

An Apparatus Having the Handwriting and Mouse Input Functions

FIELD OF THE INVENTION

The present invention relates to an apparatus having handwriting input and
5 mouse functions, which belongs to the peripheral input device of computer field.

BACKGROUD OF THE INVENTION

The computer is one of the most important scientific achievements in the
10 human history of science and technology development, now it has been applied widely. The input device is indispensable for computers, and serves to provide the host computer with instructions and data. In the early time, the mouse has become the normal external input device of the computer's configuration, that is, basically, each computer is equipped with a mouse. In
15 addition, there are several main input devices, such as the keyboard, handwriting screen, scanner, digitizer, handwriting tablet and so on, in which the handwriting tablet has currently been widely used, making it more convenient for handwriting font inputting and those computer users who have trouble with the use of keyboard. It could be predicted that more than
20 10% of computer users equip their computers with handwriting tablets or other input devices in addition to the keyboard and the mouse. Consequently, there are at least three external input devices of computer, which involves the keyboard, the mouse and the handwriting tablet. Too many input devices add burden of cost on the user, furthermore, they occupy users' desktop
25 space and computer's interface resources, and bring more inconveniences for users to carry, especially for the users having notebook computers. Therefore, the development for computer peripheral devices is oriented to integration, minimization and intelligentization.

Moreover, at present, the mouse on market is only specialized in cursor-controlling and web page-browsing, while few are entitled with handwriting input. For example, MPTR handwriting board of optical induction mouse type, made by CTT company, i.e. Cybertouch-tech Int. Co. Ltd., is structured with a capacitance-sensing means attached to the mouse housing. This kind of device can detect the specific position by means of the capacitance change of users' fingers when users use the device. It is characterized by enabling users to operate directly with their figures, while its drawbacks exist in its extreme sensitivity to humidity and less precision. Further, it is necessary to analyze whether the mouse or the handwriting capacitance touch screen is working before the function switch is completed between the mouse and the handwriting, which will lead to time delay and the possible error judgement during the operation. In addition, the present handwriting tablets are accompanied with some cursor positioning and controlling functions like a mouse. But their appearances are shaped as handwriting tablet profile, and the easiness to use and convenience is far less than a mouse, so the said practicability of that functions is not strong. To sum up, so far there has never been a computer external input device that integrates the easiness, convenience and accuracy of a mouse, and performs handwriting input at any moment without switching.

SUMMARY OF THE INVENTION

To solve the above technical problems, the present invention aims to provide a computer external input device that integrates the easiness, convenience and accuracy of a mouse, and performs handwriting input at any moment without switching.

According to the first aspect of the present invention, an apparatus having the handwriting input and mouse functions is provided. The apparatus comprises a mouse and a handwriting screen, wherein the handwriting

screen is provided on the mouse, and the mouse includes a processor connected to the handwriting screen; and an optical displacement sensor and a USB interface unit are connected to the processor, respectively.

- 5 According to the second aspect of the present invention, the optical displacement sensor and the USB interface unit are built in the processor.

According to the third aspect of the present invention, the handwriting screen is provided on a housing of the mouse.

10

- According to the fourth aspect of the present invention, the apparatus further comprises a USB hub connected to an external USB interface of the computer. The number of the processor is two. The two processors are used for processing signals delivered by the optical displacement sensor and the handwriting screen, respectively. Each of the two processors has one built-in USB interface unit, and is connected to the USB hub, respectively.

15

According to the fifth aspect of the present invention, the said handwriting screen is covered with a handwriting screen lid.

20

According to the sixth aspect of the present invention, the said handwriting screen is exposed.

25

According to the seventh aspect of the present invention, a handwriting stylus is placed in the middle of the said handwriting screen lid.

According to the eighth aspect of the present invention, the handwriting stylus is placed on both sides of the mouse.

According to the ninth aspect of the present invention, the apparatus is one of flip-over cover type in which the handwriting screen is fixed on the inner side of the flip-over cover of the mouse, or of pullout type in which the handwriting screen is fixed on the sliding track inside the mouse to form a pullout handwriting screen.

According to the tenth aspect of the present invention, the handwriting screen is a resistance composition screen composed of two conductive layers and the isolating substance sandwiched therebetween.

