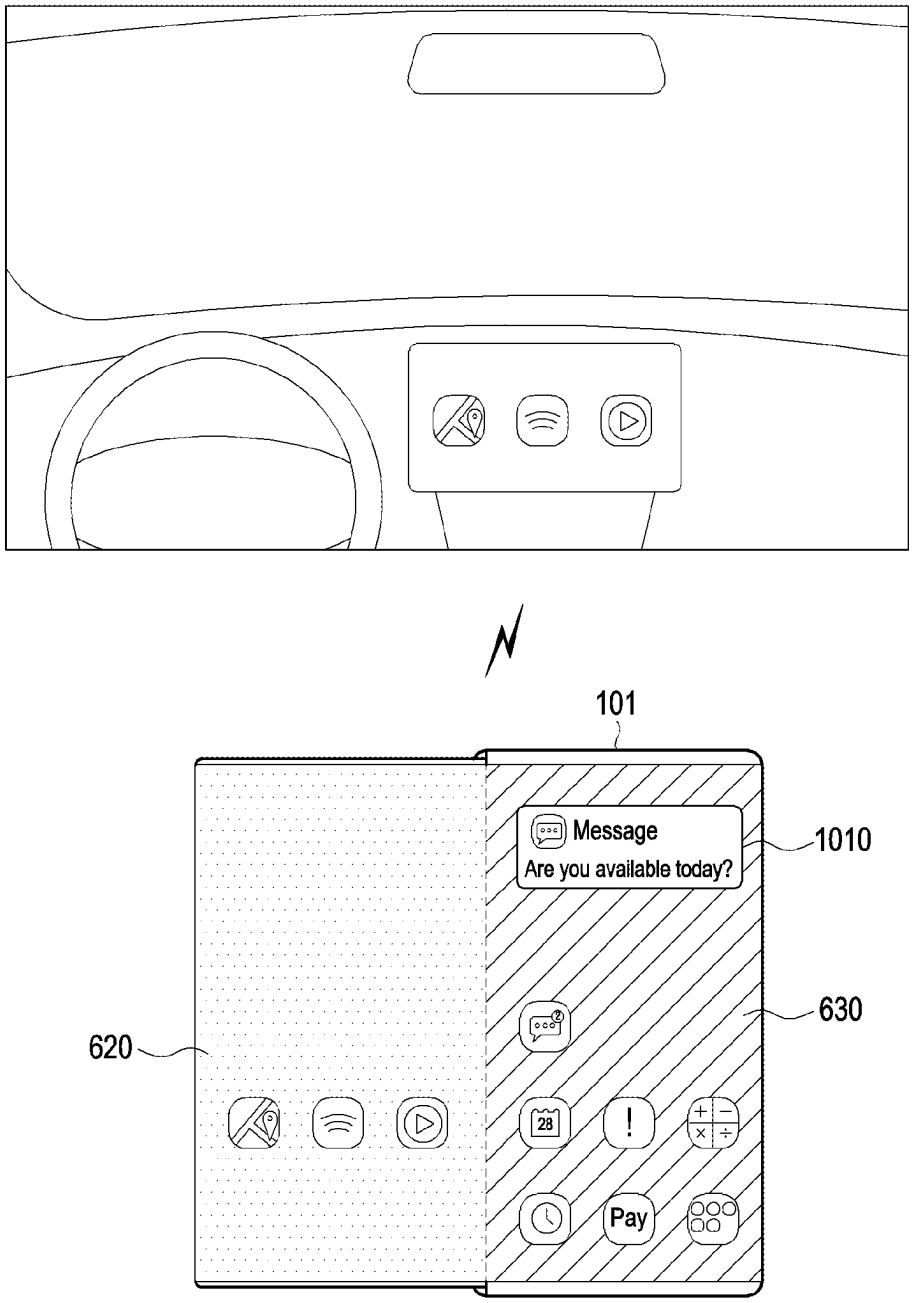

FIG. 17

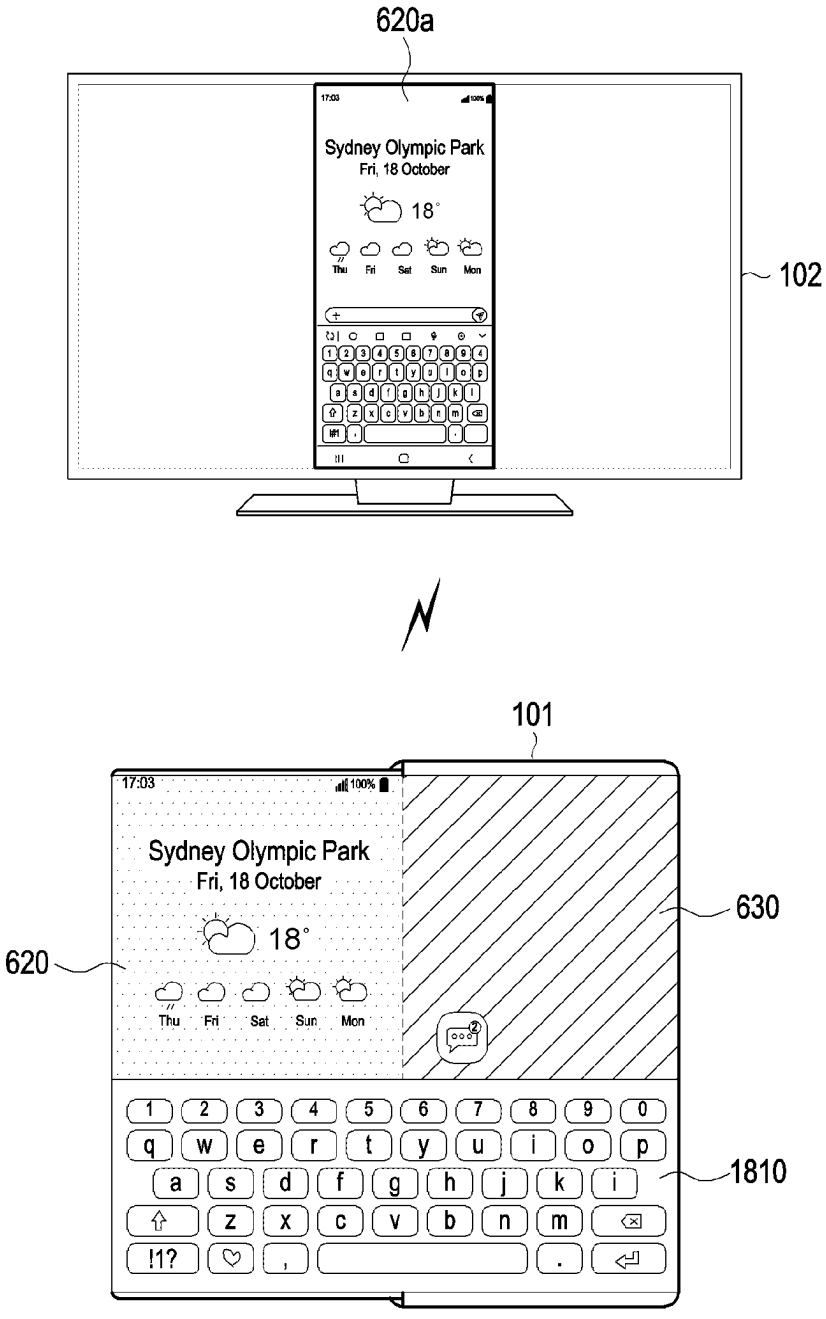
620a
17:03
Sydney Olympic Park
Fri, 18 October
18°
Thu
Fri
Sat
Sun
Mon
102
101
17:03
100%
Sydney Olympic Park
Fri, 18 October
18°
Thu
Fri
Sat
Sun
Mon
620
630
1810

FIG. 18A

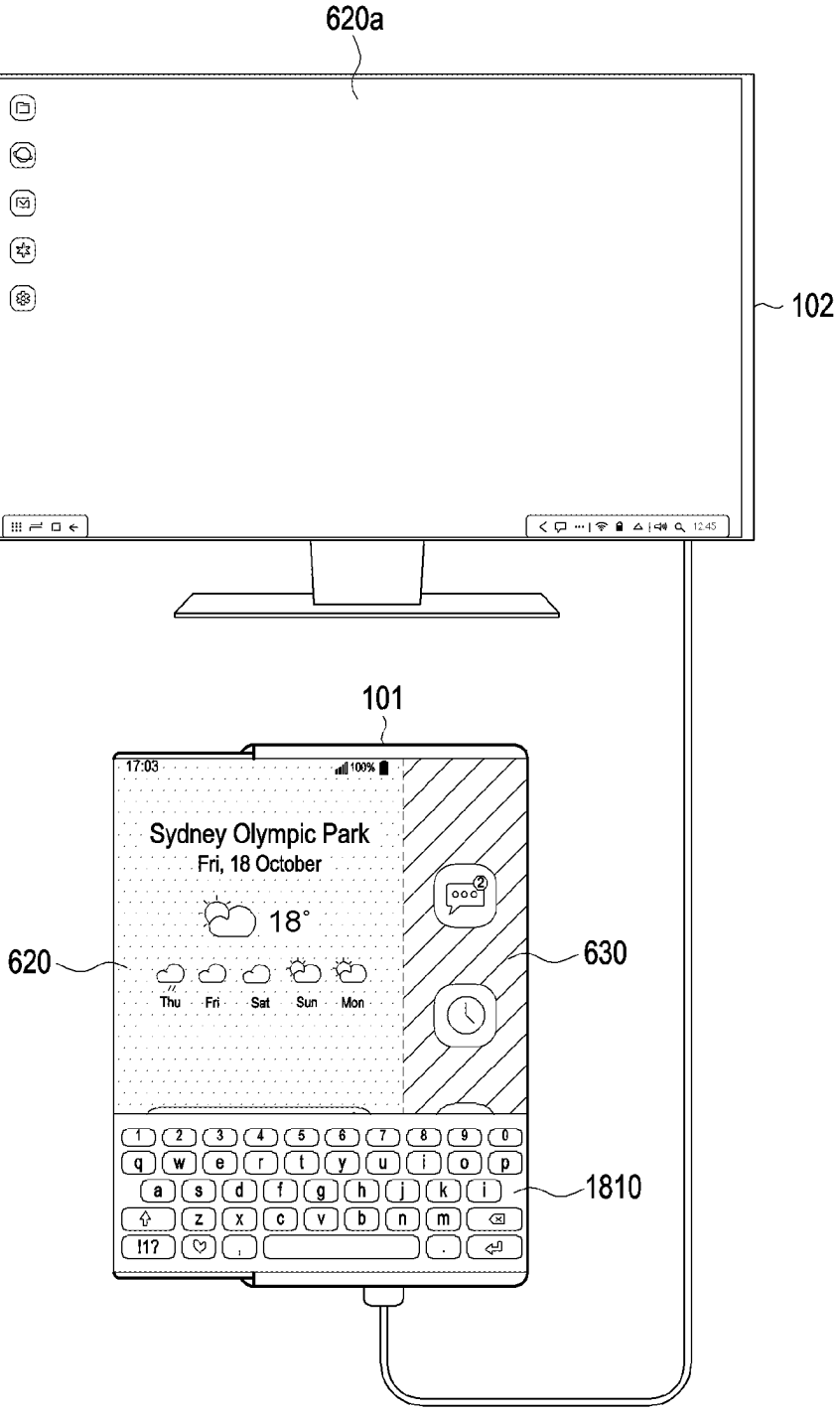
620a
102
101
17:03
100%
Sydney Olympic Park
Fri, 18 October
18°
620
630
Thu
Fri
Sat
Sun
Mon
1810

FIG. 18B

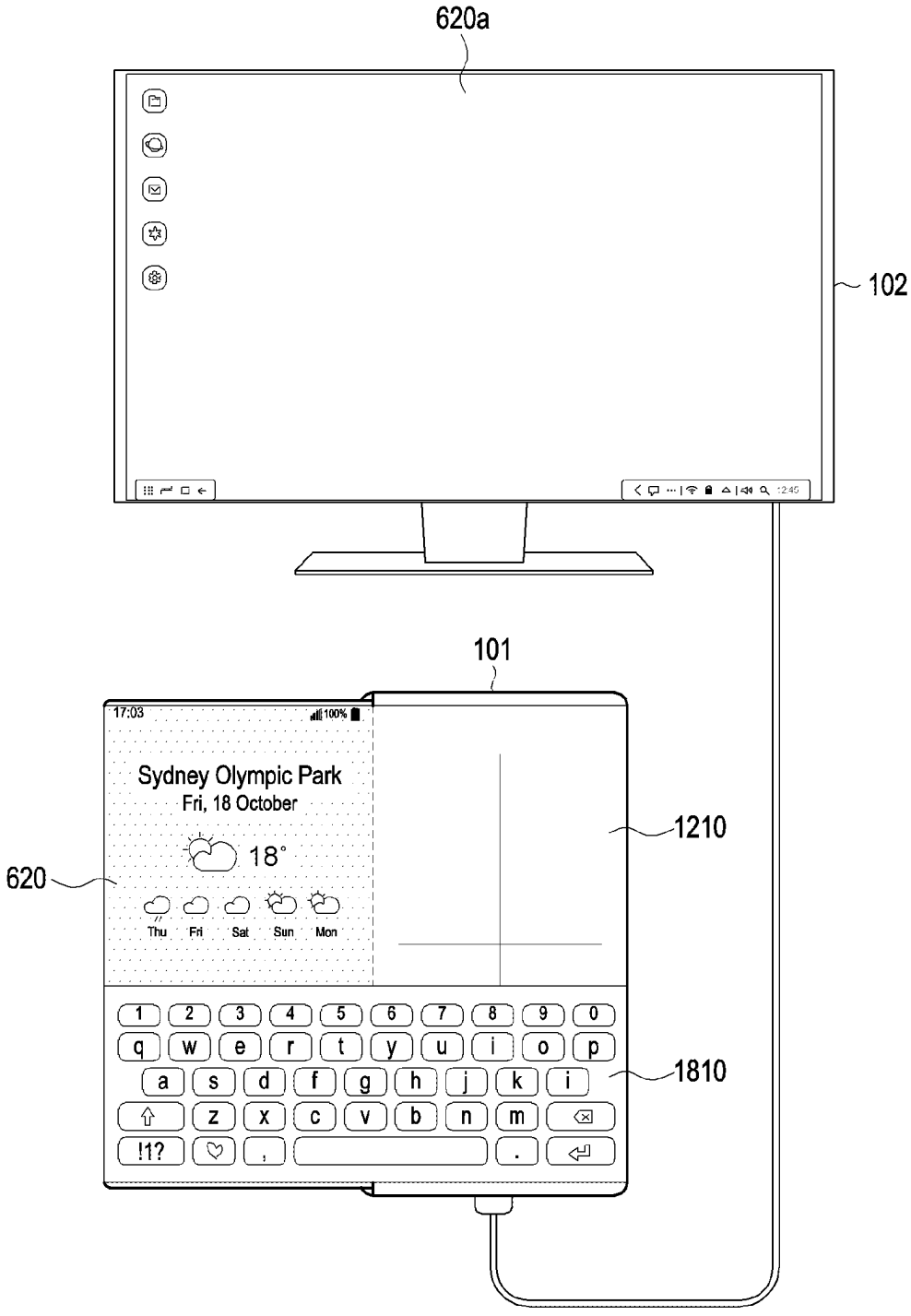
620a
102
101
17:03
100%
Sydney Olympic Park
Fri, 18 October
18°
620
Thu
Fri
Sat
Sun
Mon
1210
1810

