properties of the transducer assemblies to determine changes within the system that are then used to determine the position of the applied force. Thus, the transducer assemblies **110, 112, 114, 116** do not actually measure force directly, but rather rely primarily on changes in capacitance in each transducer assembly to determine the position of the applied force.

[**0023**] A capacitive device **200** illustrated in **FIG. 2** may be used as one of the transducer assemblies shown in **FIG. 1**. Capacitive device **200** includes first and second electrodes **210, 250** each mounted directly or indirectly to a substrate **202**. First electrode **210** includes first and second surfaces **212, 214**, first and second sides **216, 218**, and a center portion **220**. Second electrode **250** includes first and second surfaces **252, 254**. A dimple **204** may be positioned on a first surface **212** in the center portion **220** of first electrode **210** at a location directly aligned with the position of second electrode **250**. The purpose of dimple **204** is to translate an applied force from an object, such as the plate shaped input structure **102** shown in **FIG. 1**, through a point contact of the dimple to translate the normal forces applied by the object to the capacitive device **200**. In other embodiments, a different shaped dimple than the hemispherical-shaped dimple **204** shown in **FIG. 2** may be used. Preferably, the dimple has structure that provides a point contact between the device and the object through which the applied force enters device **200**.

[**0024**] First electrode **210** is indirectly secured to substrate **202** with connecting material **230, 240** positioned between second surface **214** at respective first and second sides **216, 218** of first electrode **200** and substrate **202**. Connecting material **230, 240** preferably includes a curable material **232, 242** and structured elements **234, 244**. The structured elements **234, 244** have a predetermined dimension defined by, for example, the diameter of the circular-shaped structured elements **234, 244**, which provides a predetermined spacing between first and second electrodes **210, 250**. Structured elements and connecting materials that may be applicable for use in capacitive device **200** are discussed in further detail below. Thus, regardless of the properties of the curable material **232, 234** in a cured or uncured state, the predetermined maximum dimension of the structured elements **234, 244** will define the predetermined distance between the first and second electrodes **210, 250**.

[**0025**] In some embodiments, first electrode **210** may be directly mounted to substrate **202** using connecting material **230, 240**. In other embodiments, a third electrode, represented as electrodes **260, 262**, may be formed on a mounting surface of substrate **202** to provide an electrical connection between first electrode **210** and other components associated with substrate **202**. For example, substrate **202** may be a printed circuit board and third electrode **260, 262** may be formed on the printed circuit board with high precision techniques. In order to provide an electrical connection between first electrode **210** and third electrode **260, 262**, either the curable material **232, 242** or the structured elements **234, 244** must include an electrically conductive material. In one example, the curable material **232, 242** includes a curable conductive material such as solder, and structured elements **234, 244** include a non-conductive material such as glass. In other examples, curable material **232, 242** may be an adhesive that is non-conductive and structured elements **234, 244** include an electrically conductive material. Thus, the capacitive device **200** is structured to provide electrical connection of first electrode **210** to substrate **202** via the mounting configuration of first electrode **210** rather than having to separately mount the electrode to the circuit board and connect the electrodes to other compounds associated with the circuit board.

[**0026**] The second electrode **250** may likewise be mounted directly to substrate **202** or may be mounted to a fourth electrode (not shown) so as to provide an electrical connection between the second electrode **250** and other electronic components (not shown) associated with substrate **202**. In the embodiment illustrated in **FIG. 2**, second electrode **250** could be a trace formed on a surface of substrate **202**, and substrate **202** is a printed circuit board (PCB) so that a separate electrode is not needed to provide the necessary electrical connection of second electrode **250** to other electronic components.

[**0027**] A second example capacitive device **300** is shown in **FIG. 3**. The capacitive device **300** includes first and second electrodes **310, 350** mounted to a substrate **302**. First electrode **310** includes first and second surfaces **312, 314** and first and second sides **316, 318**. Second electrode **350** also includes first and second surfaces **352, 354**. Preferably, a dimple feature **304** is formed on first surface **312** at first side **316** so that the dimple is aligned with second electrode **350** on substrate **302**.

[**0028**] First electrode **310** is mounted to substrate **302** at second side **318** using a connecting material **330**. Connecting material **330** may include a curable material **332** and structured elements **334**. In some embodiments, first electrode **310** may be directly mounted to substrate **302** using connecting material **330**. Such a configuration may require separate electrical connection of first electrode **310** to other electronic components, for example, using wires or a flex circuit. In the capacitive device **300** shown in **FIG. 3**, first electrode **310** is mounted to a third electrode **360** via connecting material **330**. Third electrode **360** may provide the necessary electrical connection of first electrode **310** to associated electronic components. Connecting material **330** and third electrode **360** may have the same or very similar characteristics as described above with reference to connecting material **230** and third electrode **260, 262** of capacitance device **200**. Likewise, second electrode **350** may be mounted in the same or similar ways as discussed above related to second electrode **250** of capacitive device **200**.

[**0029**] In the examples discussed above, a common feature of these capacitive devices is that a capacitance exists between the first and second electrodes. Preferably, a constant voltage is applied to either the first or the second electrode at a given frequency, for example, a frequency of 100 kHz. An amplifier or similar device, such as an op-amp, is electrically connected to the electrode that is not connected to the voltage source. With this configuration the amplifier can measure the amount of current flowing between the first and second electrodes, which amount varies as the distance between the first and second electrodes changes.

[**0030**] In one example configuration, the constant voltage source is electrically connected to the first electrode and the amplifier is electrically connected to the second electrode. When an applied force enters the capacitive device through the dimple or through another means that decreases the