Obviously, the advantages are obtained by the present invention apparatus having above structures. It has both the mouse and handwriting input functions. It can implement the mouse or the handwriting input operation at any moment, and the computer processor is not required to make an operating judgment and wait for function switching, therefore, resulting in no mutual interference and the time delay. Also, it employs a resistance screen to prevent the influence of humidity. Moreover, it is reasonably designed in structure, so it is convenient, accurate and rapid to operate as well as a small bulk to be easily carried.

DESCRIPTION OF THE DRAWINGS

Fig.1 is a system schematic diagram of the preferred aspect of the present inventive apparatus.

Fig.2 is a system schematic diagram of the second aspect of the present inventive apparatus.

Fig.3 is a system schematic diagram of the third aspect of the present inventive apparatus.

Fig.4 is a profile diagram of the apparatus described in the present invention.

Fig.5 is a diagram showing the effect of the using state of the apparatus described in the present invention.

Fig.6 is a sectional diagram of the structure of the handwriting screen described in the present invention.

5 Fig.7 is a circuit diagram of a preferred aspect of the present inventive apparatus.

Numeric marks

- 61 mouse body
- 10 62 handwriting stylus
- 63 handwriting screen
- 64 handwriting screen lid
- 65 conductive layer
- 66 isolating substance
- 15 70 optical displacement sensor
- 72 processor
- 74 USB interface unit
- 76 computer external USB interface
- 78 USB hub
- 20

DETAILED DESCRIPTION OF EMBODIMENTS

Hereafter, the present invention is further explained in detail with reference to the accompanying drawings and embodiments of the invention.

25 Fig.1 is the system schematic diagram of a preferred aspect of the present invention, in which an optical displacement sensor 70, a handwriting screen 63, a processor 72 and a USB interface unit 74 are included. The processor 72 is connected to the optical displacement sensor 70 and the handwriting screen 63, respectively. The USB interface unit 74 is embedded in the
30 processor 72 and connected to a computer external USB interface 76. The

processor 72 is connected directly to the computer external USB interface 76 via the USB interface unit 74 to establish a communication. The optical displacement sensor 70 is used to acquire relative coordinate information when the apparatus moves, and the handwriting screen 63 is used to acquire
5 handwriting trace information. The processor 72 transmits directly the acquired relative coordinate information and the handwriting trace information to the computer through the embedded USB interface.

According to this embodiment, the optical displacement sensor 70 is used to
10 acquire relative coordinate information when said apparatus moves. When a mouse body is moving in a plane, the optical displacement sensor 70 captures, in real-time, the planar image information at a speed of over 1500 frames per second. Next, the captured image information is processed by an embedded dedicated DSP processor 72, which is a digital signal processor
15 72, thereby obtaining the relative change relation of each image. The relative change relation is then converted to a relative movement parameter, i.e. the variable x and y values, which is transmitted to the computer through the USB interface unit 74 in the processor 72 to complete the cursor positioning function of the mouse in the present invention.

20

In this embodiment, the handwriting screen 63 comprises a resistance composition screen formed of two conductive layers 65 and the isolating substance 66 sandwiched therebetween, as shown in Fig.6. The handwriting screen 63 may convert the acquired signals corresponding to writing trace to
25 different voltage signals or current signals, and transmit them to the processor 72. After processing the handwriting trace information, the processor 72 transmits it to the computer through the embedded USB interface unit 74 so as to complete the handwriting input function in the present invention.

30

Fig.2 is the apparatus schematic diagram of another aspect of the present invention. The specific connection relation among the optical displacement sensor 70, the handwriting screen 63, the processor 72 and the USB interface unit 74 is shown in Fig. 2. The handwriting screen 63 is directly connected to the processor 72 in the mouse. Also, the optical displacement sensor 70 is located in the processor 72 in which the USB interface unit 74 is embedded. The processor 72 is directly connected to the computer external USB interface 76 through the USB interface unit 74 to establish a communication.