FIG. 18C

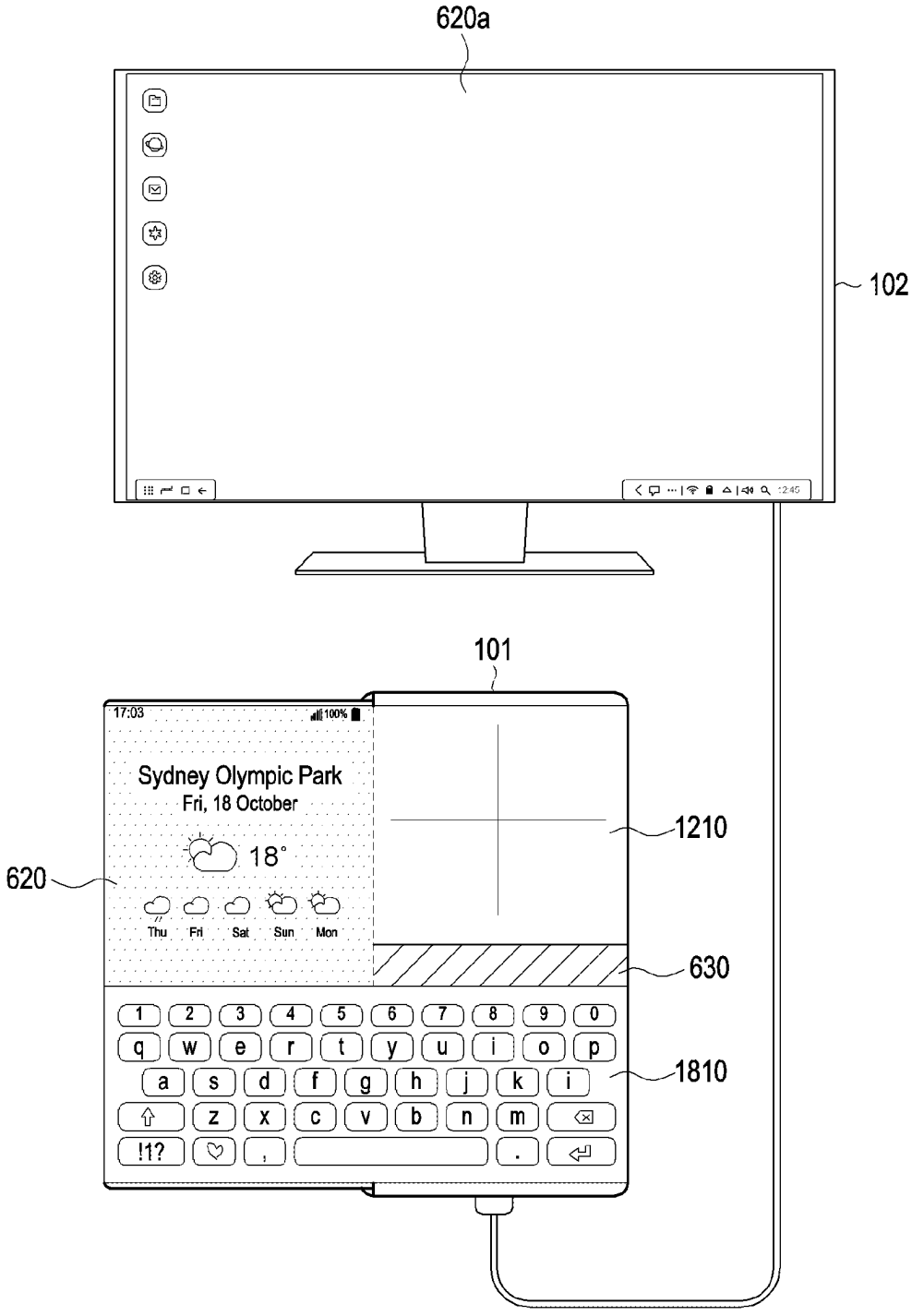
620a
102
101
17:03
100%
Sydney Olympic Park
Fri, 18 October
18°
Thu
Fri
Sat
Sun
Mon
620
1210
630
1810

FIG. 18D

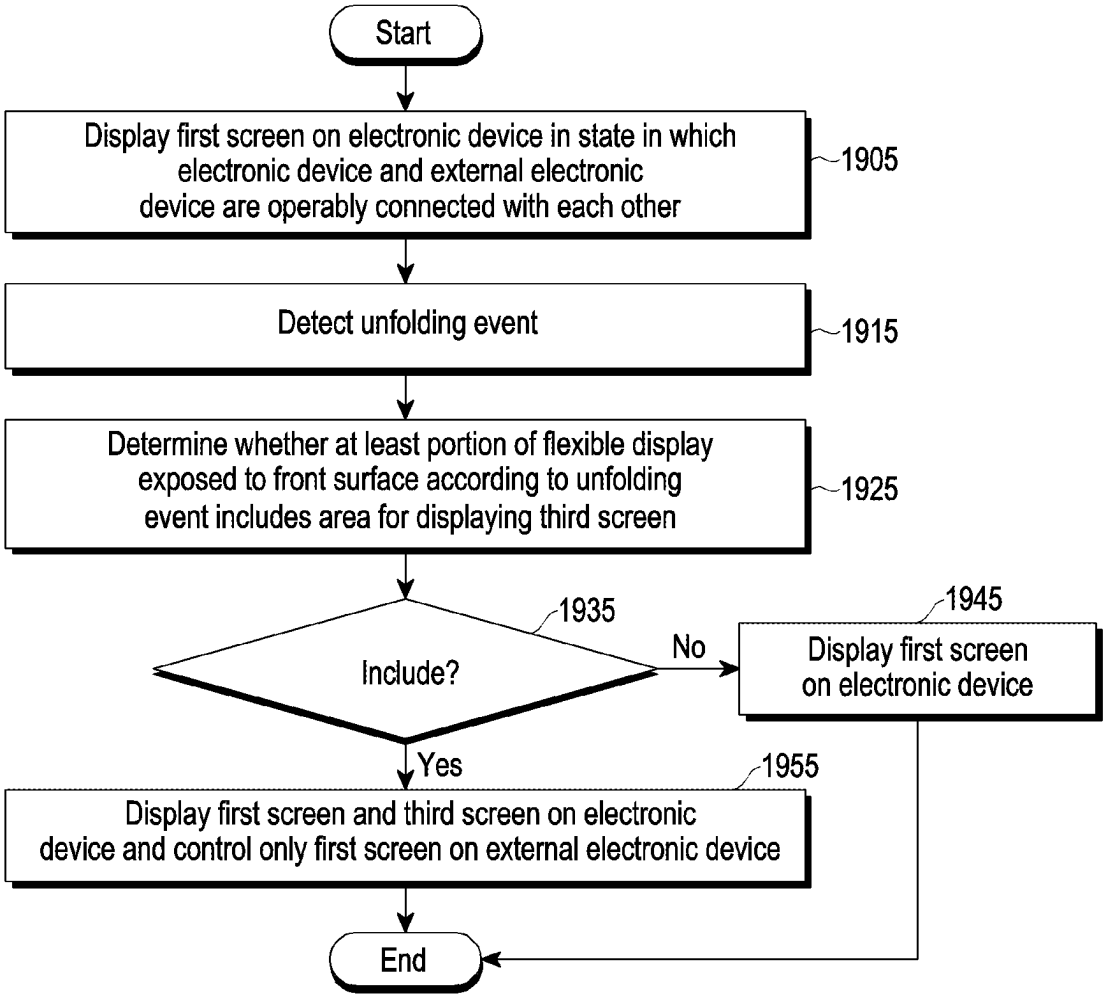
Start
Display first screen on electronic device in state in which electronic device and external electronic device are operably connected with each other
1905
Detect unfolding event
1915
Determine whether at least portion of flexible display exposed to front surface according to unfolding event includes area for displaying third screen
1925
1935
Include?
No
1945
Display first screen on electronic device
Yes
1955
Display first screen and third screen on electronic device and control only first screen on external electronic device
End

FIG. 19A

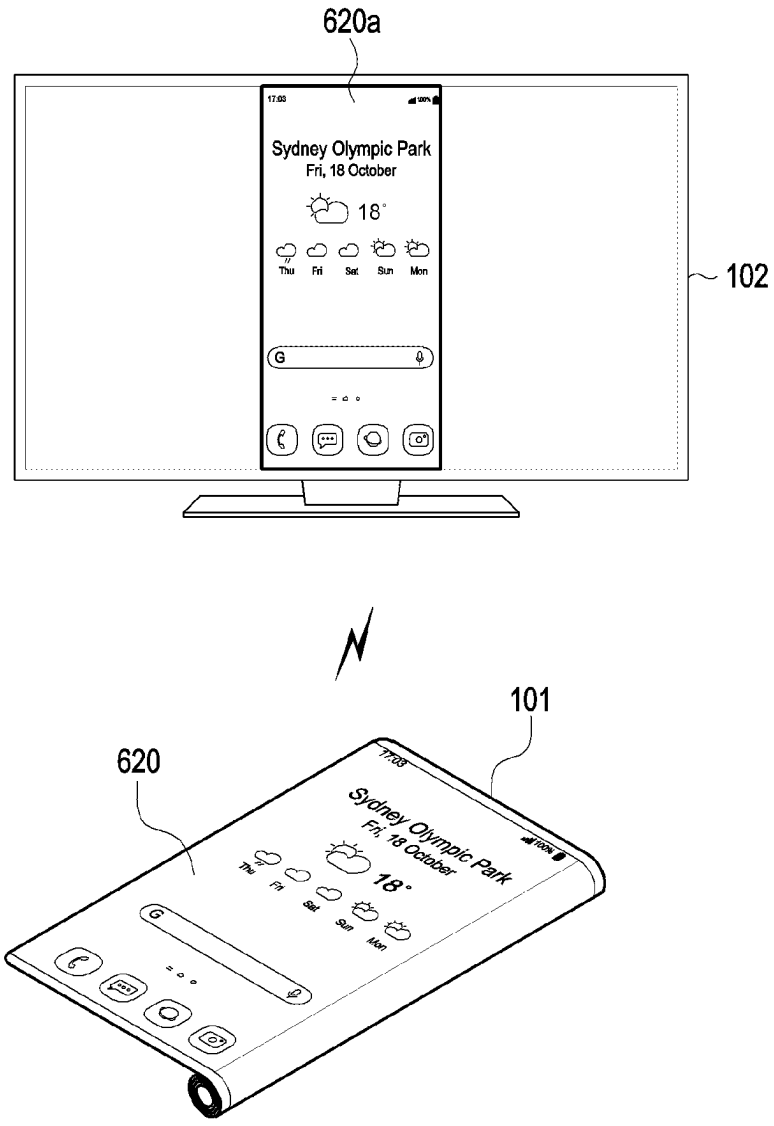
620a
17:03
Sydney Olympic Park
Fri, 18 October
18°
Thu
Fri
Sat
Sun
Mon
102
101
620
17:03
Sydney Olympic Park
Fri, 18 October
18°
Thu
Fri
Sat
Sun
Mon

FIG. 19B

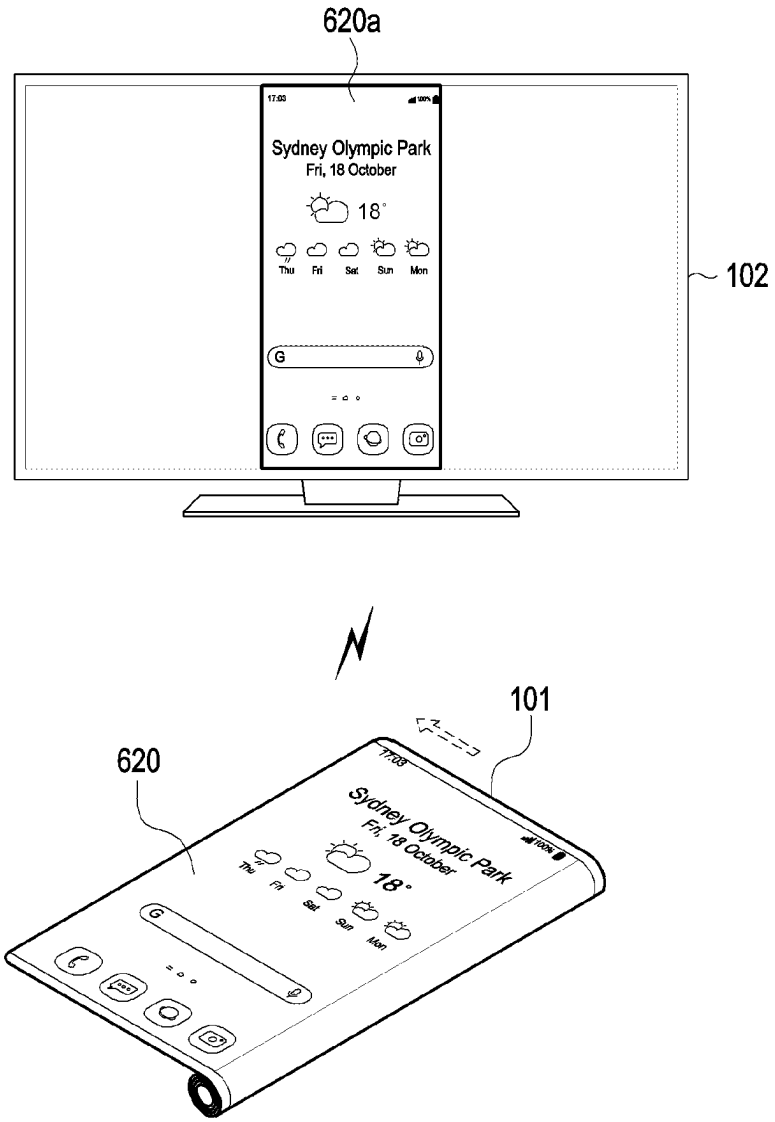
620a
Sydney Olympic Park
Fri, 18 October
18°
Thu
Fri
Sat
Sun
Mon
102
101
620

