

DISPLAY INPUT DEVICE AND DISPLAY INPUT SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is based upon and claims the benefit of priority from the prior Japanese Patent Application No 2002-093812, filed on Mar. 29, 2002, and the prior Japanese Patent Application No. 2002-143181, filed on May 17, 2002; the entire contents of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

This invention relates to a display input device and a display input system, and more particularly, to a display input device with which data input of not only digital information but also analog information or vector information become possible by combining a display unit which has a pliability to form change and an input part which can detect the form change, and to the data input system comprising the data input device.

As an input device which can be combined with a display, a "touch panel" can be mentioned, for example. Such a device has a matrix-like signal input mechanism on a display screen, for example, and enables a signal input by detecting the existence and its coordinate position of a signal input. That is, a user contacts an input part corresponding to a button displayed on the display. Corresponding to this, the device can detect the existence of an input and the position information.

By such an input method, although a coordinate position is detectable, the signal is substantially restricted to binary signals of ON/OFF. This is because it is not easy for the user to control the thrust precisely when contacting the input part. For this reason, in order to input multi-value information or analog information, it is necessary to combine techniques, such as a numerical selection type input and a ten-key input, separately, for example, to obtain an amount of signals corresponding to that button display position.

That is, in order to carry out a multi-value input or an analog value input, in view of a position by the side of a user, it is necessary to perform selection of an input item, and an input of an analog value separately. On the other hand, research and development of a display called electronic paper which combines the features of paper and an electronic display are performed in recent years (for example, JP2002-072257A etc.). Although electronic paper does not attain to commercial production yet, a device of an experimental production level is seen.

However, when it is apparatus for which portability is needed especially, it is desirable that various information can be inputted by the easiest possible operation from a viewpoint of the use form. As such a portable device, an "electronic book" to which development is advanced can be mentioned, for example. In reproducing contents, such as a novel, a magazine and a newspaper, using the electronic book, it becomes main operation to turn over pages or to scroll the display screen. It is also possible to use the touch-sensitive input method like the conventional example for this operation. However, in the case of contents like a magazine or a newspaper, the contents are various and discrete. For this reason, random access which jumps over several pages or tens pages will be needed, and a function to input multi-values or an analog value like the number of pages or the amount of scroll is needed. However, opera-

tionality and portability are restricted when the conventional ten-key input or a numerical selection type input is used.

On the other hand, when displaying information on a large area like map information, only the part is displayed on a screen from restrictions of area of a display, or the degree of minuteness in many cases. In such a case, in order to search a position which a user wishes to obtain, a scroll function etc. is used. In the case of apparatus having input devices, such as a mouse and a pointing device, the analog input of the scroll direction and the amount of movements can be carried out. However, since a touch panel is mainly adopted as an input device in the case of apparatus excellent in portability, it is necessary to input separately the scroll direction and its amount of movements of a screen.

Thus, there is no simple method of inputting the amount of signals as an analog value with a device which combines a conventional display and a conventional input device. For this reason, for example, in switching a display over tens pages, both hands will surely be needed in the case of an input, or many operations will be required of the user side, and a burden by the side of a user increases.

SUMMARY OF THE INVENTION

According to an embodiment of the invention, there is provided a display input device comprising: a display unit having a flexibility; and a first form change detection unit having a flexibility, and being able to detect a deformation ascribed to the flexibility as a change in an electrical property.

According to other embodiment of the invention, there is provided a display input system comprising: a display input device including: a display unit having a flexibility; and a first form change detection unit having a flexibility, and being able to detect a deformation ascribed to the flexibility as a change in an electrical property; a display driving unit that supplies a display signal to the display unit; and a signal judging unit that judges a input data based on the change in the electrical property in the first form change detection unit, an input of a first data being performed by adding the deformation to the display input device.

According to other embodiment of the invention, there is provided a display input system comprising: a display input device including: a display unit having a flexibility; and a first form change detection unit having a flexibility, and being able to detect a deformation ascribed to the flexibility as a change in an electrical property; a display driving unit that supplies a display signal to the display unit; and a signal judging unit that judges a input data based on the change in an electrical property in the first form change detection unit, wherein the change in the electrical property corresponds to an amount of the deformation, the electrical property changes continuously in accordance with the amount of the deformation, and the signal judging unit converts the change in the electrical property into a numerical data.

According to other embodiment of the invention, there is provided a display input system comprising: a display input device including: a display unit having a flexibility; a first form change detection unit having a flexibility, and being able to detect a deformation ascribed to the flexibility as a change in an electrical property; and a second form change detection unit laminated with the form change detection unit, the second form change detection unit having a flexibility, and being able to detect a deformation ascribed to the flexibility as a change in an electrical property, a display driving unit that supplies a display signal to the display unit; and a signal judging unit that judges a input data based on the change in an electrical property in the first form change