Fig.3 is the apparatus schematic diagram of another aspect of the present invention. As shown in Fig.3, two processors 72 and a USB hub 78 are provided, and the two processors 72 process signals delivered by the optical displacement sensor 70 and the handwriting screen 63, respectively. The specific connection relation is that the handwriting screen 63 is connected to one of the two processors 72, in which one USB interface unit 74 is located. Also, the optical displacement sensor 70 is connected to the other processor 72, in which another USB interface unit 74 is located. The two processors 72 are further connected to the same USB hub 78, which is connected to the computer external USB interface 76, to establish a communication.

Fig.4 is the profile drawing of this apparatus, and Fig.5 is the use effect diagram of this apparatus. The structural body of this apparatus is divided into two parts including the mouse 61 and the handwriting screen 63. The handwriting screen 63 is arranged inside the mouse 61. More specifically, on the mouse body there is a structural location such as a hole of circular or square shape in which the handwriting screen 63 is mounted. The handwriting screen 63 may be covered with a handwriting screen lid 64, or may be exposed. When only the mouse function of this apparatus is used, the handwriting screen lid 64 is disposed over the handwriting screen 63 as shown in Fig.4. When both the mouse and handwriting input functions are

used simultaneously, the handwriting screen lid 64 can be taken out from the top of the handwriting screen 63. The specific using approach thereof is shown in Fig.5.

5 This apparatus may be provided with a handwriting stylus 62 to facilitate the handwriting input. The handwriting stylus 62 can be arranged either in the middle of the handwriting screen lid 64 or both sides of the mouse. The handwriting stylus 62 can be inserted into the corresponding location of the mouse 61 so as to be pull out if necessary. It may also be inserted straightly
10 to the corresponding part of the handwriting screen lid 64 as shown in Fig.4.

In addition, the mouse 61 may be designed as flip-over cover type or pullout type, that is, the handwriting screen can be fixed to the inner side of the flip-over cover, or can be fixed to the sliding track inside the mouse to form
15 a pullout handwriting screen.

Fig.7 is the circuit diagram of the preferred aspect of the present inventive apparatus, in which the specific connection relation among the processor and the handwriting screen, the optical displacement sensor, the USB interface is
20 in following manner. The pin 1 of the optical displacement sensor chip U1 is floating. The pin 2 of the chip U1 is connected to the pin 10 of the processor chip U2; the pin 3 of the chip U1 is connected to the pin 9 of the chip U2. The pin 4 of the chip U1 is connected to the pin 6 of the chip U2. The pin 5 of the chip U1 is connected to the pin 5 of the chip U2. The pin 6 of the chip
25 U1 is connected to the base of the transistor T6; the emitter of the transistor T6 is grounded. The collector of the transistor T6 is connected to the cathode of the diode L2, and the anode of the diode L2 is connected in series with the resistor R18 and then connected to the power supply VCC. The pins 7 and 8 of the chip U1 are connected to both terminals of the capacitor C16,
30 respectively. The pins 9 and 11 of the chip U1 are connected to both

terminals of the electrolytic capacitor CRY2, respectively. The pins 10 and 12 of the chip U1 are connected in parallel and then grounded. The pin 16 of the chip U1 is floating. The pins 13 and 14 of the chip U1 are connected in parallel and then connected to the power supply VCC, while they are connected in series with the capacitor C15 and then grounded. The pins 15 and 17 of the chip U1 are connected in series and then grounded. The pin 1 of the processor chip U2 is floating. The pin 2 of the chip U2 is connected to one terminal of the resistor R3, and the other terminal of the resistor R3 is connected to the base of the transistor T3. The emitter of the transistor T3 is connected to the power supply VCC and the collector of the transistor T3 is connected to one terminal of the resistor R5 and the other terminal of which is connected to the pin 3 of the chip U2. The pins 4, 7, 8, 11, 12, 13, 14, 15, 17, 18 of the chip U2 are floating. The pin 16 of the chip U2 is connected to the pin 15 of the chip U1. The pin 19 of the chip U2 is connected to the power supply VCC. The pin 20 of the chip U2 outputs a voltage of 3.3V. The pin 21 of the chip U2 is connected respectively to one terminal of the resistor R12, the capacitors C12 and C10. Here, the other terminal of the resistor R12 is connected to the pin 3 of the USB interface, the other terminal of the capacitor C12 is grounded, and the other terminal of the capacitor C10 is connected to the pin 20 of the chip U2. The pin 22 of the chip U2 is connected respectively to one terminal of the resistors R10 and R11, the capacitors C9 and C11. Here, the other terminals of the resistor R10 and the capacitor C9 are connected in parallel and connected to the pin 20 of the chip U2, and the other terminal of the capacitor C11 is grounded and the other terminal of the resistor R11 is connected to the pin 2 of USB interface. The pins 23 and 24 of the chip U2 are connected to the pins 3 and 2 of the interface TOUCH1, respectively. The pins 25 to 34 of the chip U2 are floating. The pin 35 of the chip U2 is connected to one terminal of the resistor R6, and the other terminal of the resistor R6 is connected to the base of the transistor T4. The emitter of the transistor T4 is grounded, the