FIG. 19C

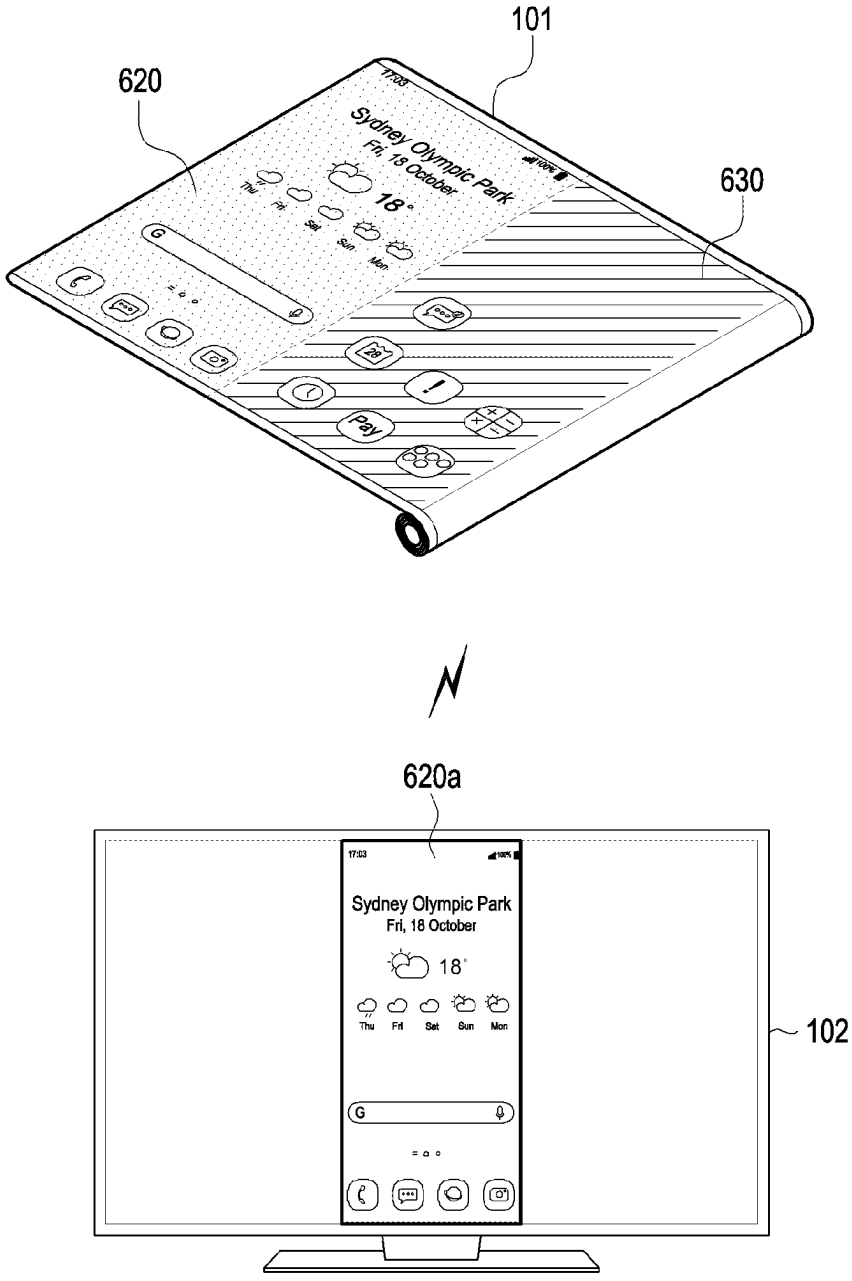
101
620
630
Sydney Olympic Park
Fri, 18 October
18°
Thu
Fri
Sat
Sun
Mon
620a
Sydney Olympic Park
Fri, 18 October
18°
Thu
Fri
Sat
Sun
Mon
102

FIG. 19D

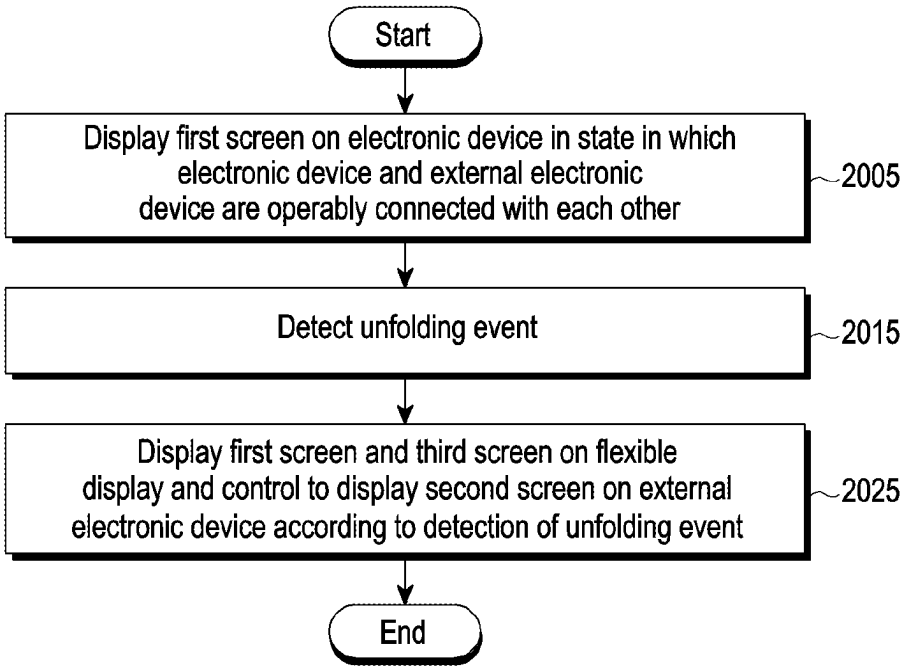
Start
Display first screen on electronic device in state in which electronic device and external electronic device are operably connected with each other
2005
Detect unfolding event
2015
Display first screen and third screen on flexible display and control to display second screen on external electronic device according to detection of unfolding event
2025
End

FIG. 20A

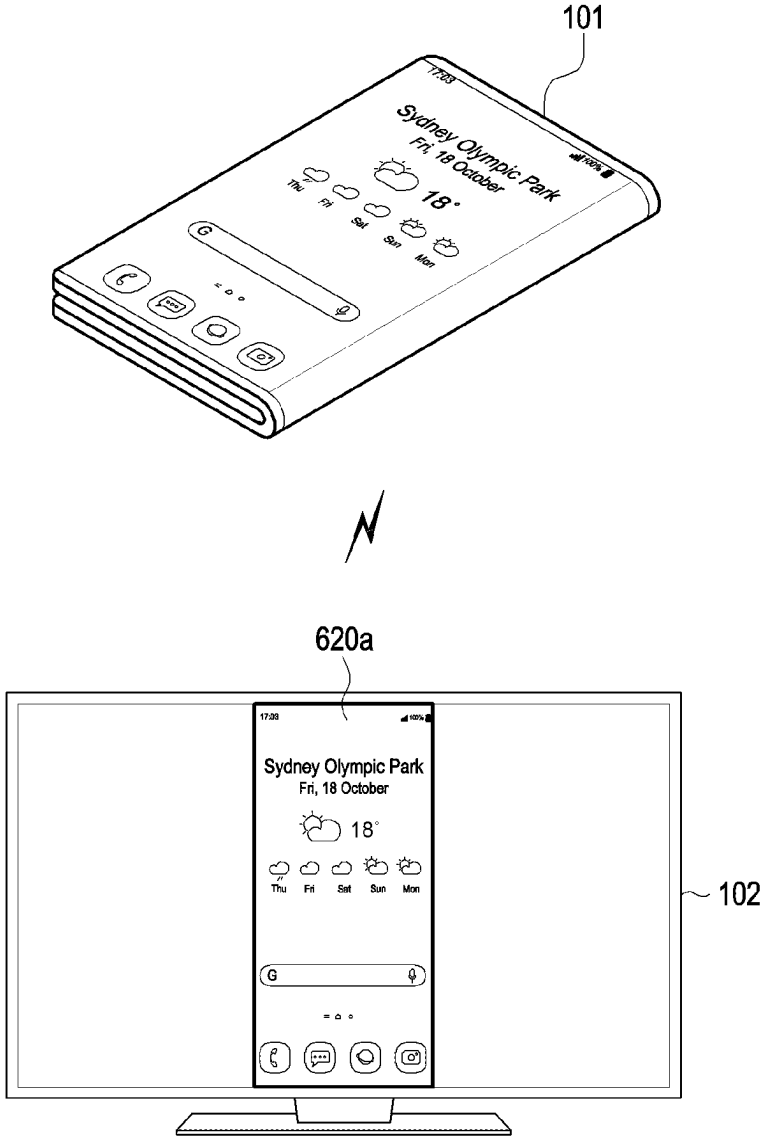
101
Sydney Olympic Park
Fri, 18 October
18°
Thu
Fri
Sat
Sun
Mon
620a
Sydney Olympic Park
Fri, 18 October
18°
Thu
Fri
Sat
Sun
Mon
102

FIG. 20B

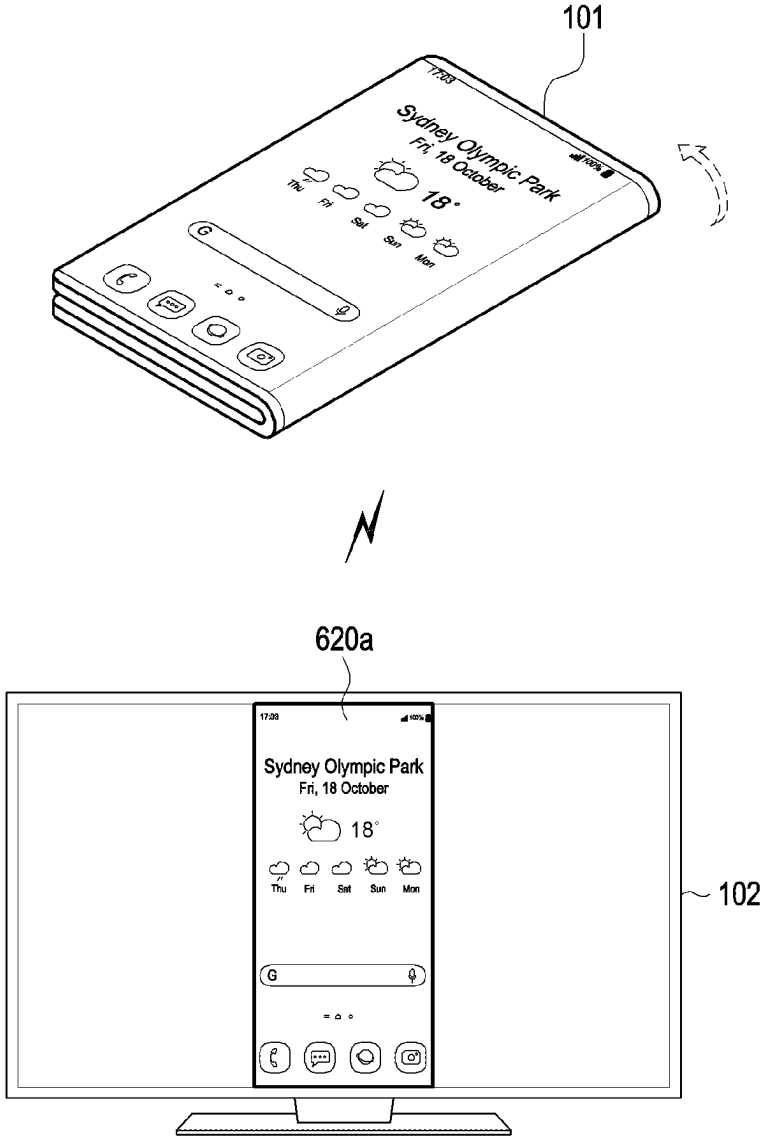
101
Sydney Olympic Park
Fri, 18 October
18°
Thu
Fri
Sat
Sun
Mon
620a
Sydney Olympic Park
Fri, 18 October
18°
Thu
Fri
Sat
Sun
Mon
102

FIG. 20C

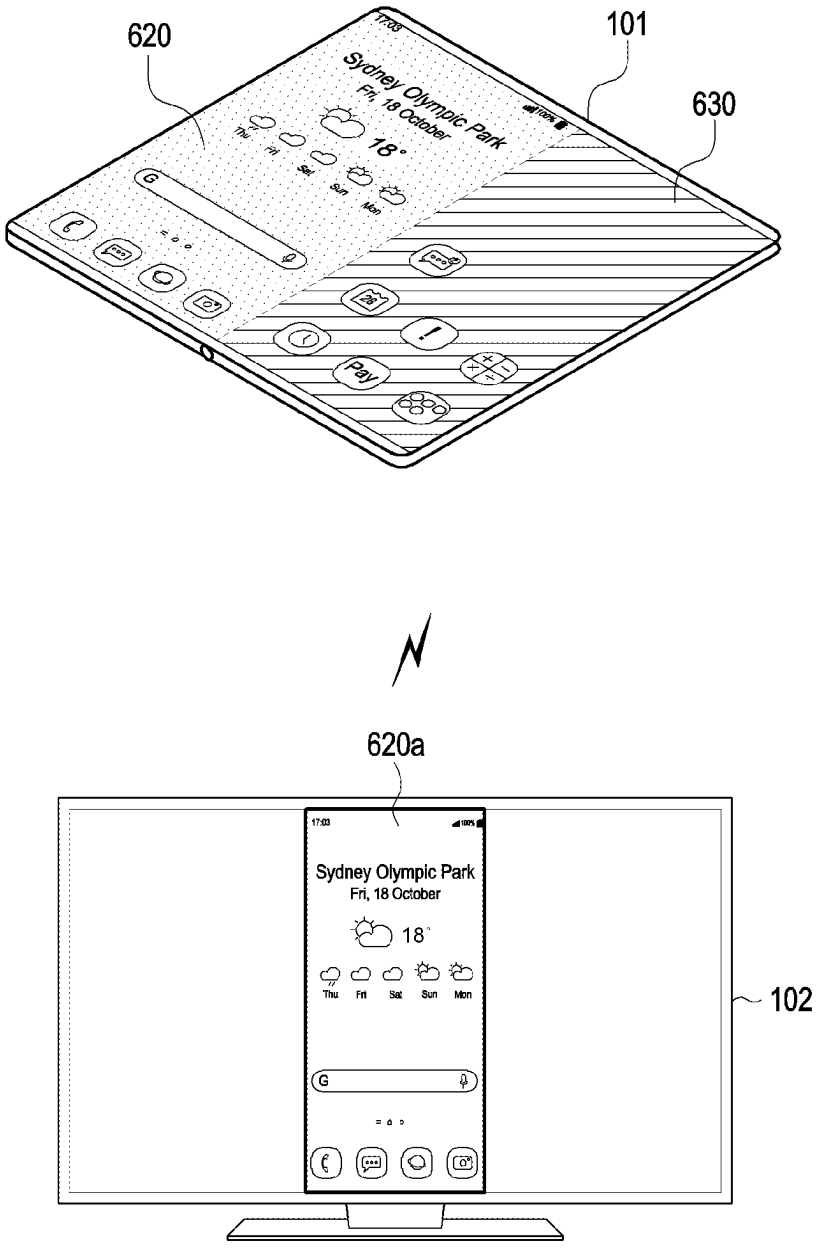
620
101
630
17:03
Sydney Olympic Park
Fri, 18 October
18°
Thu
Fri
Sat
Sun
Mon
620a
17:03
Sydney Olympic Park
Fri, 18 October
18°
Thu
Fri
Sat
Sun
Mon
102

FIG. 20D

ELECTRONIC DEVICE FOR PROVIDING BOTH SHARED SCREEN AND PRIVATE SCREEN, AND CONTROL METHOD THEREFOR

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of International Patent Application No. PCT/KR2021/009380 designating the United States, filed on Jul. 21, 2021, in the Korean Intellectual Property Receiving Office and claiming priority to Korean Patent Application No. 10-2020-0091298, filed on Jul. 22, 2020, in the Korean Intellectual Property Office, the disclosures of which are incorporated by reference herein in their entireties.

