(e.g., orthogonal). The intersections of the upper layer and lower layer lines become sensors. During operation, the rows are charged and the charge capacitively couples to the columns at the intersection. As an object approaches the surface of the touch screen, the object capacitively couples to the rows at the intersections in close proximity to the object thereby attract charge away from the rows and therefore the columns as well. The amount of charge in each of the columns is measured by the sensing controller to determine the positions of different touching objects.

[0033] In accordance with another embodiment, the sensing device is based on resistance. As should be appreciated, resistive touch screen composed of a flexible top layer and a flexible bottom layer, which forms separately by insulate material, such as insulating dots, attached to a sensing controller. The inside surface of each of the two layers is coated with a transparent metal oxide coating (ITO) or conductive ink as the sensor that facilitates a gradient across each layer when voltage is applied. Pressing the flexible top sheet creates electrical contact between the resistive layers, producing a switch closing in the circuit. The control electronics alternate voltage between the layers and pass the resulting X and Y touch coordinates to the sensing controller. The sensing controller data is then passed on to the computer operating system for processing. The sensing controller can recognize multiple objects, and determine the location, pressure, direction, speed and acceleration of the objects as they are moved across the touch screen. For example, the sensing controller can determine when and where each of the fingers and palm of one or more hands are touching as well as the pressure being exerted by the finger and palm of the hand(s) at the same time.

[0034] The simplicity of resistance allows for a great deal of flexibility in design and construction of the sensing device. For example, the sensing device may be based on self resistance or mutual resistance. In self resistance, each of the sensors is provided by an individual metal oxide coating on bottom layer. When an object presses the surface of the touch screen, the upper layer couples to those individual metal oxide coating on bottom layer which will produce a switch closing in the circuit. The amount of alternate voltage between the layers is measured by the sensing controller to determine the positions of different touching objects. In mutual resistance, the sensing device includes a two layer grid of spatially separated metal oxide lines or wires. For the simplest case, the upper layer includes lines in rows while the lower layer includes lines in columns (e.g., orthogonal). The intersections of the upper layer and lower layer lines become sensors. During operation, the rows are charged. As an object presses the surface of the touch screen, the object presses the rows at the intersections with the columns, and therefore switch closing in the circuit. The amount of closing in the circuit in each of the columns and rows is measured by the sensing controller to determine the positions of different touching objects.

[0035] According to FIG. **3**, the flexible multipoint touch screen is capable of sensing the position and the pressure of multiple objects at the same time. This particular touch screen is based on a plurality of transparent sensors **30**, and each represents different coordinate of the touch screen. The sensors are configured to detect input from one or more objects touching the screen in the vicinity of the sensors. The sensors are connected to a sensing controller through a plurality of thin, flexible, electrical leads that are positioned in the gaps **33** between the spaced apart sensors or in the different level of sensors. The sensors are spaced apart in order to electrically isolate them from each other. The gap is preferably made small enough to maximize the sensing area and to minimize optical differences between the space and the transparent sensors.

[0036] The thin, flexible, electrical sense lead **32** is electrical contact with the sensors for transmitting electrical signals to and from the sensors where they also connected to the sensing controller. The sensing controller **31** includes one or more sensor ICs that measure the signal form each sensor and report their findings or some forms thereof to a host controller. The sensor ICs may for example convert the analog signals to digital data and thereafter transmit the digital data over a serial bus to a host controller. Any number of sensor ICs may be used. For example, a single chip may be used for all sensors, or multiple chips may be used for a single or group of sensors.

[0037] The sensors, leads and sensing controller are generally disposed on an optical transmissive member. In most cases, the optically transmissive member is formed from a clear flexible material such as thin glass or flexible plastic. The member preferably is a sheet of polyethylene terephthalate (PET), and this member may be a flexible sheet of another suitable material, e. g., polycarbonate polyester, polyvinyl chloride, polyether sulfone, polyimide polyether imide, cellulose triacetate and polyethelene naphthalate. The sensors, leads and conductive areas preferably comprise indium tin oxide (ITO) or conductive ink, most preferably silver epoxy conductive ink, and this conductive ink preferably is deposited by screen printing or ink-jet printing. In addition, the sensor ICs of the sensing controller can be electrically coupled to the leads using any suitable techniques.

[0038] The distribution of the sensors may be widely varied. For example, the sensors may be placed everywhere in the touch screen. The sensors may be placed randomly or in a particular pattern. The position of the sensors may depend on the coordinate system used. Furthermore, the sensors may be formed from almost any shape whether simple (e.g., squares, circles, ovals, triangles, rectangles, polygons, and the like) or complex (e.g., random shapes). Moreover, the sensors may have identical shapes or they may have different shapes. The shapes are generally chosen to maximize the sensing area and to minimize optical differences between the gaps and the transparent sensors.

[0039] According to FIG. **4**, another embodiment of the invention, unlike the touch screen above, the touch screen includes a two layer grid of spatially separated lines or wires. In most cases, the lines **40** on each layer are parallel to one another. Furthermore, the lines on the different layers are configured to intersect or cross in order to produce sensor **41**, and each represents different coordinates in the touch screen. They are configured to detect input from one or more objects touching the screen in the vicinity of the sensors. The top layer provides the driving lines while the bottom layer provides the sensing lines (vice verse). The driving lines are connected to a voltage source that separately drives the current through each of the driving lines. That is, the stimulus is only happening over one line while all the other lines are grounded. They may be driven similarly to a raster scan. The sensing lines are connected with sensing controller that continuously senses all of the sensing lines. Each line is make of flexible materials, such as, conductive ink.

[0040] When driven, the charge on the driving line to the intersecting sensing lines through the nodes and the sensing