collector of the transistor T4 is connected to the pin 2 of the interface TOUCH1. The pin 36 of the chip U2 is connected to one terminal of the resistor R4, and the other terminal of which is connected to the base of the transistor T5. Here, the emitter of the transistor T5 is connected to the power supply VCC and the collector of the transistor T5 is connected to the pin 4 of the interface TOUCH1. The pin 37 of the chip U2 is connected to one terminal of the resistor R2, and the other terminal of which is connected to the base of the transistor T2. Here, the emitter of the transistor T2 is grounded and the collector of the transistor T2 is connected to the pin 3 of the interface TOUCH1. The pin 38 of the chip U2 is connected to one terminal of the resistor R1, and the other terminal of which is connected to the base of the transistor T1. Here, the emitter of the transistor T1 is connected to the power supply VCC and the collector of the transistor T1 is connected to the pin 1 of the interface TOUCH1. The pins 39 to 48 of the chip U2 are floating.

According to the second and third aspects of the present invention, the profiles and use effects of the designed apparatus can be the same as the above embodiment.

Moreover, the handwriting screen lid 64 of the present invention may be provided with some simple devices commonly used, such as thermometer, compass and the like, to endow it with greater functionality and abundant practicability.

The present invention is convenient to use, accurate, reliable, and has no need to judge and wait for the operating states of the handwriting and the mouse, thereby increasing the speed. It is also durable, saves the space for placing the handwriting screen and has both the functions of handwriting and mouse with great practicability.

What is claimed is:

1. An apparatus having handwriting input and mouse functions, wherein the apparatus comprises
5 a mouse and a handwriting screen, the handwriting screen being arranged in the mouse, and the said mouse including a processor connected to the handwriting screen; and
an optical displacement sensor and a USB interface unit which are connected to the processor, respectively, the optical displacement sensor optically acquiring relative
10 coordinate information when the apparatus moves.
2. The apparatus having handwriting input and mouse functions according to claim 1, wherein the optical displacement sensor and the USB interface unit are built in the processor.
15
3. The apparatus having handwriting input and mouse functions according to claim 1, wherein the handwriting screen is provided on the mouse body.
4. The apparatus having handwriting input and mouse functions according to claim 1,
20 further comprises a USB hub connected to an external USB interface of a computer, wherein the number of said processors is two, and are used to process signals delivered by the optical displacement sensor and the handwriting screen, respectively, each of the two processors having a built-in USB interface unit to be connected to the USB hub, respectively.
25
5. The apparatus having handwriting input and mouse functions according to claim 1, wherein the handwriting screen is covered with a handwriting screen lid.
6. The apparatus having handwriting input and mouse functions according to claim 1,
30 wherein the handwriting screen is exposed.

7. The apparatus having handwriting input and mouse functions according to claim 1, wherein a handwriting stylus is placed in the middle of the handwriting screen lid.

5

8. The apparatus having handwriting input and mouse functions according to claim 1, wherein the handwriting stylus is placed on both sides of the mouse.

9. The apparatus having handwriting input and mouse functions according to claim 1, wherein the said apparatus is of a flip-over cover type in which the handwriting screen is fixed on the inner side of the flip-over cover, or of a pullout type in which the handwriting screen is fixed on the sliding track to form a pullout handwriting screen.

10. The apparatus having handwriting input and mouse functions according to claim 1, wherein the handwriting screen is a resistance composition screen composed of two conductive layers and the isolating substance between them.