BACKGROUND

Field

The disclosure relates to an electronic device for providing both a shared screen and a non-shared screen and a method for controlling the same.

Description of Related Art

More and more services and additional functions are being provided through electronic devices, e.g., smartphones, or other portable electronic devices. To meet the needs of various users and raise use efficiency of electronic devices, communication service carriers or device manufacturers are developing electronic devices with differentiated and diversified functionalities. Accordingly, various functions that are provided through electronic devices are evolving more and more.

Mirroring (which may be referred to herein as a "first mode" for convenience of description) is used to share the screen displayed on an electronic device (e.g., smartphone) by several people. It is also available to enable the screen displayed on a smartphone to be shared by several people or to allow the user of the smartphone to conveniently control the smartphone on a relatively larger screen by displaying a screen with changed attributes (e.g., resolution, number of screens, position of displayed object on the screen, brightness of screen, color of object, shape of object, contrast, or screen size), as displayed on the smartphone, through another display device (this may be referred to herein as a "second mode" or Dex mode" for convenience of description). Various types of electronic devices with a flexible display are recently coming out, but no technical consideration is taken into what screen is being displayed on an electronic device (e.g., smartphone) and an external electronic device (e.g., monitor) when the first mode or second mode is used by the user through the various types of electronic devices. Nor is there any technical consideration as to how a notification event, such as reception of a text message, is handled when the notification event occurs while the user shares the screen with other users through the first mode or second mode.

SUMMARY

Embodiments of the disclosure provide an electronic device and method that take into technical consideration what screen is being displayed on an electronic device and an external electronic device when the first mode or second mode is provided through various types of electronic devices using a flexible display.

Embodiments of the disclosure provide an electronic device and method that take into technical consideration how a generated notification event is processed when the first mode or second mode is provided through various types of electronic devices using a flexible display.

According to an example embodiment of the disclosure, an electronic device may comprise: a communication module comprising communication circuitry, a flexible display, and at least one processor configured to: control the display to display a first screen on the flexible display and a second screen corresponding to the first screen on an external electronic device in a state in which the electronic device and the external electronic device are operably connected to each other through the communication module, detect an occurrence of a first event to extend the flexible display, and control the display to display both the first screen and a third screen different from the first screen on the extended flexible display and control the external electronic device to display only the second screen on the external electronic device, according to the detection of the occurrence of the first event.

According to an example embodiment of the disclosure, an electronic device may comprise: a communication module comprising communication circuitry, a flexible display, and at least one processor configured to: control the display to display a first screen on the flexible display and a second screen corresponding to the first screen on an external electronic device in a state in which the electronic device and the external electronic device are operably connected to each other through the communication module, detect an occurrence of a first event to extend the flexible display, and control the display to display at least two or more screens among a third screen different from the first screen, the first screen, and a fourth screen on the extended flexible display and control the external electronic device to display only the second screen on the external electronic device, according to the detection of the occurrence of the first event.

According to an example embodiment of the disclosure, a method for controlling an electronic device may comprise: displaying a first screen on a flexible display of the electronic device and a second screen corresponding to the first screen on an external electronic device in a state in which the electronic device and the external electronic device are operably connected to each other through a communication module of the electronic device, detecting an occurrence of a first event to extend the flexible display, and displaying both the first screen and a third screen different from the first screen on the extended flexible display and controlling the external electronic device to display only the second screen on the external electronic device, according to the detection of the occurrence of the first event.

According to various example embodiments of the disclosure, an electronic device may take into technical consideration what screen is being displayed on an electronic device and an external electronic device when the first mode or second mode is provided through various types of electronic devices using a flexible display.

According to various example embodiments of the disclosure, an electronic device and method may take into technical consideration how a generated notification event is processed when the first mode or second mode is provided through various types of electronic devices using a flexible display.

The effects set forth herein are not limited thereto, and it is apparent to one of ordinary skill in the art that various effects may be disclosed herein.

BRIEF DESCRIPTION OF THE DRAWINGS

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

FIG. **1** is a diagram illustrating an example electronic device according to various embodiments;

FIG. **2**A is a diagram illustrating an electronic device, wherein a portion of a flexible display is received in a second structure according to various embodiments;

FIG. **2**B is a diagram illustrating an electronic device, wherein most of a flexible display is exposed to the outside of a second structure according to various embodiments;

FIG. **3**A is a diagram illustrating a front view of an electronic device according to various embodiments;

FIG. **3**B is a diagram illustrating a rear view of an electronic device according to various embodiments;

FIG. **3**C is a diagram illustrating a side view of an electronic device according to various embodiments;

FIG. **3**D is a diagram illustrating a rear, see-through view of an electronic device in an unfolded state according to various embodiments;

FIG. **4**A is a perspective view illustrating an electronic device illustrating a folding of the electronic device according to various embodiments;

FIG. **4**B is a side, cross-sectional view illustrating an electronic device according various embodiments;

FIG. **4**C is an partial cross-sectional view illustrating an internal structure of an electronic device in a folding state according to various embodiments;

FIG. **5**A is a diagram illustrating an electronic device in an unfolded state according to various embodiments;

FIG. **5**B is an diagram illustrating an electronic device in a folded state according to various embodiments;

FIGS. **6**A, **6**B, **6**C, **6**D, **6**E, **6**F, **6**G, **6**H, and **6**I include a flowchart and example views illustrating an example operation of displaying a screen on an electronic device and an external electronic device when a sliding event for the electronic device occurs in a state in which the electronic device and the external electronic device are connected, with a reference line set to a first setting state in a first mode according to various embodiments;

FIGS. **7**A, **7**B, **7**C, and **7**D include a flowchart and example views illustrating an example function or operation of displaying a screen on an electronic device and an external electronic device when a sliding event for the electronic device occurs in a state in which the electronic device and the external electronic device are connected, with a reference line set to a second setting state in a first mode according to various embodiments;

FIGS. **8**A, **8**B, and **8**C include a flowchart and example views illustrating an example function or operation of providing a notification to a user when a space where an icon included in a second screen in a first mode is displayed is insufficient according to various embodiments;

FIGS. **9**A and **9**B include a flowchart and example views illustrating a screen displayed on an external electronic device when only a first screen is set to be displayed on an electronic device in a first mode according to various embodiments;

FIGS. **10**A, **10**B, and **10**C include a flowchart and example views illustrating an example function or operation of outputting, through an electronic device, a message indicating that a notification event occurs, when the notification event occurs in a state in which both a first screen and a third screen are displayed on the electronic device, in a first mode according to various embodiments;

FIGS. **11**A, **11**B, and **11**C include a flowchart and example views illustrating a screen displayed on an electronic device and an external electronic device when a sliding event is detected in a second mode according to various embodiments;

FIGS. **12**A, **12**B, and **12**C include a flowchart and example views illustrating an example function or operation of providing a touchpad area through an electronic device when a sliding event is detected in a second mode according to various embodiments;

FIGS. **13**A, **13**B, **13**C, and **13**D include a flowchart and example views illustrating a screen displayed on an external electronic device when both a first screen and a third screen are set to be displayed on an electronic device in a second mode according to various embodiments;

FIGS. **14**A, **14**B, and **14**C include a flowchart and example views illustrating a screen displayed on an external electronic device when a first screen and a touchpad area are set to be provided through an electronic device according to various embodiments;

FIGS. **15**A, **15**B, **15**C, **15**D, and **15**E include a flowchart and example views illustrating a screen displayed on an external electronic device when a first screen, a third screen, and a touchpad area are set to be provided through an electronic device according to various embodiments;

FIGS. **16**A, **16**B, and **16**C include a flowchart and example views illustrating an example function or operation of changing an attribute of an application corresponding to an icon according to movement of the icon according to various embodiments;

FIG. **17** is a diagram illustrating an example function or operation of customizing a first screen when an electronic device is connected with an external electronic device according to various embodiments;

FIGS. **18**A, **18**B, **18**C, and **18**D are diagrams illustrating an example function or operation of displaying a keypad on an electronic device when the electronic device is connected with an external electronic device according to various embodiments;

FIGS. **19**A, **19**B, **19**C, and **19**D include a flowchart and example views illustrating that various embodiments of the disclosure are applicable to another type of device (e.g., rollable device) according to various embodiments; and

FIGS. **20**A, **20**B, **20**C, and **20**D include a flowchart and example views illustrating that various embodiments of the disclosure are applicable to another type of device (e.g., foldable device) according to various embodiments.

DETAILED DESCRIPTION

FIG. **1** is a diagram illustrating an example electronic device according to various embodiments.

FIG. **1** is a block diagram illustrating an electronic device **101** in a network environment **100** according to various embodiments. Referring to FIG. **1**, the electronic device **101** in the network environment **100** may communicate with an electronic device **102** via a first network **198** (e.g., a short-range wireless communication network), or an electronic device **104** or a server **108** via a second network **199** (e.g., a long-range wireless communication network). According to an embodiment, the electronic device **101** may communicate with the electronic device **104** via the server **108**.

According to an embodiment, the electronic device **101** may include a processor **120**, memory **130**, an input module **150**, a sound output module **155**, a display module **160**, an audio module **170**, a sensor module **176**, an interface **177**, a connecting terminal **178**, a haptic module **179**, a camera module **180**, a power management module **188**, a battery **189**, a communication module **190**, a subscriber identification module (SIM) **196**, or an antenna module **197**. In various embodiments, at least one (e.g., the connecting terminal **178**) of the components may be omitted from the electronic device **101**, or one or more other components may be added in the electronic device **101**. According to an embodiment, some (e.g., the sensor module **176**, the camera module **180**, or the antenna module **197**) of the components may be integrated into a single component (e.g., the display module **160**).

The processor **120** may execute, for example, software (e.g., a program **140**) to control at least one other component (e.g., a hardware or software component) of the electronic device **101** coupled with the processor **120**, and may perform various data processing or computation. According to an embodiment, as at least part of the data processing or computation, the processor **120** may store a command or data received from another component (e.g., the sensor module **176** or the communication module **190**) in volatile memory **132**, process the command or the data stored in the volatile memory **132**, and store resulting data in non-volatile memory **134**. According to an embodiment, the processor **120** may include a main processor **121** (e.g., a central processing unit (CPU) or an application processor (AP)), or an auxiliary processor **123** (e.g., a graphics processing unit (GPU), a neural processing unit (NPU), an image signal processor (ISP), a sensor hub processor, or a communication processor (CP)) that is operable independently from, or in conjunction with, the main processor **121**. For example, when the electronic device **101** includes the main processor **121** and the auxiliary processor **123**, the auxiliary processor **123** may be configured to use lower power than the main processor **121** or to be specified for a designated function. The auxiliary processor **123** may be implemented as separate from, or as part of the main processor **121**.

The auxiliary processor **123** may control at least some of functions or states related to at least one component (e.g., the display module **160**, the sensor module **176**, or the communication module **190**) among the components of the electronic device **101**, instead of the main processor **121** while the main processor **121** is in an inactive (e.g., sleep) state, or together with the main processor **121** while the main processor **121** is in an active state (e.g., executing an application). According to an embodiment, the auxiliary processor **123** (e.g., an image signal processor or a communication processor) may be implemented as part of another component (e.g., the camera module **180** or the communication module **190**) functionally related to the auxiliary processor **123**. According to an embodiment, the auxiliary processor **123** (e.g., the neural processing unit) may include a hardware structure specified for artificial intelligence model processing. The artificial intelligence model may be generated via machine learning. Such learning may be performed, e.g., by the electronic device **101** where the artificial intelligence is performed or via a separate server (e.g., the server **108**). Learning algorithms may include, but are not limited to, e.g., supervised learning, unsupervised learning, semi-supervised learning, or reinforcement learning. The artificial intelligence model may include a plurality of artificial neural network layers. The artificial neural network may be a deep neural network (DNN), a convolutional neural network (CNN), a recurrent neural network (RNN), a restricted Boltzmann machine (RBM), a deep belief network (DBN), a bidirectional recurrent deep neural network (BRDNN), deep Q-network or a combination of two or more thereof but is not limited thereto. The artificial intelligence model may, additionally or alternatively, include a software structure other than the hardware structure.

The memory **130** may store various data used by at least one component (e.g., the processor **120** or the sensor module **176**) of the electronic device **101**. The various data may include, for example, software (e.g., the program **140**) and input data or output data for a command related thereto. The memory **130** may include the volatile memory **132** or the non-volatile memory **134**.

The program **140** may be stored in the memory **130** as software, and may include, for example, an operating system (OS) **142**, middleware **144**, or an application **146**.

The input module **150** may receive a command or data to be used by other component (e.g., the processor **120**) of the electronic device **101**, from the outside (e.g., a user) of the electronic device **101**. The input module **150** may include, for example, a microphone, a mouse, a keyboard, keys (e.g., buttons), or a digital pen (e.g., a stylus pen).

The sound output module **155** may output sound signals to the outside of the electronic device **101**. The sound output module **155** may include, for example, a speaker or a receiver. The speaker may be used for general purposes, such as playing multimedia or playing record. The receiver may be used for receiving incoming calls. According to an embodiment, the receiver may be implemented as separate from, or as part of the speaker.

The display module **160** may visually provide information to the outside (e.g., a user) of the electronic device **101**. The display **160** may include, for example, a display, a hologram device, or a projector and control circuitry to control a corresponding one of the display, hologram device, and projector. According to an embodiment, the display **160** may include a touch sensor configured to detect a touch, or a pressure sensor configured to measure the intensity of a force generated by the touch.

