

THUMB ACTUATED X-Y INPUT DEVICE

FIELD OF THE INVENTION

[0001] This invention relates to a computer input device. More specifically the present invention is an ergonomic hand controller pointing device with functionality that enables it to replace current pointing devices such as a mouse or a digitizer pad. The present invention is less taxing to the user to minimize fatigue even during a protracted period of continuous use.

BACKGROUND AND DESCRIPTION OF THE PRIOR ART

[0002] Many computer applications require or accept input beyond the input of text from a keyboard. The types of input vary but the input can be broadly categorized as point and click. The pointing device couples an x-y position on the display with input from an actuator on the pointing device (although some computer keyboards have designated keys to duplicate some actuators for the pointing devices). Thus, an x-y position of a position icon on a display screen is combined with an input of some type from the actuator in order to select something such as a command or menu choice from a series of such choices, a piece of text, or a drawing element. This selection is known as a "point and click" operation. Thus, input devices used for this sort of input are often called "pointing devices". Often the act of selection can be coupled with one of several command choices from one or more actuators on the point device. Sometimes these commands are a sequence of selection indications from an input so that a single click, double click and even a triple click can convey different requests. Sometimes maintaining pressure on an actuator is interpreted as a different command, for example a drag instead of a click. Sometimes alternative input actuators on the pointing device are used (so that a right click from an actuator typically on the right side of the pointing device is processed differently than a left click). In some cases, some input commands are relatively insensitive to the specific position of the position icon on the computer display such as in applications that allow a "right click" to bring up a menu or frequently used commands that are relevant to the current state of the application. Such a pointing device can be used to input commands into a wide range of applications including those operating on distributed computer terminal workstations, personal computers, games and amusement devices, and other equipment with need for user input.

[0003] One such pointing device is the mouse, which is moved by the user's hand across a work surface such as a desktop. Some mouse pointing devices need or benefit from moving the mouse over a special mouse pad located on the user's desktop. The movement of the mouse is detected and communicated to the computer so that an indicator on the display screen moves. The position indicator can be something simple such as cursor, a cross hair or a more fanciful indicator ranging up to a cartoon character. For sake of simplicity, we shall call this symbol a position icon. With practice, the user can move the mouse to move the position icon over various choices, text, or locations so that one or more movements of the user's fingers can couple an input command with the location choice to make a request to be acted upon by the computer application.

[0004] The invention of the mouse is attributed to Doug Englebart as part of work done for NASA in the mid 1960's.

While the mouse was a large improvement over other pointing devices such as light pens, the repetitive motions required to place the position icon in the desired location and the movements to couple an input command with the selected location have been linked with repetitive motion injuries to some computer users. The problems are particularly acute among users who use a mouse pointing device frequently as is the case with people who use such a device as part of their occupation. The unresolved problems from use of the mouse and alternative prior art pointing devices is discussed in more detail below.

[0005] In light of the popularity of the mouse as a pointing device since its invention in the mid-1960s, and the recurrent problems of repetitive motion injuries, there have been many attempts to improve the device to account for the interaction between the mouse or mouse alternatives and the human body. This trend has continued as interaction with computers in certain applications such as computer aided drafting or browsing the World Wide Web portion of the Internet may require many point and click operations and very few text input operations, thus increasing the importance of the mouse design in minimizing repetitive motion injuries. The improvements have refined the initial design but do not eliminate the adverse effects of repetitive use. A brief description of selected attempts to improve the mouse is included below.

[0006] U.S. Pat. No. 4,862,165 for an Ergonomically-Shaped Hand Controller issued in 1989. The '165 patent reviews the prior art designs for hand controllers or mouse devices and finds that the shape of the prior art mouse was not ergonomically compatible with the user's hand. The proposed solution is an alteration to the outer housing of the mouse which is asserted to be ergonomically shaped to minimize hand muscle fatigue even during protracted periods of continuous use.

[0007] U.S. Pat. No. 5,287,090 for a Combination Mouse and Track Ball Unit was issued in 1994. The '090 patent asserts that the combined mouse/trackball device of the '090 patent particularly reduces the onset and severity of or can prevent entirely repetitive strain injuries, and other neurological or orthopedic malfunctions such as tendonitis and tenosynovitis that are commonly related to usage of a flat and rectangular-type mouse. The '090 device may operate as a trackball, as a right handed mouse or a left handed mouse. In brief, the device had a track ball that protruded through the bottom of the device to act as an input when in mouse mode and also protruded through the face of the device distal to the arm of the user to serve as a thumb operated track ball. When operated as a mouse, the user moves the mouse to indirectly turn two slotted wheels positioned at right angles to one another to provide input to move the position icon. The '090 device uses a pair of V-shaped switch plates (best shown in '090 FIG. 5) which actuate microswitches located below the switch plates to convey an input command from the user. Thus, operation in mouse mode to supply the x-y input called for gross motion of the mouse using the various muscles in the arm to move the hand.

[0008] When the user chooses to move the '090 device to trackball mode, several "bullet switches" are caused to extend from the device to lift the mouse movement detector from the surface of the desk. The trackball mode required manipulation of the trackball with the thumb of the user.