11. The apparatus having handwriting input and mouse functions according to claim 1, wherein there is a specific circuit connection relation among the optical displacement sensor, the handwriting screen, the processor and the USB interface unit, in which the pin (1) of the optical displacement sensor chip (U1) is floating; the pin (2) of the chip (U1) is connected to the pin (10) of the processor chip (U2); the pin (3) of the chip (U1) is connected to the pin (9) of the chip (U2); the pin (4) of the chip (U1) is connected to the pin (6) of the chip (U2); the pin (5) of the chip (U1) is connected to the pin (5) of the chip (U2); the pin (6) of the chip (U1) is connected to the base of the transistor (T6); the emitter of the transistor (T6) is grounded; the collector of the transistor (T6) is connected to the cathode of the diode (L2) and the

anode of the diode (L2) is connected in series with the resistor (R18) and then connected to the power supply VCC; the pins (7) and (8) of the chip (U1) are connected to both terminals of the capacitor (C16) respectively; the pins (9, 11) of the chip (U1) are connected to both terminals of the electrolytic capacitor (CRY2) respectively; the pins (10, 12) of the chip (U1) are connected in parallel and then grounded; the pin (16) of the chip (U1) is floating; the pins (13, 14) of the chip (U1) are connected in parallel and then connected to the power supply VCC, and they are connected in series with the capacitor (C15) and then grounded; the pins (15) of the chip (U1) and a capacitor (17) are connected in series and then grounded; the pin (1) of the processor chip (U2) is floating; the pin (2) of the chip (U2) is connected to one terminal of the resistor (R3); the other terminal of the resistor (R3) is connected to the base of the transistor (T3); the emitter of the transistor (T3) is connected to the power supply VCC; the collector of the transistor (T3) is connected to one terminal of the resistor (R5) and the other terminal of which is connected to the pin (3) of the chip (U2); the pins (4, 7, 8, 11, 12, 13, 14, 15, 17, 18) of the chip (U2) is floating; the pin (16) of the chip (U2) is connected to the pin (15) of the chip (U1); the pin (19) of the chip (U2) is connected to the power supply VCC; the pin (20) of the chip (U2) outputs the voltage of 3.3V; the pin (21) of the chip (U2) is connected respectively to each terminal of the resistor (R12) and the capacitors (C12, C10); the other terminal of the resistor (R12) is connected to the pin (3) of the USB interface; the other terminal of the capacitor (C12) is grounded, and the other terminal of the capacitor (C10) is connected to the pin (20) of the chip (U2); the pin (22) of the chip (U2) is connected respectively to each terminal of the resistors (R10, R11), the capacitors (C9, C11), the other terminals of the resistor (R10) and the capacitor (C9) are connected in parallel and then connected to the pin (20) of the chip (U2) and the other terminal of the capacitor (C11) is grounded, and the other terminal of the resistor (R11) is connected to the pin (2) of the USB interface; the pins (23, 24) of the chip

(U2) are connected to the pins (3, 2) of the interface TOUCH1 respectively; the pins (25~34) of the chip (U2) are floating; the pin (35) of the chip (U2) is connected to one terminal of the resistor (R6) and the other terminal of which is connected to the base of the transistor (T4); the emitter of the transistor (T4) is grounded, the collector of the transistor (T4) is connected to the pin (2) of the interface TOUCH1; the pin (36) of the chip (U2) is connected to one terminal of the resistor (R4) and the other terminal of which is connected to the base of the transistor (T5), while the emitter of the transistor (T5) is connected to the power supply VCC and its collector is connected to the pin (4) of the interface TOUCH1; the pin (37) of the chip (U2) is connected to one terminal of the resistor (R2) and the other terminal of which is connected to the base of the transistor (T2), while the emitter of the transistor (T2) is grounded and its collector is connected to the pin (3) of the interface TOUCH1; the pin (38) of the chip (U2) is connected to one terminal of the resistor (R1) and the other terminal of which is connected to the base of the transistor (T1), while emitter of the transistor (T1) is connected to the power supply VCC and whose collector is connected to the pin (1) of the interface TOUCH1; the pins (39~48) of the chip (U2) are floating.