The audio module **170** may convert a sound into an electrical signal and vice versa. According to an embodiment, the audio module **170** may obtain the sound via the input module **150**, or output the sound via the sound output module **155** or a headphone of an external electronic device (e.g., an electronic device **102**) directly (e.g., wiredly) or wirelessly coupled with the electronic device **101**.

The sensor module **176** may detect an operational state (e.g., power or temperature) of the electronic device **101** or an environmental state (e.g., a state of a user) external to the electronic device **101**, and then generate an electrical signal or data value corresponding to the detected state. According to an embodiment, the sensor module **176** may include, for example, a gesture sensor, a gyro sensor, an atmospheric pressure sensor, a magnetic sensor, an accelerometer, a grip sensor, a proximity sensor, a color sensor, an infrared (IR) sensor, a biometric sensor, a temperature sensor, a humidity sensor, or an illuminance sensor.

The interface **177** may support one or more specified protocols to be used for the electronic device **101** to be coupled with the external electronic device (e.g., the electronic device **102**) directly (e.g., wiredly) or wirelessly. According to an embodiment, the interface **177** may include, for example, a high definition multimedia interface (HDMI), a universal serial bus (USB) interface, a secure digital (SD) card interface, or an audio interface.

A connecting terminal **178** may include a connector via which the electronic device **101** may be physically connected with the external electronic device (e.g., the electronic device **102**). According to an embodiment, the connecting terminal **178** may include, for example, a HDMI connector, a USB connector, a SD card connector, or an audio connector (e.g., a headphone connector).

The haptic module **179** may convert an electrical signal into a mechanical stimulus (e.g., a vibration or motion) or electrical stimulus which may be recognized by a user via his tactile sensation or kinesthetic sensation. According to an embodiment, the haptic module **179** may include, for example, a motor, a piezoelectric element, or an electric stimulator.

The camera module **180** may capture a still image or moving images. According to an embodiment, the camera module **180** may include one or more lenses, image sensors, image signal processors, or flashes.

The power management module **188** may manage power supplied to the electronic device **101**. According to an embodiment, the power management module **188** may be implemented as at least part of, for example, a power management integrated circuit (PMIC).

The battery **189** may supply power to at least one component of the electronic device **101**. According to an embodiment, the battery **189** may include, for example, a primary cell which is not rechargeable, a secondary cell which is rechargeable, or a fuel cell.

The communication module **190** may support establishing a direct (e.g., wired) communication channel or a wireless communication channel between the electronic device **101** and the external electronic device (e.g., the electronic device **102**, the electronic device **104**, or the server **108**) and performing communication via the established communication channel. The communication module **190** may include one or more communication processors that are operable independently from the processor **120** (e.g., the application processor (AP)) and supports a direct (e.g., wired) communication or a wireless communication. According to an embodiment, the communication module **190** may include a wireless communication module **192** (e.g., a cellular communication module, a short-range wireless communication module, or a global navigation satellite system (GNSS) communication module) or a wired communication module **194** (e.g., a local area network (LAN) communication module or a power line communication (PLC) module). A corresponding one of these communication modules may communicate with the external electronic device **104** via a first network **198** (e.g., a short-range communication network, such as Bluetooth™, wireless-fidelity (Wi-Fi) direct, or infrared data association (IrDA)) or a second network **199** (e.g., a long-range communication network, such as a legacy cellular network, a 5G network, a next-generation communication network, the Internet, or a computer network (e.g., local area network (LAN) or wide area network (WAN)). These various types of communication modules may be implemented as a single component (e.g., a single chip), or may be implemented as multi components (e.g., multi chips) separate from each other. The wireless communication module **192** may identify or authenticate the electronic device **101** in a communication network, such as the first network **198** or the second network **199**, using subscriber information (e.g., international mobile subscriber identity (IMSI)) stored in the subscriber identification module **196**.

The wireless communication module **192** may support a 5G network, after a 4G network, and next-generation communication technology, e.g., new radio (NR) access technology. The NR access technology may support enhanced mobile broadband (eMBB), massive machine type communications (mMTC), or ultra-reliable and low-latency communications (URLLC). The wireless communication module **192** may support a high-frequency band (e.g., the mmWave band) to achieve, e.g., a high data transmission rate. The wireless communication module **192** may support various technologies for securing performance on a high-frequency band, such as, e.g., beamforming, massive multiple-input and multiple-output (massive MIMO), full dimensional MIMO (FD-MIMO), array antenna, analog beam-forming, or large scale antenna. The wireless communication module **192** may support various requirements specified in the electronic device **101**, an external electronic device (e.g., the electronic device **104**), or a network system (e.g., the second network **199**). According to an embodiment, the wireless communication module **192** may support a peak data rate (e.g., 20 Gbps or more) for implementing eMBB, loss coverage (e.g., 164 dB or less) for implementing mMTC, or U-plane latency (e.g., 0.5 ms or less for each of downlink (DL) and uplink (UL), or a round trip of 1 ms or less) for implementing URLLC.

The antenna module **197** may transmit or receive a signal or power to or from the outside (e.g., the external electronic device). According to an embodiment, the antenna module **197** may include one antenna including a radiator formed of a conductor or conductive pattern formed on a substrate (e.g., a printed circuit board (PCB)). According to an embodiment, the antenna module **197** may include a plurality of antennas (e.g., an antenna array). In this case, at least one antenna appropriate for a communication scheme used in a communication network, such as the first network **198** or the second network **199**, may be selected from the plurality of antennas by, e.g., the communication module **190**. The signal or the power may then be transmitted or received between the communication module **190** and the external electronic device via the selected at least one antenna. According to an embodiment, other parts (e.g., radio frequency integrated circuit (RFIC)) than the radiator may be further formed as part of the antenna module **197**.

According to various embodiments, the antenna module **197** may form a mmWave antenna module. According to an embodiment, the mmWave antenna module may include a printed circuit board, a RFIC disposed on a first surface (e.g., the bottom surface) of the printed circuit board, or adjacent to the first surface and capable of supporting a designated high-frequency band (e.g., the mmWave band), and a plurality of antennas (e.g., array antennas) disposed on a second surface (e.g., the top or a side surface) of the printed circuit board, or adjacent to the second surface and capable of transmitting or receiving signals of the designated high-frequency band.

At least some of the above-described components may be coupled mutually and communicate signals (e.g., commands or data) therebetween via an inter-peripheral communication scheme (e.g., a bus, general purpose input and output (GPIO), serial peripheral interface (SPI), or mobile industry processor interface (MIPI)).

According to an embodiment, commands or data may be transmitted or received between the electronic device **101** and the external electronic device **104** via the server **108** coupled with the second network **199**. The external electronic devices **102** or **104** each may be a device of the same or a different type from the electronic device **101**. According to an embodiment, all or some of operations to be executed at the electronic device **101** may be executed at one or more of the external electronic devices **102**, **104**, or **108**. For

example, if the electronic device **101** should perform a function or a service automatically, or in response to a request from a user or another device, the electronic device **101**, instead of, or in addition to, executing the function or the service, may request the one or more external electronic devices to perform at least part of the function or the service. The one or more external electronic devices receiving the request may perform the at least part of the function or the service requested, or an additional function or an additional service related to the request, and transfer an outcome of the performing to the electronic device **101**. The electronic device **101** may provide the outcome, with or without further processing of the outcome, as at least part of a reply to the request. To that end, a cloud computing, distributed computing, mobile edge computing (MEC), or client-server computing technology may be used, for example. The electronic device **101** may provide ultra low-latency services using, e.g., distributed computing or mobile edge computing. In an embodiment, the external electronic device **104** may include an Internet-of-things (IoT) device. The server **108** may be an intelligent server using machine learning and/or a neural network. According to an embodiment, the external electronic device **104** or the server **108** may be included in the second network **199**. The electronic device **101** may be applied to intelligent services (e.g., smart home, smart city, smart car, or healthcare) based on 5G communication technology or IoT-related technology.

FIG. **2**A is a diagram illustrating an electronic device, wherein a portion of a flexible display (e.g., the display module **160** of FIG. **1** or the display **203**) is received in a second structure according to various embodiments. FIG. **2**B is a diagram illustrating an electronic device, wherein most of a flexible display is exposed (e.g., visible) to the outside of a second structure according to various embodiments. In the disclosure, the type of the electronic device **101** illustrated in FIGS. **2**A and **2**B may be referred to as a "slidable electronic device". Further, the term "exposed" as used herein may be used interchangeably with the term "visible" or "viewable" and is intended to include a display including a cover or protective layer or glass.

The state shown in FIG. **2**A may refer, for example, to a first structure **201** being closed with respect to a second structure **202**, and the state shown in FIG. **2**B may refer, for example, to the first structure **201** being opened with respect to the second structure **202**. According to an embodiment, the "closed state" or "opened state" may be defined as a closed or open state of the electronic device.

Referring to FIGS. **2**A and **2**B, an electronic device **101** may include a first structure **201** and a second structure **202** disposed to be movable in the first structure **201**. According to an embodiment, the electronic device **101** may be interpreted as having a structure in which the first structure **201** is slidably disposed on the second structure **202**. According to an embodiment, the first structure **201** may be disposed to perform reciprocating motion by a predetermined distance in a predetermined direction with respect to the second structure **202**, for example, a direction indicated by an arrow. ①.

According to an embodiment, the first structure **201** may be referred to as, for example, a first housing, a slide unit, or a slide housing, and may be disposed to reciprocate on the second structure **202**. According to an embodiment, the second structure **202** may be referred to as, for example, a second housing, a main part, or a main housing, and may receive various electric or electronic components such as a main circuit board or a battery. A portion (e.g., the first area A**1**) of the display **203** may be seated on the first structure **201**. According to an embodiment, another portion (e.g., the second area A**2**) of the display **203** may be received (e.g., slide-in) into the inside of the second structure **202** or exposed (e.g., slide-out) to the outside of the second structure **202** as the first structure **201** moves (e.g., slides) relative to the second structure **202**.

According to various embodiments, the first structure **201** may include a first plate **211***a* (e.g., a slide plate) and may include a first surface formed with at least a portion of the first plate **211***a* and a second surface F**2** facing away from the first surface. According to an embodiment, the second structure **202** may include a second plate **221***a* (e.g., a rear case), a first sidewall **223***a* extending from the second plate **221***a*, a second sidewall **223***b* extending from the first sidewall **223***a* and the second plate **121***a*, a third sidewall **223***c* extending from the first sidewall **223***a* and the second plate **221***a* and positioned parallel to the second sidewall **223***b*, and/or a rear plate **221***b* (e.g., a rear window). According to an embodiment, the second sidewall **223***b* and the third sidewall **223***c* may be formed to be perpendicular to the first sidewall **223***a*. According to an embodiment, the second plate **221***a*, the first sidewall **223***a*, the second sidewall **223***b*, and the third sidewall **223***c* may be formed to have an opening (e.g., in the front face) to receive (or surround) at least a portion of the first structure **201**. For example, the first structure **201** may be coupled to the second structure **202** in a state in which it is at least partially surrounded, and the first structure **201** may be guided by the second structure **202** to slide in a direction parallel to the first surface or the second surface F**2**, for example, direction indicated with the arrow ①.

According to an embodiment, the display **203** may include the first area A**1** and the second area A**2**. The second area A**2** may extend from the first area A**1** and be inserted or received into the inside of the second structure **202** (e.g., housing) or be exposed to the outside of the structure **202** as the first structure **201** slides. The second area A**2** may be moved while being substantially guided by a roller mounted on the second structure **202** and may thus be received into the inside of or exposed (e.g., visible or viewable) to the outside of the second structure **202**. For example, while the first structure **201** slides, a portion of the second area A**2** may be deformed into a curved shape in a position corresponding to the roller **251**.

FIG. **3**A is a diagram illustrating a front view of an electronic device according to various embodiments. FIG. **3**B is a diagram illustrating rear view of an electronic device according to various embodiments. FIG. **3**C is a diagram illustrating side view of an electronic device according to various embodiments. FIG. **3**D is diagram illustrating a rear, see-through view of an electronic device in an unfolded state according to various embodiments. In the disclosure, the type of the electronic device **101** illustrated in FIGS. **3**A, **3**B, **3**C and **3**D (which may be referred to as FIGS. **3**A to **3**D) may be referred to as a "rollable electronic device".

Referring to FIGS. **3**A to **3**D, according to an embodiment, an electronic device **101** may include a housing **310** with a first surface (or front surface) **310***a*, a second surface (or rear surface) **310***b*, and a side surface **310***c* surrounding a space between the first surface **310***a* and the second surface **310***b*. According to an embodiment (not shown), the housing may denote a structure forming part of the first surface **310***a*, the second surface **310***b*, and the side surfaces **310***c* of FIGS. **3**A to **3**D. According to an embodiment, the first surface **310***a* may be formed by a front plate **302** (e.g., a glass plate or polymer plate with various laminated layers) at least part of which is substantially transparent. The second surface **310***b* may be formed by a rear plate **308** that is substantially

opaque. The rear plate **308** may be formed of, e.g., laminated or colored glass, ceramic, polymer, metal (e.g., aluminum, stainless steel (STS), or magnesium), or a combination of at least two thereof. The side surface **310***c* may be formed by a side bezel structure (or a "side member") that couples to the front plate **302** and the rear plate **308** and includes a metal and/or polymer. According to an embodiment, the rear plate **308** and the side bezel plate may be integrally formed together and include the same material (e.g., a metal, such as aluminum).

According to various embodiments, the housing **310** may include a plurality of body portions **300**. The plurality of body portions **300** may be segmented from each other and be rotatably connected through hinge structures disposed therebetween. For example, the plurality of body portions **300** may include at least three or more body portions and provide a folding state of the electronic device **101**, together with the display **301**. According to an embodiment, the plurality of body portions **300** may dispose and support the display **301** on one surface (e.g., an upper surface) thereof. Various electronic components may be mounted in the inner space of the plurality of body portions **300** and be electrically connected to each other.

According to various embodiments, the display **301** may be exposed (e.g., visible or viewable) through, e.g., a majority portion of the front plate **302**. According to an embodiment, at least a portion of the display **301** may be exposed through the front plate forming the first surface **310***a* and a partial area of the side surface **310***c*. According to an embodiment, the edge of the display **301** may be formed to be substantially the same in shape as an adjacent outer edge of the front plate **302**. According to an embodiment (not shown), the interval between the outer edge of the display **301** and the outer edge of the front plate **302** may remain substantially even to give a larger area of exposure the display **301**. For example, when viewed from above the front plate **302**, the screen display area of the display **301** may be 90% or more of the area of the first surface **310***a*. According to an embodiment, a recess or an opening may be formed in a portion of the screen display area of the display **301**, and other electronic components, e.g., a camera module or an unshown sensor module (e.g., proximity sensor or illuminance sensor, may be included which are aligned with the recess or the opening.

