

ELECTRONIC DEVICE AND METHOD OF MANAGING ITS KEYBOARD

FIELD

[0001] The invention relates to an electronic device and to a method of managing the virtual keyboard of the electronic device.

BACKGROUND

[0002] Electronic devices, e.g. portable subscriber terminals of a mobile communication system, usually include a keyboard. The keyboard can be implemented as a virtual keyboard using a touch pad, for example. The touch pad may also be provided with a display; this solution is known as a touch screen. The use of a virtual keyboard is facilitated by providing the user with tactile feedback on its use. As the devices are made smaller, the size of the virtual keyboard can also be decreased. When pressing keyboard keys, the user may also press wrong keys. The small key size may increase the occurrences of wrong key presses. The dimensions of users' hands are different and the ways in which the keys are pressed also vary: some use the thumb whereas the others use the index finger. Thus the tactile appearance of the keyboard is usually always a compromise; it suits an average user fine but has not been designed in accordance with the needs and routines of any individual user. As the use of different electronic devices provided with a keyboard is constantly becoming more common, there is a great need to enhance the ergonomics of keyboards.

BRIEF DESCRIPTION

[0003] The object of the invention is to provide an improved electronic device and an improved method of managing the virtual keyboard of the electronic device.

[0004] One aspect of the invention relates to an electronic device, comprising a touch pad, a processing unit connected to the touch pad over a data transmission connection, the processing unit being configured to determine a virtual keyboard on the touch pad and a tactile appearance of the touch pad, receive information generated by the pressing of a keyboard key and identify the key that was pressed on the basis of the information, and a feedback unit connected to the processing unit over a data transmission connection, the feedback unit being configured to provide tactile feedback on the keyboard use for the device user. The processing unit is further configured to collect information on key presses and carry out an analysis of them, and re-determine the tactile appearance of the keyboard on the basis of the collected information and the analysis carried out so as to make the keyboard more ergonomic for the user, which makes the use of the keyboard easier and/or the pressing of a wrong key less likely.

[0005] One aspect of the invention relates to a method of managing the virtual keyboard of an electronic device, the method comprising: determining a tactile appearance of the virtual keyboard; receiving information generated by the pressing of a keyboard key, and identifying the key that was pressed using the information. The method further comprises: collecting information on the key presses and carrying out an analysis of them; and re-determining the tactile appearance of the keyboard on the basis of the collected information and the analysis carried out so as to make the

keyboard more ergonomic for the user, which makes the use of the keyboard easier and/or the pressing of a wrong key less likely.

[0006] The preferred embodiments of the invention are disclosed in the dependent claims.

[0007] The invention is based on the idea that the electronic device automatically analyzes how successfully the keyboard is used. On the basis of the analysis, the tactile appearance of the keyboard is tailored to meet the user's needs and routines better.

[0008] The device and the method of the invention provide several advantages. A personal keyboard can be implemented for each user with relatively little computation. The usability of small keyboards, in particular, can be improved. The method described can also be utilized in the product development phase, where the tactile keyboard appearance can be designed as ergonomic as possible for a large number of people on the basis of empirical tests carried out on the users.

LIST OF FIGURES

[0009] The invention will now be described in greater detail by means of preferred embodiments, with reference to the accompanying drawings, where

[0010] **FIGS. 1A, 1B** and **1C** illustrate implementation of a virtual keyboard and examples of the appearance of an electronic device provided with a keyboard,

[0011] **FIGS. 2, 3, 4,** and **5** illustrate tests carried out by the applicant;

[0012] **FIG. 6** is a simplified block diagram of the structure of an electronic device;

[0013] **FIGS. 7A** and **7B** illustrate the devices of **FIGS. 1B** and **1C** after the tactile appearance of their keyboards has been made more ergonomic;

[0014] **FIG. 8** illustrates the structure of a processing unit of the electronic device;

[0015] **FIG. 9** illustrates some principles according to which the tactile keyboard appearance can be re-determined; and

[0016] **FIG. 10** is a flow chart illustrating a method of managing the keyboard of the electronic device.

DESCRIPTION OF THE EMBODIMENTS

[0017] The electronic device may be, for example, a portable device for ubiquitous data processing, such as a subscriber terminal of a radio system, e.g. mobile communication system, a PDA device (Personal Digital Assistant) or another device, e.g. an electronic measurement device where the user interface comprises a keyboard. The device may also combine different functions, i.e. it may be a combination of a subscriber terminal and a PDA device, for example. An example of this kind of combined device is the Nokia® Communicator®.

[0018] The electronic device comprises a virtual keyboard, which provides tactile feedback and can be formed using the structure shown in **FIG. 1A**, for example. The topmost part is a touch pad **106**, below which there may be a display, and the lowest part is a feedback unit **108**, which