METHODS OF INTERACTING WITH A COMPUTER USING A FINGER(S) TOUCH SENSING INPUT DEVICE WITH VISUAL FEEDBACK

FIELD

[0001] The present system and method relate to computerized systems. More particularly, the present system and method relate to human computer interaction using finger touch sensing input devices in conjunction with computerized systems having visual feedback.

BACKGROUND

[0002] Computerized systems such as computers, personal data assistants (PDA) and mobile phones, receive input signals from a number of input devices including a stylus, a number of touch sensors, mice, or other switches. However, traditional input devices pale in comparison to hands and fingers capabilities. Work and tasks are performed every day using our hands and fingers. It is the dexterity of our hands that creates the world today. While computer technology has advanced at an incredibly high speed for the last two decades, computer technology is rarely used for tasks that require high degrees of freedom such as classroom note-taking situations. Computerized systems are limited by the current input hardware and its human computer interaction methods.

[0003] For example, switches are typically found in the buttons of mice, joysticks, game pads, mobile phone keypads, and the keys of keyboards. As computerized systems get smaller, user input through these input devices is not always feasible. Mechanical keyboards have limited features due the size and shape of their buttons. Moreover, PDA devices and mobile phones encounter numerous challenges fitting keyboards onto their systems. As a result, many of these input devices include alternative interfaces such as voice activation, handwriting recognition, pre-programmed texts, stylus pens, and number keypads. Accordingly, it may be difficult for an operator to use a word processor to make simple notes on the increasingly small devices.

[0004] Additionally, traditional input devices suffer from a lack of flexibility and adaptability. For example, keyboards often have different layouts or are meant to be used for multiple languages. As a result, the labels on these keyboards can be very confusing. Moreover, some computer applications do not use a keyboard as an input device, rather, many computer applications use a mouse or other input device more than a keyboard.

[0005] Mouse pointing precision by an operator is also unpredictable and imprecise. Even with new technology, such as the optical mouse, an operator is still unable to use a mouse to freehand a picture. The lack of precision exhibited by a mouse can be partially attributed to the configuration in which an operator handles the mouse. The hand configuration is not the way the human hand is designed to make precise movements. Rather, movements made by a finger are much more precise than movements that can be made by an entire hand.

[0006] Mouse operation as an input device also results in unnecessary movements between one location and another. In current operating systems, a pointer pre-exists on the computer screen. This pre-existence reduces direct operation because the cursor must be moved to a desired target before selecting or otherwise manipulating the target. For instance, an operator must move a pointer from a random location to a 'yes' button to submit a 'yes' response. This movement is indirect and does not exploit the dexterity of the human hands and fingers, thereby limiting precise control.

[0007] Finger touch-sensing technology, such as touch pads, has been developed to incorporate touch into an input device. However, traditional touch-sensing technology suffers from many of the above-mentioned shortcomings including, unnecessary distance that a pointer has to travel, multiple finger strokes on a sensing surface, etc. Furthermore, multiple simultaneous operations are sometimes required such as the operator being required to hold a switch while performing finger strokes.

[0008] Touch screen technology is another technology that attempts to incorporate touch into an input device. While touch screen technology uses a more direct model of human computer interaction than many traditional input methods, touch screen technology also has limited effectiveness as the display device gets smaller. Reduced screen size contributes to an operator's fingers blinding the displayed graphics, making selection and manipulation difficult. The use of a stylus pen may alleviate some of these challenges; however, having to carry a stylus can often be cumbersome. Additionally, if the displayed graphics of a computer application are rapid, it may be difficult to operate a touch screen since hands and fingers often blind the operator's visibility. Furthermore, an operator may not wish to operate a computer near the display devices.

[0009] U.S. Pat. No. 6,559,830 to Hinckley et al. (2003), which reference is incorporated hereby in its entirety, discloses the inclusion of integrated touch sensors on input devices, such that these devices can generate messages when they have been touched without indicating what location on the touch sensor has been touched. These devices help the computer obtain extra information regarding when the devices are touched and when they are released. However, because the position of the touch is not presented to the computer, touch sensors lack some advantages provided by a touch pad.

[0010] Several prior arts allow the operator to communicate with the computer by using gestures or using fingertip cords on a multi-touch surface. However, these methods require the operator to learn new hand gestures without significantly improving the interaction.

SUMMARY

[0011] With a preferred finger(s) touch sensing input device, the present system and method of interacting with a computer can be used properly, creatively and pleasantly. These methods include: active space interaction mode, word processing using active space interaction mode on a small computing device, touch-type on a multi-touch sensing surface, multiple pointers interaction mode, mini hands interaction mode, chameleon cursor interaction mode, tablet cursor interaction mode, and beyond.

DRAWINGS

[0012] The accompanying drawings illustrate various exemplary embodiments of the present system and method