The plurality of body portions **300** may include a total of N body portions which may include a first body portion **311**, a second body portion **312** connected to one end of the first body portion **311**, a third body portion **313** connected to one end of the second body portion **312**, . . . , an nth body connected to one end of an n−1th body. As another example, the plurality of body portions **300** may include a total of 24 body portions, and a hinge structure may be disposed between two adjacent ones thereof. One body (e.g., the second body portion **302**) of the plurality of body portions **300** may rotate within a designated angle with respect to the bodies disposed on two opposite sides thereof. The housing **310** may change from a flat unfolded state to a rolled state. For example, the plurality of body portions **300**, together with the display **301**, may be changed into a folded state by being rolled inward (in-rolling) or rolling outward (out-rolling).

FIG. **4**A is a perspective view illustrating a folding of the electronic device according to various embodiments. FIG. **4**B is a side, cross-sectional view illustrating an electronic device according to various embodiments. FIG. **4**C is partial cross-sectional view illustrating an internal structure of an electronic device in a folding state according to various embodiments. In the disclosure, the type of the electronic device **101** illustrated in FIGS. **4**A, **4**B and **4**C (which may be referred to as FIGS. **4**A to **4**C) may be referred to as an "out-folding electronic device".

Referring to FIGS. **4**A to **4**C, according to an embodiment of the disclosure, the electronic device **101** may be folded on the center line of the flexible display. According to various embodiments of the disclosure, a first main circuit board **462** and a second main circuit board **463** may be connected via a connecting member **430**. According to various embodiments of the disclosure, the connecting member **430** may fix the first main circuit board **462** and the second main circuit board **463** to be rotatable. According to various embodiments of the disclosure, if a folding event occurs on the electronic device **101**, the first main circuit board **462** and second main circuit board **463** may push up the hinge structure **410***b* in a first direction (e.g., the P1 direction) as shown in FIG. **4**C. According to various embodiments of the disclosure, as the first main circuit board **462** and the second main circuit board **463** push up the hinge structure **410***b*, the hinge structure **410***b* may be folded. According to an embodiment, there may be included another structure in which the connecting member **430** is alternatively/interchangeably connected to the circuit board (e.g., the first main circuit board **462** or second main circuit board **463**).

FIG. **5**A is a diagram illustrating an electronic device in an unfolded state according to various embodiments. FIG. **5**B is a diagram illustrating an electronic device in a folded state according to various embodiments. In the disclosure, the type of the electronic device illustrated in FIGS. **5**A and **5**B may be referred to as an "in-folding electronic device".

Referring to FIGS. **5**A and **5**B, according to an embodiment, an electronic device **101** may include a foldable housing **500**, a hinge cover **530** covering a foldable portion of the foldable housing **500**, and a flexible or foldable display **540** disposed in a space formed by the foldable housing **500**. According to various embodiments, the foldable housing **500** may include a first housing structure **510**, a second housing structure **520** including a sensor area **524**, a first rear cover **580**, and a second rear cover **590**. According to various embodiments, the first housing structure **510** may be connected to the hinge structure and may include a first surface facing in a first direction and a second surface facing in a second direction opposite to the first direction. The second housing structure **520** may be connected to the hinge structure and may include a third surface facing in a third direction and a fourth surface facing in a fourth direction opposite to the third direction, and may rotate from the first housing structure **510** on the hinge structure. Thus, the electronic device **101** may turn into a folded state or unfolded state. In the folded state of the electronic device **101**, the first surface may face the third surface and, in the unfolded state, the third direction may be identical to the first direction.

According to various embodiments, the first housing structure **510** and the second housing structure **520** may be positioned on opposite sides of a folding axis (axis A), and they may be overall symmetrical in shape with each other with respect to the folding axis A. As is described below, the angle or distance between the first housing structure **510** and the second housing structure **520** may be varied depending on whether the electronic device **101** is in the unfolded state, the folded state, or the partially unfolded intermediate state.

FIGS. **6**A, **6**B, **6**C, **6**D, **6**E, **6**F, **6**G, **6**H, and **6**I include a flowchart and example views illustrating an example operation of displaying a screen on an electronic device and an external electronic device when a sliding event for the

electronic device occurs in a state in which the electronic device and the external electronic device are connected, with a reference line set to a first setting state in a first mode according to various embodiments.

Referring to FIG. **6**A, according to an embodiment of the disclosure, in operation **605**, the electronic device **101** may display a first screen **620** on the electronic device **101** in a state in which the electronic device **101** and an external electronic device **102** are operably connected with each other. According to an embodiment of the disclosure, the electronic device **101** may display the first screen **620** on the electronic device and a second screen **620***a* corresponding to the first screen **620** on the external electronic device, as shown in FIG. **6**F. According to an embodiment of the disclosure, the second screen **620***a* may be a mirrored screen of the first screen. Or, according to an embodiment of the disclosure, the second screen **620***a* may include a screen in which the attribute (e.g., resolution, number of screens, direction of screen, position of displayed obtain on screen, brightness of screen, color of object, shape of object, contrast, or screen size) of the first screen has been changed. According to an embodiment of the disclosure, the electronic device **101** may receive a user input to select a mode for mirroring or a mode for displaying both a main launcher (e.g., the first screen **620**) and a sub launcher (e.g., the third screen **630**) on the electronic device **101**, as shown in FIGS. **6**A to **6**E. Referring to FIG. **6**B, according to an embodiment of the disclosure, the electronic device **101** may receive a user input for displaying a quick panel. According to an embodiment of the disclosure, the user input for displaying the quick panel may include a drag or swipe input downward from an upper edge area of the electronic device **101**. According to an embodiment of the disclosure, the quick panel may be displayed while covering the home screen **600**. According to an embodiment of the disclosure, the quick panel may include various icons including an icon **610** for selecting a mode (e.g., mirror mode or sub launcher mode). Referring to FIG. **6**C, according to an embodiment of the disclosure, the electronic device **101** may receive a selection input on the icon **610** for selecting a mode on the quick panel. Referring to FIG. **6**D, according to an embodiment of the disclosure, the electronic device **101** may display a menu **612** to receive selection of a mode for mirroring or a mode for displaying both a main launcher (e.g., the first screen **620**) and a sub launcher (e.g., the third screen **630**) on the electronic device **101**. Referring to FIG. **6**E, according to an embodiment of the disclosure, the electronic device **101** may receive a user input to select any one of a mode for mirroring or a mode for displaying both a main launcher (e.g., the first screen **620**) and a sub launcher (e.g., the third screen **630**) on the electronic device **101**. FIGS. **6**A to **6**I illustrate an example case in which the user selects the mode for displaying both the main launcher (e.g., the first screen **620**) and the sub launcher (e.g., the third screen **630**) on the electronic device **101**.

According to an embodiment of the disclosure, in operation **615**, the electronic device **101** may detect a sliding event to extend the flexible display (e.g., the display module **160** of FIG. **1**). For example, as shown in FIG. **6**G, the electronic device **101** may detect an event of sliding the display to the left.

According to an embodiment of the disclosure, in operation **625**, the electronic device **101** may display the first screen **620** and the third screen **360** on the flexible display extended according to detection of the sliding event and control to display the second screen **620***a* alone on the external electronic device **102**. Referring to FIG. **6**H, according to an embodiment of the disclosure, the electronic device **101** may display a second screen **630** including at least one icon in the area extended to be newly displayed on the front surface or upper surface (e.g., the surface facing the user) according to the sliding event. According to an embodiment of the disclosure, the electronic device **101** may display the first screen **620** in the left (or right) area of a preset virtual reference line and display the third screen **630** in the right (or left) area. FIGS. **6**A to **6**I illustrate an example state (e.g., first setting state) in which a reference line is predesignated to minimize and/or reduce the area in which the flexible display is exposed to the front surface or upper surface (e.g., towards the user). Referring to FIG. **6**I, according to an embodiment of the disclosure, the electronic device **101** may continuously display the third screen **630** in the area continuously extended according to the sliding event. According to an embodiment of the disclosure, the electronic device **101** may control the external electronic device **102** to display only the second screen **620***a* corresponding to the first screen **620** although the third screen **630** is displayed on the electronic device **101**. According to an embodiment of the disclosure, the electronic device **101** may store information about the area in which the first screen **620** is displayed according to the reference line **710** set by the user. According to an embodiment of the disclosure, when the electronic device **101** is slid in a size equal to or larger than the area in which the first screen **620** is displayed according to the user's sliding event, the electronic device **101** may determine that the virtual reference line is positioned on the flexible display exposed to the front surface or upper surface. Or, according to an embodiment of the disclosure, the electronic device **101** may identify whether the reference line is exposed to the front surface or upper surface using, e.g., the amount of rotation of the roller according to the sliding event. For example, if the reference line is set to a first setting state, the reference line may be determined to be exposed to the outside although the relative value of the amount of rotation of the roller is 1 (e.g., when the roller is rotated once).

FIGS. **7**A, **7**B, **7**C, and **7**D include a flowchart and example views illustrating an example function or operation of displaying a screen on an electronic device and an external electronic device when a sliding event for the electronic device occurs in a state in which the electronic device and the external electronic device are connected, with a reference line set to a second setting state in a first mode according to various embodiments.

According to an embodiment of the disclosure, in operation **705**, the electronic device **101** may display a first screen **620** on the electronic device **101** in a state in which the electronic device **101** and an external electronic device are operably connected with each other. According to an embodiment of the disclosure, the electronic device **101** may display the first screen **620** on the electronic device **101** as shown in FIG. **6**F.

According to an embodiment of the disclosure, in operation **715**, the electronic device **101** may detect a sliding event to extend the flexible display. For example, as shown in FIG. **6**G, the electronic device **101** may detect an event of sliding the display to the left.

According to an embodiment of the disclosure, in operation **725**, the electronic device **101** may determine whether at least a portion of the flexible display exposed (e.g., visible or viewable) to the front surface or upper surface according to the sliding event includes the area for displaying the third screen **630**. According to an embodiment of the disclosure, the electronic device **101** may determine whether the area

for displaying the third screen is included based on whether the virtual reference line is positioned on the flexible display exposed to the front surface or upper surface. According to an embodiment of the disclosure, the reference line **710** may be predesignated as described above, or may be set by the user as shown in FIG. **7**B. In the disclosure, the state in which the reference line **710** is set by the user may be referred to as a second setting state. According to an embodiment of the disclosure, the electronic device **101** may display the set reference line and may set a reference line according to a user input (e.g., drag input) for a reference line to be set.

According to an embodiment of the disclosure, in operation **755** (yes in operation **735**), when at least a portion of the flexible display exposed (e.g., visible or viewable) to the front surface or upper surface according to the sliding event includes the area for displaying the third screen **630**, the electronic device **101** may display the first screen **620** and the third screen **630** on the electronic device **101** and control to display only the screen **620***a* corresponding to the first screen **620** on the external electronic device. Referring to FIGS. **7**C and **7**D, the electronic device **101** may extend and display the first screen **620** according to the detected sliding event. According to an embodiment of the disclosure, the electronic device **101** may display the extended first screen **620** on the external electronic device **102**. According to an embodiment of the disclosure, when the reference line **710** is positioned on the front surface or upper surface according to the sliding event, the electronic device **101** may display the first screen **620** on one side (e.g., left side) of the reference line **710** and third screen **630** on the other side (e.g., right side) of the reference line **710**. In this case, only the second screen **620***a* corresponding to the first screen may be displayed on the external electronic device **101** as shown in FIG. **7**D. According to an embodiment of the disclosure, in operation **745** (no in operation **735**), when at least a portion of the flexible display exposed (e.g., visible or viewable) to the front surface according to the sliding event does not include the area for displaying the third screen **630**, the electronic device **101** may display the first screen **620** on the electronic device **101**.

FIGS. **8**A, **8**B, and **8**C include a flowchart and example views illustrating an example function or operation of providing a notification to a user when a space where an icon included in a second screen in a first mode is displayed is insufficient according to various embodiments.

Referring to FIG. **8**A, according to an embodiment of the disclosure, in operation **805**, the electronic device **101** may display the first screen **620** on the electronic device **101**. According to an embodiment of the disclosure, the electronic device **101** may display the first screen **620** on the electronic device and a second screen **620***a* corresponding to the first screen **620** on the external electronic device, as shown in FIG. **6**F.

According to an embodiment of the disclosure, in operation **815**, the electronic device **101** may detect a sliding event. For example, as shown in FIG. **6**G, the electronic device **101** may detect an event of sliding the display to the left.

According to an embodiment of the disclosure, in operation **825**, the electronic device **101** may determine whether at least one graphic object (e.g., icon) included in the third screen **630** may be displayed on the flexible display extended according to the sliding event. According to an embodiment of the disclosure, when at least a portion of the area where the icon is displayed is not included in the third screen **630**, the electronic device **101** may determine that the icon may not be displayed on the extended flexible display.

According to an embodiment of the disclosure, in operation **855** (yes in operation **835**), when at least one graphic object (e.g., icon) included in the third screen **630** may be displayed on the flexible display extended according to the sliding event, the electronic device **101** may display the first screen **620** and the third screen **630** on the electronic device **101**. However, according to an embodiment of the disclosure, in operation **845** (no in operation **835**), as shown in FIG. **8**B, when at least one graphic object (e.g., icon) included in the third screen **630** may not be displayed on the flexible display extended according to the sliding event, the electronic device **101** may provide a notification **820** to request to extend the flexible display as shown in FIG. **8**C. According to an embodiment of the disclosure, the notification **820** to request to extend the flexible display may be continuously displayed until at least one graphic object **810** may be displayed on the third screen **630**.

FIGS. **9**A and **9**B includes a flowchart and example views illustrating a screen displayed on an external electronic device when only a first screen is set to be displayed on an electronic device in a first mode according to various embodiments. FIGS. **9**A and **9**B illustrate, by way of non-limiting example, a case where a mode for mirroring is selected by the user.

Referring to FIG. **9**A, according to an embodiment of the disclosure, in operation **905**, the electronic device **101** may display a first screen **620** on the electronic device in a state in which the electronic device **101** and an external electronic device **102** are operably connected with each other. According to an embodiment of the disclosure, the electronic device **101** may display the first screen **620** on the electronic device and a second screen **620***a* corresponding to the first screen **620** on the external electronic device, as shown in FIG. **6**F.

