INPUT METHOD AND INPUT DEVICE

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to input methods and input devices suited for operating, for example, portable electronic apparatuses.

[0003] 2. Description of the Related Art

[0004] It is difficult to provide a keyboard with portable electronic apparatuses, such as PDAs (Personal Digital Assistants), compared to typical computers. Input devices, such as touch panels, are therefore constructed to realize various inputs by touching a panel with an object, such as a finger and a special pen.

[0005] The touch panel is formed on the display panel, such as a liquid crystal display panel, where operation buttons, a keyboard, and the like are displayed. When one of the buttons or a key on the keyboard is touched, even though the touch panel has relatively a small area, a complicated input process can be realized by assigning a function to the corresponding button or key.

[0006] However, known touch panels are constructed to accept an input via direct contact on the front surface of the display panel with the object. This causes a variety of problems. For example, touching the display panel directly to operate it may smudge the front surface of the display panel. The smudges become worse, making characters and graphics on the display panel hard to recognize. This requires occasional cleaning of the front surface of the display panel with a cloth or the like.

[0007] In addition, when touching the display panel with the finger to operate it, the sizes of the operation buttons shown on the display panel should not be less than the width of the finger. To be specific, a touch panel in which a plurality of operation buttons is aligned with a pitch narrower than the width of a finger to operate it by touching the display position of a desired operation button has been constructed. When using this touch panel, however, the user may accidentally touch several buttons simultaneously or may cover the entirety of one operation button with his/her finger. Hence, the user cannot easily recognize which operation button corresponds to the position being touched with the finger. This reduces the operability of the touch panel.

SUMMARY OF THE INVENTION

[0008] Accordingly, it is an object of the present invention to enable the input operation of a touch-sensitive input device, such as a touch panel, to be easily and reliably performed.

[0009] To this end, according to a first aspect of the present invention, there is provided an input method including an operation-input display step of displaying information related to an operation input at a display position, a detecting step of detecting a touch of an object at a touch position on a first surface behind the information displayed at the operation input display step, a touch-position display step of displaying a mark at a mark position directly above the touch position, the mark representing the touch position, and an input step of determining whether the display position of the information displayed at the operation-input display step and the mark position of the mark displayed at the touch-position display step are overlapped, and when overlapping is determined, executing an input process corresponding to the overlapped information.

[0010] According to a second aspect of the present invention, an input device includes a display panel disposed on the front surface of a casing, a back-surface sensor for detecting a touch of an object at a touch position on the back surface of the casing, and a control unit for displaying information related to an operation input on the display panel, displaying a mark representing the touch position at the corresponding position of the display panel directly above the touch position detected by the back-surface sensor, determining whether the display position of the information and the position of the mark are overlapped, and when overlapping is determined, executing an input process corresponding to the overlapped information.

[0011] A finger or the like touches the back surface of a device with a display on the display panel on the front surface of the device being observed. A mark is displayed on the display panel at the position on the display panel directly above the touch position of the finger. When the position of the mark, that is, the touch position on the back surface and the display position of information related to the operation input shown on the display panel, for example, operation buttons, are overlapped, an input process is performed. Therefore, without touching the front surface, the same operations as those of known touch panels are realized. In addition, since there is no need to touch the front surface during the operation, no smudge on the display panel occurs, and characters and graphics on the display panel are not covered with the touched finger. Accordingly, a user can perform reliable input operations because the display on the display panel can be easily recognized. Even when the operation buttons are aligned with a pitch narrower than the width of a finger, a desired button is reliably operated by causing, for example, the center of the mark representing the touch position to be overlapped with the display position of the desired button. This improves the operability of the touch panel.

[0012] The back-surface sensor may detect an approach of the object to an approach position on the back surface of the casing, and the control unit may display a mark representing the approach position detected by the back-surface sensor on the corresponding position of the display panel.

[0013] In this case, the sensor also detects an approach of the object to the back surface of the casing. The mark representing the approach position detected by the sensor is displayed at the corresponding position on the display panel. For example, a position on the display panel the finger approaches may be displayed even though the finger does not completely touch the back surface. Accordingly, the user can notice a position to be touched before the user actually touches the back surface to operate the device.

[0014] The input device may further include a front-surface sensor for detecting a touch on the front surface of the display panel. In the input device, the control unit performs a predetermined input process corresponding to the touch position detected by the front-surface sensor.

[0015] Aside from the back surface sensor, the front surface sensor is disposed on the front surface of the display