communication with the processor **86** and displays the representation **112** of the keyboard **84** on the head-mounted display **90**. To input data to an electronic system, the user moves the user's finger **98** across the keyboard **84**. The user's finger **98** is detected by the finger position sensor **92** and the finger orientation sensor **94**. The forward edge **106** of the user's finger **98** is determined by the sensors **92**, **94** and is used to establish an active point **108**. The active point **108** is the point of the user's finger **98** which is used by the processor **86** to determine which key of the keyboard **84** the user selects.

Using the XY position data from the finger position sensor **92** and the angular orientation β data from the finger orientation sensor **94**, the processor **86** determines the XY location and the angular orientation β of the user's finger in virtual space relative to the representation **112** of the keyboard **84**. The processor **86** forms this position and orientation information into a cursor image which is fed to the display controller **88**. FIG. **8** shows a finger-shaped embodiment of the cursor **110**. The cursor **110** may also be any other desired shape, such as an "X" or a circle. In another embodiment, the display controller **88** superimposes the image of the cursor **110** onto the graphic representation **112** of the keyboard **84**, thereby providing a continuous virtual representation of the real interface to the user. The system **80** provides the user with continuous information about the location of the user's finger **98** with respect to each key of the keyboard **84**. The user moves the user's finger across the keyboard **84** until the user views the position of the cursor **110** over the desired key of the representation **112** of the keyboard **84**. Once the cursor **110** is over the desired key, the user may input that key into the electronic system by selecting the key. Selection of the key is determined by the intended actuation sensor **96**. In one embodiment, the user's finger presses against the keyboard **84** to select the key. In another embodiment, the user's finger moves within a predetermined distance above the keyboard **84** to select the key. The processor **86** uses the location of the active point **108** of the user's finger **98** at the instant the intended actuation signal is received from the intended actuation sensor **96**, such as the force detecting element **58** described above and shown in FIG. **7**, to determine the key to be input to the electronic system. The key input to the electronic system is thereby directly related to the image provided to the user at the time the user selects to input a key.

FIG. **9** further illustrates the finger-shaped embodiment of the cursor **110**. The active point **109** of the finger-shaped cursor **110** is located near the tip of the finger-shaped cursor **110**, thereby simulating the point of a real finger that a user would use to press a key of a keyboard in the real world. The display angle β is controlled by the processor **86** to simulate the true angle of the user's finger **98** with respect to the keyboard **84**.

Referring again to FIG. **8**, in one embodiment, the area of the cursor **110** is displayed as semi-transparent, thereby allowing the user to read the graphic legend beneath the cursor **110**. In another embodiment, the size of the cursor **110** may be varied. The feature of enabling a user to see which key will be selected without having to view the input device offers a greater degree of physical presence in a virtual world and provides a higher quality interface to the user than traditional input devices. The cursor **110** representing the location of the user with respect to the input device is instantly locatable by the user and provides the user a clear mental mapping between the real and virtual worlds.

In another embodiment, the sensor **82** senses the position of more than one user finger. In this embodiment, more than one finger-shaped cursor **110** may be displayed simultaneously.

FIGS. **10**A and **10**B demonstrate a method for toggling between two input modes in an electronic system having more than one input mode. For example, an electronic system may be able to receive data through a mouse input mode and a keyboard input mode. In this embodiment, the sensor **12** of the system **10** described above and shown in FIG. **1**, is capable of distinguishing between a single user finger and a plurality of user fingers. FIG. **10**A shows the position of the user's hand during the first input mode and the proximate image perceived by the processor **14**. When the sensor **12** senses only the single user finger, the processor **14** places the electronic system in the first input mode. In one embodiment, the first input mode is a keyboard input mode. FIG. **10**B shows the position of the user's hand during the second input mode and the proximate image perceived by the processor **14**. When the sensor **12** senses a plurality of user fingers, the processor **14** places the electronic system in the second input mode. In one embodiment, the second input mode is a mouse input mode. It is the difference, especially the transient difference between the two perceived images shown in FIGS. **10**A and **10**B, that is used by the processor **14** to differentiate between the user's desire to operate in one of two input modes.

FIG. **11** shows another embodiment of a sensor **119** for sensing the position of the user's finger in real space. The sensor **119** includes a finger-mounted device **120** and is capable of being used in keyboard and mouse input modes. The sensor **119** may be used in the method for toggling between two input modes described above. The sensor **119** is implemented with a magnetic field locally induced by a base unit **122**. To move between different input options, the user moves the finger-mounted device **120** relative to the base unit **122**. As the user's finger moves relative to the user's wrist (of either hand) the magnetic field may also be generated by a base unit **122** that is contained in a wrist band **124** located on one of the user's wrists. In one embodiment, the base unit **122** is mounted in a watch-like device and is worn on the same hand as the finger-mounted device **120**. Because the user perceives the keyboard only in virtual space, because all motions may be relative to any given key within that virtual space, and because accuracy is not required (only a consistent inaccuracy that can be adjusted for), it is possible to implement a truly virtual keyboard and cursor control with the sensor **119**. For example, if the system is non-linear, as long as it is non-linear in a consistent manner, the non-linear response can be linearized in software.

The base unit **122** includes a magnetic driver and receiver. FIG. **12** shows one embodiment of a base transceiver **126** which functions as a magnetic driver and receiver. The base transceiver **126** is located within the base unit **122**. Referring again to FIG. **11**, in one embodiment, the system operates without a battery in the finger-mounted device **120** by using at least two tuned inductor-resistor-capacitor (LRC) circuits. Three coils **128**_a_, **128**_b_, and **128**_c_ are disposed within the finger-mounted device **120** and are orthogonally oriented. Each of the three coils **128**_a_, **128**_b_ and **128**_c_ are tuned to different distinct frequencies using standard RC techniques. The three coils **128**_a_, **128**_b_, **128**_c_ are used to determine the position of the finger-mounted device **120** relative to the base unit **122**. In one embodiment, the base unit **122** includes a separate base transceiver **126** for each of the three coils **128**_a_, **128**_b_, **128**_c_. Each coil is in communication with its corresponding base transceiver **126** through magnetic field coupling.

FIG. **12** shows a schematic of a base transceiver **126**. The base transceiver **126** includes a magnetic field source driver