According to an embodiment of the disclosure, in operation **915**, the electronic device **101** may detect a sliding event. According to an embodiment of the disclosure, in operation **925**, the electronic device **101** may display a second screen corresponding to the first screen **620** extended according to the sliding event on the external electronic device **102**. According to an embodiment of the disclosure, when the mode for mirroring is selected by the user, if the first screen **620** is extended as shown in FIG. **9**B, the screen displayed on the external electronic device **102** may also be extended and displayed accordingly. According to an embodiment of the disclosure, the extended first screen **620** may include more icons than those on the first screen **620** before extension. According to an embodiment of the disclosure, the position where the graphic object including information, such as character or number, included in the first screen **620** is displayed as the first screen **620** is extended may be gradually/continuously moved to be aligned with the center line of the first screen **620** as the screen is extended.

FIGS. **10**A, **10**B, and **10**C include a flowchart and example views illustrating an example function or operation of outputting, through an electronic device, a message indicating that a notification event occurs, when the notification event occurs in a state in which both a first screen and a third screen are displayed on the electronic device in a first mode according to various embodiments.

Referring to FIG. **10**A, according to an embodiment of the disclosure, in operation **1005**, the electronic device **101** may display a first screen **620** on the electronic device **101** in a state in which the electronic device **101** and an external electronic device **102** are operably connected with each

other. According to an embodiment of the disclosure, the electronic device **101** may display the first screen **620** on the electronic device and a second screen **620***a* corresponding to the first screen **620** on the external electronic device, as shown in FIG. **6**F.

According to an embodiment of the disclosure, in operation **1015**, the electronic device **101** may detect a sliding event. For example, as shown in FIG. **6**G, the electronic device **101** may detect an event of sliding the display to the left.

According to an embodiment of the disclosure, in operation **1025**, the electronic device **101** may display the first screen **620** and the third screen **630** on the extended flexible display.

According to an embodiment of the disclosure, in operation **1035**, the electronic device **101** may determine whether a notification event (e.g., reception of text message or incoming call) occurs.

According to an embodiment of the disclosure, in operation **1045**, the electronic device **101** may display a message **1010** indicating the notification event on the third screen **630** as shown in FIG. **10**B. According to an embodiment of the disclosure, the message **1010** indicating the notification event may not be displayed on the external electronic device **102**. This may be attributed to the icon corresponding to the message application being positioned on the third screen **630**. For example, if the icon corresponding to the text message application is positioned on the first screen **620**, the message **1010** indicating the notification event may be displayed on the external electronic device **102**. According to an embodiment of the disclosure, in the case of an incoming call as shown in FIG. **10**C, although the icon corresponding to the call application is positioned on the first screen **620**, the message indicating the notification event (e.g., incoming call) may be displayed on the third screen **630**. However, according to an embodiment of the disclosure, when the icon corresponding to the call application is positioned on the first screen **620**, the message indicating the notification event (e.g., incoming call) may be displayed on the first screen **620** and the second screen **620***a*.

FIGS. **11**A, **11**B, and **11**C include a flowchart and example views illustrating a screen displayed on an electronic device and an external electronic device when a sliding event is detected in a second mode (e.g., a mode in which a screen obtained by changing the attribute of the screen displayed on the smartphone is displayed through another display device) according to various embodiments.

Referring to FIG. **11**A, according to an embodiment of the disclosure, in operation **1105**, the electronic device **101** may display a first screen **620** on the electronic device **101** in a state in which the electronic device **101** and an external electronic device **102** are operably connected with each other. According to an embodiment of the disclosure, as shown in FIG. **11**B, the electronic device **101** and the external electronic device **102** may be wiredly connected to each other through a connector (e.g., USB connector and HDMI connector). However, this is merely and example, and the electronic device **101** and the external electronic device **102** may be connected through wireless communication.

According to an embodiment of the disclosure, in operation **1105**, the electronic device **101** may display a second screen **620***a* corresponding to the first screen **620** on the external electronic device **102**. According to various embodiments of the disclosure, the screens displayed on the electronic device **101** and the external electronic device **102** may have different display attributes. According to various embodiments of the disclosure, the display attribute may include at least one of resolution, number of screens, direction of screen, position of displayed obtain on screen, brightness of screen, color of object, shape of object, contrast, or screen size. For example, the electronic device **101** may display with a relatively lower resolution (e.g., 1920×1080) than that of the external electronic device **102**, and the external electronic device **102** may display according to a relatively higher resolution (e.g., 3840×2160) than that of the electronic device **101**. According to various embodiments of the disclosure, information about the external electronic device **102** connectable with the electronic device **101** may be stored in the memory (e.g., the memory **130** of FIG. **1**) of the electronic device **101**. According to various embodiments of the disclosure, the electronic device **101** may display a screen having at least one different display attribute from that of the screen displayed on the electronic device **101** on the external electronic device **102** based on the information about the external electronic device **102**, stored in the memory **130**. According to various embodiments of the disclosure, the memory (e.g., the memory **130** of FIG. **1**) of the electronic device **101** may store information about various interfaces defined according to the display attributes. The electronic device **101** may display a screen adapted to the external electronic device **102** on the external electronic device **102** based on the display attribute information obtained according to various embodiments of the disclosure and the information about various user interfaces stored in the memory (e.g., the memory **130** of FIG. **1**). According to an embodiment of the disclosure, an icon corresponding to an application installed on the electronic device **101** may be displayed on the second screen **620***a* or at least one icon alone included in the first screen **620** may be displayed thereon.

According to an embodiment of the disclosure, in operation **1115**, the electronic device **101** may detect a sliding event. For example, as shown in FIG. **6**G, the electronic device **101** may detect an event of sliding the display to the left.

According to an embodiment of the disclosure, in operation **1125**, the electronic device **101** may control to display the extended first screen **620** on the flexible display extended according to detection of a sliding event while maintaining the second screen **620***a*. Referring to FIG. **11**C, according to an embodiment of the disclosure, the electronic device **101** may maintain the display state of the second screen **620***a* to be the same as that before the flexible display is extended although the flexible display is extended according to detection of the sliding event.

FIGS. **12**A, **12**B, and **12**C include a flowchart and example views illustrating an example function or operation of providing a touchpad area through an electronic device when a sliding event is detected in a second mode (e.g., a mode in which a screen obtained by changing the attribute of the screen displayed on the smartphone is displayed through another display device) according to various embodiments.

Referring to FIG. **12**A, according to an embodiment of the disclosure, in operation **1205**, the electronic device **101** may provide a fourth screen **1210** (e.g., including a touchpad) through the electronic device **101** in a state in which the electronic device **101** and the external electronic device **102** are operably connected to each other. As shown in FIG. **12**B, it is possible to allow the user to control the cursor displayed on the second screen **620***a* through a user input on the fourth screen by providing the fourth screen **1210** to the user.

According to an embodiment of the disclosure, in operation **1215**, the electronic device **101** may display the second screen **620***a* on the external electronic device **102**. According to an embodiment of the disclosure, the electronic device **101** may display the second screen **620***a* on the external electronic device **102** while providing the fourth screen **1210** through the electronic device **101**.

According to an embodiment of the disclosure, in operation **1225**, the electronic device **101** may detect a sliding event. For example, as shown in FIG. **6**G, the electronic device **101** may detect an event of sliding the display to the left.

According to an embodiment of the disclosure, in operation **1235**, the electronic device **101** may provide the extended flexible display area, as the fourth screen **1210**, while displaying the second screen **620***a* on the external electronic device **102** as shown in FIG. **12**C. According to an embodiment of the disclosure, the electronic device **101** may maintain the display state of the second screen **620***a* to be the same as that before the flexible display is extended although the flexible display is extended according to detection of the sliding event.

FIGS. **13**A, **13**B, **13**C, and **13**D include a flowchart and example views illustrating a screen displayed on an external electronic device when both a first screen and a third screen are set to be displayed on an electronic device in a second mode according to various embodiments.

Referring to FIG. **13**A, according to an embodiment of the disclosure, in operation **1305**, the electronic device **101** may display a first screen **620** on the electronic device **101** in a state in which the electronic device **101** and an external electronic device **102** are operably connected with each other. According to an embodiment of the disclosure, the electronic device **101** may display the first screen **620** on the electronic device and a second screen **620***a* corresponding to the first screen **620** on the external electronic device, as shown in FIG. **6**F. The setting state of the reference line **710** in FIGS. **13**A to **13**D may be a first setting state.

According to an embodiment of the disclosure, in operation **1315**, the electronic device **101** may detect a sliding event. For example, as shown in FIG. **6**G, the electronic device **101** may detect an event of sliding the display to the left.

According to an embodiment of the disclosure, in operation **1325**, the electronic device **101** may display the first screen **620** and the third screen **630** on the flexible display extended according to detection of the sliding event and control to display the second screen **620***a* corresponding to the first screen **620** on the external electronic device **102**. Referring to FIGS. **13**B and **13**C, according to an embodiment of the disclosure, the electronic device **101** may display the first screen **620** and the third screen **630** on the display area extended according to the sliding event. In this case, the second screen **620***a* obtained by changing the attributes of the first screen **620** may be displayed on the external electronic device **102**. According to an embodiment of the disclosure, when a notification event occurs in the extended state of the flexible display, a message **1010** indicating that the notification event occurs may be displayed on the third screen **630**. In this case, the message **1010** indicating that the notification event occurs may not be displayed on the second screen **620***a*.

FIGS. **14**A, **14**B, and **14**C include a flowchart and example views illustrating a screen displayed on an external electronic device when a first screen and a touchpad area are set to be provided through an electronic device according to various embodiments.

Referring to FIG. **14**A, according to an embodiment of the disclosure, in operation **1405**, the electronic device **101** may display a first screen **620** on the electronic device **101** in a state in which the electronic device **101** and an external electronic device **102** are operably connected with each other.

According to an embodiment of the disclosure, in operation **1415**, the electronic device **101** may detect a sliding event. For example, as shown in FIG. **6**G, the electronic device **101** may detect an event of sliding the display to the left.

According to an embodiment of the disclosure, in operation **1425**, the electronic device **101** may provide the first screen **620** and the fourth screen **1210** (e.g., including a touchpad area) through the flexible display extended according to the sliding event and control to display only the second screen **620***a* on the external electronic device **102** as shown in FIGS. **14**B and **14**C. In this case, the reference line **710** may be in a state of having been set according to the first setting state. According to an embodiment of the disclosure, when the first screen **620** and the fourth screen **1210** are provided through the electronic device **101**, if a notification event occurs, a message **1210** indicating that the notification event occurs may be displayed on the second screen **620***a*. Or, an occurrence of a notification event may be indicated in a different manner (e.g., flicker of the corresponding application icon). According to an embodiment of the disclosure, a user menu to turn off the notification on the second screen **620***a* may be provided. The user menu may provide the user with such an effect as if the sub launcher (e.g., the third screen **630**) is executed although not needed.

FIGS. **15**A, **15**B, **15**C, **15**D, and **15**E include a flowchart and example views illustrating a screen displayed on an external electronic device when a first screen, a third screen, and a fourth screen (e.g., a touchpad area) are set to be provided through an electronic device according to various embodiments. According to an embodiment of the disclosure, the fourth screen **1210** may include, e.g., a screen having a black background. According to an embodiment of the disclosure, the electronic device **101** may allow the user to control at least one graphic object (e.g., cursor) displayed on the external electronic device **102** through an input (e.g., input through a stylus pen) on the fourth screen **1210** by providing the fourth screen **1210**.

Referring to FIG. **15**A, according to an embodiment of the disclosure, in operation **1505**, the electronic device **101** may provide at least one of the first screen **620** or the fourth screen **1210** according to a user setting. Referring to FIG. **15**B, a menu **1530** for receiving a selection input for the display mode may be displayed in the quick panel area. According to an embodiment of the disclosure, the quick panel area may further include a menu **1510** for switching from the first mode to the second mode (or switching from the second mode to the first mode) and a menu **1520** for using the electronic device **101** as a touchpad. According to various embodiments of the disclosure, the menu **1530** for receiving a selection input for the display mode may include a first icon **1530***a* for displaying the first screen **620** alone on the electronic device, a second icon **1530***b* for displaying the first screen **620** and the third screen **630** (or providing the first screen **620** and the fourth screen **1210**), and a third icon **1530***c* and a fourth icon **1530***d* for providing all of the first screen **620**, the fourth screen **1210**, and the third screen **630**. A display mode may be determined according to the user's selection input on at least one icon among the icons **1530***a*, **1530***b*, **1530***c*, and **1530***d*. FIG. **15**C illustrates an embodiment of displaying the first screen **620**, the fourth screen

1210, and the third screen 630 on the electronic device 101 under the assumption that the third icon 1530*c* is selected by the user.

According to an embodiment of the disclosure, in operation 1515, the electronic device 101 may detect a sliding event. For example, as shown in FIG. 6G, the electronic device 101 may detect an event of sliding the display to the left.

According to an embodiment of the disclosure, in operation 1525, the electronic device 101 may provide at least one of the third screen 630 or the fourth screen 1210 (e.g., including a touchpad) in a partial area of the extended flexible display according to the user setting. For example, as shown in FIGS. 15C and 15D, the third screen 630 may be displayed in an area on one side (e.g., right side) of the virtual reference line 710, and the first screen 620 and fourth screen 1210 may be provided in an area on the other side (e.g., left side) of the virtual reference line 710 according to the user's setting. Alternatively, according to the user's setting (e.g., when the fourth icon 1530*d* is selected by the user), as shown in FIG. 15E, the first screen 620 may be displayed in the area on one side (e.g., left side) of the virtual reference line 710, and the fourth screen 1210 and the third screen 630 may be provided in the area on the other side (e.g., right side) of the virtual reference line 710.

FIGS. 16A, 16B, and 16C include a flowchart and example views illustrating an example function or operation of changing an attribute of an application corresponding to an icon according to movement of the icon according to various embodiments.

Referring to FIG. 16A, according to various embodiments of the disclosure, in operation 1605, the electronic device 101 may display a first screen 620 on the electronic device in a state in which the electronic device 101 and an external electronic device 102 are operably connected with each other.

According to various embodiments of the disclosure, in operation 1615, the electronic device 101 may detect a sliding event. For example, as shown in FIG. 6G, the electronic device 101 may detect an event of sliding the display to the left.

According to various embodiments of the disclosure, in operation 1625, the electronic device 101 may display the first screen 620 and the third screen 630 on the flexible display extended according to detection of the sliding event and control to display the second screen 620*a* alone on the external electronic device 102.

According to an embodiment of the disclosure, in operation 1635, the electronic device 101 may detect a user input to move the icon 1610 included in the third screen 630 to the first screen 620. According to an embodiment of the disclosure, the user input may include a drag input as shown in FIG. 16B. According to an embodiment of the disclosure, operation 1635 may be replaced with the operation of moving the icon 1610 from the first screen 620 to the third screen 630 as shown in FIG. 16C. According to various embodiments of the disclosure, when 50% or more of the display area of the icon 1610 is included, over the reference line, in another screen, the electronic device 101 may move the icon 1610 from the current screen to the other screen.

