thin film sensors are able to generate x, y, and z translation commands as well as pitch, yaw, and roll rotation commands based on the direction of a finger swipe as indicated in FIG. **51***a*.

FIG. **51***b* illustrates an embodiment of controller **4360** with an attached handle **4166**. Handle **4166** is used to allow a user more flexibility in using controller **4360** such as allowing the user to grip controller **4360** by the handle **4166** with one hand, and operate controller **4360** with the other. Handle **4166** may have a number of buttons **4167** that may be programmed to perform a variety of functions.

FIG. **51***c* illustrates an embodiment of controller **4360** with a support **4148**. Support **4168** is typically used to support controller **4360** on a desk top, allowing for easy access to a user. Support **4168** may also include buttons **4167**.

FIG. **52***a* illustrates a mouse controller **4370** in accordance with yet another embodiment of the present invention. Mouse controller **4370** includes a body **4372** having buttons **4374**. Mouse controller **4370** includes a standard mouse mechanism **4373** and buttons **4374** used to control and position a cursor in a typical computer system by generating x and y translation signals as will be appreciated by those skilled in the art. Mouse controller **4370** also has a number of sensors **4375** in accordance with the present invention, which may be operated in the same manner as the methods described with references to FIGS. **49***g* and **49***h* to produce a z translation signal, as well as pitch, yaw, and roll rotation signals.

FIG. **52***b* illustrates a mouse controller **4380** in accordance with yet another embodiment of the present invention. Mouse controller **4380** is similar to mouse controller **4370**, but further includes two additional sensors **4375** to further diversify the ways in which x, y, z translation signals, and pitch, yaw and roll rotation signals may be generated. For example, unlike in mouse controller **4370**, in mouse controller **4380**, the user may use one of the two additional sensors **4375** to generate an x and y translation signal instead of using mouse mechanism **4373**.

FIG. **52***c* illustrates a trackball controller **4385** in accordance with yet another embodiment of the present invention. Trackball controller **4385** includes a body **4390** having buttons **4395**. Trackball controller **4385** also includes a trackball **4000** used to control and position a cursor in a typical computer system by generating x and y translation signals. Trackball controller **4385** is modified to utilize sensors **4375** to produce z pitch, yaw, and roll rotation signals.

FIG. **52***d* illustrates a method for operating trackball controller **4385**. In method, the trackball is used to generate x and y translation signals. Each of the sensors may then be operated with a finger swipe in the directions indicated in FIG. **53***b* to generate x, y, and z translation signals, as well as pitch, yaw, and roll rotation signals.

FIG. **53***a* illustrates a controller **4405** in accordance with yet another embodiment of the present invention. Controller **4405** includes a body **4410** having a top surface **4415**, a front surface **4420**, a left front surface **4425**, a right front surface **4430**, a left surface **4435**, a right surface **4440**, a rear surface **4445**, a left rear surface **4450**, and a right rear surface **4455**, all of which support a sensor and an edge sensor as described previously. The additional sensors allow two additional degrees of freedom for generating rotation signals as will be shown below.

FIG. **53***b* and FIG. **53***c* illustrate a method of operating controller **4405** to produce x, y, z, pitch, yaw, and roll rotation signals. The sensors and edge sensors located on top surface **4415**, front surface **4420**, left surface **4435**, right surface **4440**, and rear surface **4445**, function identically with the sensors located on corresponding faces of controller **4315***f* of FIG. **49***f*.

FIGS. **53***d–k* illustrate a method of operating controller **4405** to generate rotation signals. In particular, FIGS. **53***e–f* and FIGS. i–j illustrate a method of generating x' and x" rotation signals. The sensors and edge sensors located on right front surface **4430** and left rear surface **4450** may be used to generate an x' rotation signal, which commands the rotation of an object around an x' axis. The x' axis is defined at positive 45 degrees from the x-axis and located on the x,z plane.

The sensors and edge sensors located on left front surface **4425** and right rear surface **4455** may be used to generate an x" rotation signal, which commands the rotation of an object around an x" axis. The x" axis is defined at negative 45 degrees from the x-axis and located on the x,z plane. Each sensor of controller **4405** may be operated to generate a rotation signal by sliding an on the sensor in the desired direction while touching a second sensor with another object.

FIG. **54** is a flow chart of a method **4460** of generating translation, rotation and continuation signals from the controllers of the present invention. Method **4460** may utilize the control electronics described in FIGS. **3** and **5**. Method **4460** begins at an operation **4465** which polls each of the sensors for sensor signals (such as an x translation dsignal) from the user. During polling, the sensor signals may be generated by pressing an object against one or more of the sensors, and then moving the object while maintaining contact with the sensor surface in an operation **4470**. The sensor signals are then converted into 3D/6D manipulation commands or continuation commands by an operation **4475**. The signals are interpreted by a driver in an operation **4480**, which then carries out the 3D/6D manipulation commands or continuation of the 3D/6D manipulation commands of an object on a computer display.

The invention has been described herein in terms of several preferred embodiments. Other embodiments of the invention will be apparent to those skilled in the art from consideration of the specification and practice of the invention. For example, a variety of types of pressure-sensitive sensors can be utilized with the present invention. Various configurations and combinations of input gestures and commands can be detected by the controller in various embodiments as necessary for a particular application. Also, various types of computer-generated objects and real objects can be controlled with the present invention and be commanded to interact with other objects in an environment. Furthermore, certain terminology has been used for the purposes of descriptive clarity, and not to limit the present invention. The embodiments and preferred features described above should be considered exemplary, with the invention being defined by the appended claims.

What is claimed is:

**1**. A multiple coordinate controller device comprising:

a three-dimensional body having a first surface portion and a second surface portion which is not coplanar with said first surface;

a first transducer having a first sensing surface, said first transducer being coupled to said first portion of said body and being capable of detecting both positions and a range of pressure forces at said positions on said first sensing surface, wherein said first transducer is further capable of providing a first range of z coordinates at a detected x,y coordinate in response to said range of