

[0022] FIG. 1 is a schematic block diagram of a flexible display device, according to exemplary embodiments of the present invention.

[0023] Referring to FIG. 1, the flexible display device 100 includes an interface unit 110, a power supply 120, a display unit 130, a touch sensor 140, a flexible sensor 150, a storage unit 170, and a controller 160.

[0024] By way of example, the flexible display device 100 can be any type of mobile stations, such as handsets, terminals, stations, units, devices, or any type of interface to the user (such as “wearable” circuitry, etc.). The flexible display device 100 can operate the touch sensor 140 and flexible sensor 150 and may detect a bend event where a touch event occurs at one side of the display unit 130 if the flexible display device 100 is bent at more than a determined angle. If the touch event and the bend event occur simultaneously, the flexible display device 100 can generate an input signal and can simultaneously output a content 177 from the storage unit 170 according to the generated input signal. If a touch event additionally occurs in a state where the bend event has occurred, the flexible display device 100 can change and display the content 177 that is currently being displayed on the display unit 130.

[0025] In the following description, the configuration of each element in the flexible display device 100 is explained in detail.

[0026] The interface unit 110 may allow the flexible display device 100 to communicate with other communication terminals. If the flexible display device 100 serves to support Radio Frequency (RF) communication, the interface unit 110 may be an RF communication unit. If the device 100 serves to support serial communication, the interface unit 110 may be a Universal Serial Bus (USB) interface or a Universal Asynchronous Receiver/Transmitter (UART) interface. The interface unit 110 establishes a communication channel with other communication terminals, mobile communication networks or Internet networks, and receives contents 117 through the communication channel.

[0027] The power supply 120 may supply electrical power to each element in the flexible display device 100 under the control of the controller 160. The power supply 120 can be implemented with a battery or a secondary battery.

[0028] The display unit 130 may display screens that can be activated according to the function of the flexible display device 100. For example, screens for a booting process, an idle state, and a menu may be activated according to the contents 177. The display unit 130 may be implemented with a display, a flexible liquid crystal display (FLCD), and/or a flexible organic light emitting diode (flexible OLED). The display unit 130 may display data using electronic ink. The display unit 130 can include a panel driving unit, a frame memory for storing data, and a display device. The display unit 130 may be bent in a certain portion by an external physical force.

[0029] The touch sensor 140 can be coupled to the front of the display unit 130. The touch sensor 140 can detect touches on the display unit 130 using an input device, for example the user's finger or a stylus pen. The touch sensor 140 can generate touch events based on the detected touches. In particular, the touch sensor 140 may include multiple sensors distributed and arranged, for example, in a matrix format to support multi-touch events. Since the touch sensor 140 can be installed in the front of the display unit 130, the touch sensor 140 may be bent at a certain angle if the display unit 130 is

bent. The touch sensor 140 may generate a touch event and may output a touch signal corresponding to the touch event to the controller 160. The touch event may include information associated with touches, such as a touch down, a touch up, a drag, a flick, and/or information regarding a touch location where a corresponding touch has occurred.

[0030] The flexible sensor 150 can be implemented in such a way that members, such as optical fibers, that can perform the transmission of signals are coated on the front of the display unit 130. The flexible sensor 150 may detect a flexible operation of the optical fibers caused by the bending of the display unit 130. The flexible sensor 150 may include a plurality of sensors, and may be configured to detect a bend event at a bend location at any region, for example, a front region, of the display unit 130. Therefore, if the display unit 130 is bent at a certain portion (i.e., bend location), the flexible sensor 150 can generate a bend signal corresponding to a bend event and the bending angle. The generated bend signal can be transmitted to the controller 160. The bend event may refer to a bending of the display unit 130, and a bend signal may include information associated with a bend direction, a bend angle, a bend area, and the bend location.

[0031] The storage unit 170 can store application programs required to operate the flexible display device 100 and contents 177 received from other external systems, for example, communication terminals, and servers. The storage unit 170 may include a program area and a data area.

[0032] The program area can store an operation system (OS) for booting the flexible display device 100 and application programs for supporting multiple functions. Examples of the functions include a call function, a file reproducing function, a menu selecting function, a list searching function, a message writing function, and a web browser for supporting a web surfing function. The program area can also store a program for operating the touch sensor 140 and a program for operating the flexible sensor 150. The touch sensor operation program (Touch Sensor OP) 173 and the flexible sensor operating program (Flexible Sensor OP) 175 may be selectively enabled according to a preset condition when the flexible display device 100 is activated.

[0033] The data area can store data generated as the device 100 is being operated and user data related to a variety of optional functions. Examples of the user data include captured images or moving images, phone book data, audio data, and information regarding user data. The data area can store a plurality of contents 177 received, via the interface unit 110, from external systems or other communication terminals. The contents 177 may be images, texts, file information, and/or, for example, pages of a book. The data area stores a function table 171. The function table 171 refers to a table that defines operation states of the flexible display device 100. The operation states can be defined according to the touch event and the bend event. For example, the function table 171 may contain commands to output contents 177 or commands to output contents according to a preset method when the flexible sensor 150 outputs a bend event if one side of a corner of the display unit 130 is bent.

[0034] The controller 160 may control an electrical power supply, and enabling or disabling of each element in the flexible display device 100. The controller 160 also controls the signal flow among elements in the flexible display device 100. The controller 160 can selectively operate the touch sensor 140 and the flexible sensor 150 according to a user's request and may perform functions according to the touch