According to an embodiment of the disclosure, in operation 1645, the electronic device 101 may change the attribute of the application corresponding to the icon 1610 moved to the first screen 620. For example, when the icon is moved from the third screen 630 to the first screen 610 as shown in FIG. 16B, the attribute of the application corresponding to the icon 1610 may be changed from "private" to "public." In other words, when a notification event for the application corresponding to the icon 1610 moved to the first screen 620 occurs, the message 1010 indicating the occurrence of the notification event may be displayed on the second screen 620*a* as well as on the first screen 620. Further, the icon 1610 moved to the first screen 620 may also be displayed on the second screen 620*a*. In contrast, when the icon 1610 is moved from the first screen 620 to the third screen 630 as shown in FIG. 16C, the attribute of the application corresponding to the icon may be changed from the "public" attribute to the "private" attribute. In other words, when a notification event for the application corresponding to the icon 1610 moved to the third screen 630 occurs, the message 1010 indicating the occurrence of the notification event may be displayed only on the third screen 630. Further, the icon 1610 moved to the third screen 630 may be displayed only on the third screen 630.

FIG. 17 is diagram illustrating an example function or operation of customizing a first screen when an electronic device is connected with an external electronic device according to various embodiments.

Referring to FIG. 17, when the electronic device 101 is connected to a vehicle in the extended state (e.g., a state in which the first screen 620 and the third screen 630 both are displayed on the electronic device 101), the first screen 620 of the electronic device 101 may be customized according to a predesignated format. For example, as shown in FIG. 17, only icons may be included in the first screen 620. Further, when a notification event occurs in a state in which the electronic device 101 is connected to the vehicle, the message 1010 indicating that the notification event occurs is not displayed on the external electronic device 102 (e.g., display for the vehicle) but may be displayed only on the third screen 630.

FIGS. 18A, 18B, 18C, and 18D are diagrams illustrating example views illustrating an example function or operation of displaying a keypad on an electronic device when the electronic device is connected with an external electronic device according to various embodiments.

Referring to FIG. 18A, according to an embodiment of the disclosure, the electronic device 101 may display a keypad 1810 on the first screen 620 and the third screen 630 according to a keypad invoke command in the first mode (e.g., mirroring mode) and the extended state (e.g., a state in which both the first screen 620 and the third screen 630 are displayed on the electronic device 101). In this case, the whole or part (e.g., part of the keypad 1810, displayed on the first screen 620) of the keypad 1810 may be displayed on the second screen 620*a* displayed on the external electronic device 102.

Referring to FIGS. 18B, 18C, and 18D, according to an embodiment of the disclosure, the electronic device 101 may display the keypad 1810 according to a keypad invoke command in the second mode (e.g., a mode of displaying a screen obtained by changing the attribute of the screen displayed on the smartphone through another display device) and the extended state (e.g., a state in which at least two or more of the first screen 620, the third screen 630, and the fourth screen 1210 (e.g., including a touchpad) are displayed on the electronic device 101). In this case, the keypad 1810 may not be displayed on the second screen 620*a* displayed on the external electronic device 102.

According to an embodiment of the disclosure, when the flexible display is switched from the extended state back to the shrunken state, the above-described operations according to various embodiments of the disclosure may be performed in the opposite order. For example, according to an

embodiment of the disclosure, when a display shrink event occurs, the electronic device **101** may reduce the area where the third screen **630** is displayed and determine whether the reference line **710** is exposed to the front surface or upper surface. According to an embodiment of the disclosure, upon determining that the reference line **710** is not exposed to the front surface or upper surface according to the display shrink event, the electronic device **101** may not display the third screen **630** but may display the first screen **620** on the electronic device **101**. The above-described embodiments of the disclosure may be likewise applied to rollable electronic devices, out-folding electronic devices, or in-folding electronic devices, as well as slidable electronic devices.

FIGS. **19**A, **19**B, **19**C, and **19**D include a flowchart and example views illustrating that the disclosure is applicable to a rollable device according to various embodiments.

Referring to FIG. **19**A, according to an embodiment of the disclosure, in operation **1905**, the electronic device **101** may display a first screen on the electronic device **101** in a state in which the electronic device **101** and an external electronic device are operably connected with each other. According to an embodiment of the disclosure, the electronic device **101** may display the first screen **620** on the electronic device **101** as shown in FIG. **19**B.

According to an embodiment of the disclosure, in operation **1915**, the electronic device **101** may detect an unfolding event. For example, as shown in FIG. **19**C, the electronic device **101** may detect an unfolding event to change the rolled flexible display into a flat state.

According to an embodiment of the disclosure, in operation **1925**, the electronic device **101** may determine whether at least a portion of the flexible display exposed to the front surface according to the unfolding event includes the area for displaying the third screen **630**. According to an embodiment of the disclosure, the electronic device **101** may determine whether the area for displaying the third screen **630** is included based on whether the virtual reference line is positioned on the flexible display exposed to the front surface or upper surface. According to an embodiment of the disclosure, the reference line **710** may be predesignated as described above, or may be set by the user as shown in FIG. **7**B. For example, according to an embodiment of the disclosure, the electronic device **101** may store information about the area in which the first screen **620** is displayed according to the reference line set by the user. According to an embodiment of the disclosure, when the electronic device **101** is unfolded in a size equal to or larger than the area in which the first screen **620** is displayed according to the user's unfolding event, the electronic device **101** may determine that the virtual reference line is positioned on the flexible display exposed to the front surface or upper surface. According to an embodiment of the disclosure, in operation **1955** (yes in operation **1935**), when at least a portion of the flexible display exposed to the front surface according to the unfolding event includes the area for displaying the third screen **630**, the electronic device **101** may display the first screen **620** and the third screen **630** on the electronic device **101** and control to display only the second screen **620***a* corresponding to the first screen **620** on the external electronic device. Referring to FIGS. **19**B and **19**C, the electronic device **101** may extend and display the first screen **620** according to the detected unfolding event. According to an embodiment of the disclosure, the electronic device **101** may display the extended first screen **620** on the external electronic device **102**. According to an embodiment of the disclosure, when the reference line **710** is positioned on the front surface according to the unfolding event, the electronic device **101** may display the first screen **620** on the left side of the reference line **710** and third screen **630** on the right side of the reference line **710**. In this case, only the second screen **620***a* corresponding to the first screen may be displayed on the external electronic device **101** as shown in FIG. **19**D. According to an embodiment of the disclosure, in operation **1945** (no in operation **1935**), when at least a portion of the flexible display exposed to the front surface according to the unfolding event does not include the area for displaying the third screen, the electronic device **101** may display the first screen **620** on the electronic device **101**.

FIGS. **20**A, **20**B, **20**C, and **20**D include a flowchart and example views illustrating that the disclosure is applicable to a foldable device according to various embodiments.

Referring to FIG. **20**A, according to an embodiment of the disclosure, in operation **2005**, the electronic device **101** may display a first screen **620** on the electronic device in a state in which the electronic device **101** and an external electronic device **102** are operably connected with each other. According to an embodiment of the disclosure, the electronic device **101** may display the first screen **620** on the electronic device and a second screen **620***a* corresponding to the first screen on the external electronic device **102**, as shown in FIG. **20**B.

According to an embodiment of the disclosure, in operation **2015**, the electronic device **101** may detect an unfolding event. For example, as shown in FIG. **20**C, the electronic device **101** may detect an event of unfolding the folded electronic device **101**.

According to an embodiment of the disclosure, in operation **2025**, the electronic device **101** may display the first screen **620** and the third screen **630** on the flexible display according to detection of the unfolding event and control to display the second screen **620***a* alone on the external electronic device **102**. For example, the electronic device **101** may display the first screen **620** on the left side of the center line of the flexible display and the third screen **630** on the right side and control to display the first screen **620** alone on the external electronic device **102**.

The electronic device according to various embodiments of the disclosure may be one of various types of electronic devices. The electronic devices may include, for example, a portable communication device (e.g., a smartphone), a computer device, a portable multimedia device, a portable medical device, a camera, a wearable device, a home appliance, or the like. According to an embodiment of the disclosure, the electronic devices are not limited to those described above.

It should be appreciated that various embodiments of the present disclosure and the terms used therein are not intended to limit the technological features set forth herein to particular embodiments and include various changes, equivalents, or replacements for a corresponding embodiment. With regard to the description of the drawings, similar reference numerals may be used to refer to similar or related elements. It is to be understood that a singular form of a noun corresponding to an item may include one or more of the things, unless the relevant context clearly indicates otherwise. As used herein, each of such phrases as "A or B," "at least one of A and B," "at least one of A or B," "A, B, or C," "at least one of A, B, and C," and "at least one of A, B, or C," may include all possible combinations of the items enumerated together in a corresponding one of the phrases. As used herein, such terms as "1st" and "2nd," or "first" and "second" may be used to simply distinguish a corresponding component from another, and does not limit the components in other aspect (e.g., importance or order). It is to be understood that if an element (e.g., a first element) is

referred to, with or without the term "operatively" or "communicatively", as "coupled with," "coupled to," "connected with," or "connected to" another element (e.g., a second element), the element may be coupled with the other element directly (e.g., wiredly), wirelessly, or via a third element.

As used herein, the term "module" may include a unit implemented in hardware, software, or firmware, or any combination thereof, and may interchangeably be used with other terms, for example, "logic," "logic block," "part," or "circuitry". A module may be a single integral component, or a minimum unit or part thereof, adapted to perform one or more functions. For example, according to an embodiment, the module may be implemented in a form of an application-specific integrated circuit (ASIC).

Various embodiments as set forth herein may be implemented as software (e.g., the program **140**) including one or more instructions that are stored in a storage medium (e.g., internal memory **136** or external memory **138**) that is readable by a machine (e.g., the electronic device **101**). For example, a processor (e.g., the processor **120**) of the machine (e.g., the electronic device **101**) may invoke at least one of the one or more instructions stored in the storage medium, and execute it, with or without using one or more other components under the control of the processor. This allows the machine to be operated to perform at least one function according to the at least one instruction invoked. The one or more instructions may include a code generated by a compiler or a code executable by an interpreter. The machine-readable storage medium may be provided in the form of a non-transitory storage medium. Wherein, the "non-transitory" storage medium is a tangible device, and may not include a signal (e.g., an electromagnetic wave), but this term does not differentiate between where data is semi-permanently stored in the storage medium and where the data is temporarily stored in the storage medium.

According to an embodiment, a method according to various embodiments of the disclosure may be included and provided in a computer program product. The computer program products may be traded as commodities between sellers and buyers. The computer program product may be distributed in the form of a machine-readable storage medium (e.g., compact disc read only memory (CD-ROM)), or be distributed (e.g., downloaded or uploaded) online via an application store (e.g., Play Store™), or between two user devices (e.g., smart phones) directly. If distributed online, at least part of the computer program product may be temporarily generated or at least temporarily stored in the machine-readable storage medium, such as memory of the manufacturer's server, a server of the application store, or a relay server.

According to various embodiments, each component (e.g., a module or a program) of the above-described components may include a single entity or multiple entities. Some of the plurality of entities may be separately disposed in different components. According to various embodiments, one or more of the above-described components may be omitted, or one or more other components may be added. Alternatively or additionally, a plurality of components (e.g., modules or programs) may be integrated into a single component. In such a case, according to various embodiments, the integrated component may still perform one or more functions of each of the plurality of components in the same or similar manner as they are performed by a corresponding one of the plurality of components before the integration. According to various embodiments, operations performed by the module, the program, or another component may be carried out sequentially, in parallel, repeatedly, or heuristically, or one or more of the operations may be executed in a different order or omitted, or one or more other operations may be added.

While the disclosure has been illustrated and described with reference to various example embodiments, it will be understood that the various example embodiments are intended to be illustrative, not limiting. It will be further understood by those skilled in the art that various changes in form and detail may be made without departing from the true spirit and full scope of the disclosure, including the appended claims and their equivalents. It will also be understood that any of the embodiment(s) described herein may be used in conjunction with any other embodiment(s) described herein.

What is claimed is:

1. An electronic device, comprising:

a communication module comprising communication circuitry;

a flexible display; and

at least one processor configured to:

control the flexible display to display a first screen on the flexible display in a state in which the electronic device and an external electronic device are operably connected to each other through the communication module, wherein a second screen corresponding to the first screen is displayed on the external electronic device;

detect an occurrence of a first event to extend the flexible display; and

display both the first screen and a third screen different from the first screen on the extended flexible display and control the external electronic device to display only the second screen on the external electronic device, based on the detection of the occurrence of the first event.

2. The electronic device of claim **1**, wherein the first screen and the third screen are separated by a specified reference line or a reference line.

3. The electronic device of claim **1**, wherein the at least one processor is further configured to detect an occurrence of a notification event in a state in which the first screen and the third screen are displayed on the flexible display.

4. The electronic device of claim **3**, wherein the at least one processor is further configured to control to display a message indicating the occurrence of the notification event on the third screen while refraining from displaying the message on the first screen and the second screen based on the notification event being detected.

5. The electronic device of claim **1**, wherein the third screen includes a launcher screen including at least one icon corresponding to an application or an execution screen of the application.

6. The electronic device of claim **1**, wherein the electronic device includes at least one of a slidable device, a rollable device, or a foldable device.

7. The electronic device of claim **6**, wherein the electronic device includes a slidable display, and wherein the first event includes a sliding event.

8. The electronic device of claim **1**, wherein the at least one processor is further configured to detect a second event to shrink the extended flexible display in a state in which the flexible display is extended based on the first event.

9. The electronic device of claim **8**, wherein the at least one processor is further configured to control the display to display only the first screen while refraining from displaying the third screen based on the detection of the second event.

10. A method for controlling an electronic device, the method comprising:

displaying a first screen on a flexible display of the electronic device and a second screen corresponding to the first screen on an external electronic device in a state in which the electronic device and the external electronic device are operably connected to each other through a communication module of the electronic device;

detecting an occurrence of a first event to extend the flexible display; and

displaying both the first screen and a third screen different from the first screen on the extended flexible display and controlling the external electronic device to display only the second screen on the external electronic device, based on the detection of the occurrence of the first event.

11. The method of claim **10**, wherein the first screen and the third screen are separated by a specified reference line or a reference line.

12. The method of claim **10**, further comprising detecting an occurrence of a notification event in a state in which the first screen and the third screen are displayed on the flexible display.

13. The method of claim **12**, further comprising displaying a message indicating the occurrence of the notification event on the third screen while refraining from displaying the message on the first screen and the second screen based on the notification event being detected.

14. The method of claim **10**, wherein the third screen includes a launcher screen including at least one icon corresponding to an application or an execution screen of the application.

15. The method of claim **10**, wherein the electronic device includes at least one of a slidable device, a rollable device, or a foldable device.

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