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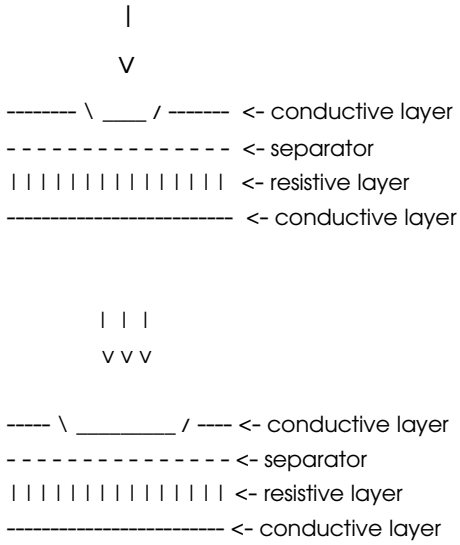
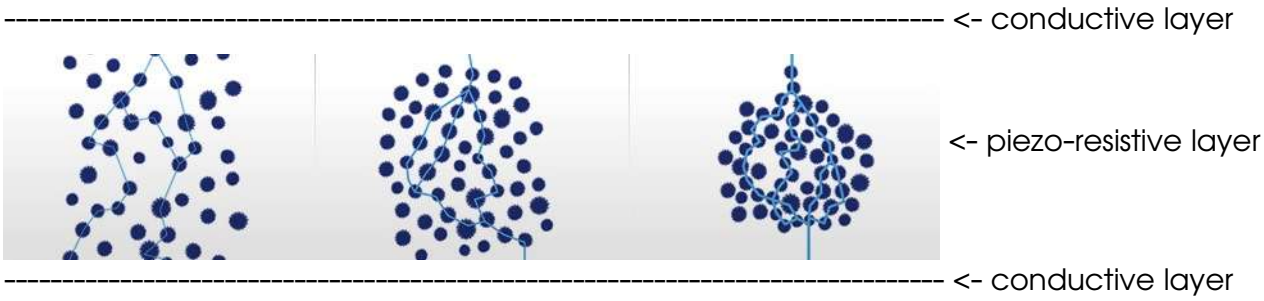
Resistive pressure sensors

Resistive pressure sensors are sensors used to quantify a pressure and / or deduct a contact. By extension, these sensors are used to measure a linear or surface position. They are used in a large number of industrial applications because they can be produced at low cost from functional ink printing processes deposited on flexible plastic films. These sensors consist of three layers of functional inks (conductive / resistive / conductive) and one or two layers of spacers. Antistatic plastic packaging such as Velostat can be used to form the resistive layer. For this type of sensor, the pressure applied onto the multilayer structure increase the size of the contact between the different layers. The contact size increase in combination with the pressure, and this decrease the sensor resistance. We can explain this by using Ohm's laws which describes the operation of resistors connected in parallel. Strongest the pressure is more resistances are connected in parallel which divide according to the following formula: $R = (R1 \times R2) / (R1 + R2)$



Piezo-resistive pressure sensors

Like resistive sensors, piezo-resistive pressure sensors are sensors used to quantify a pressure and / or deduce a contact, a linear or surface position. Piezo-resistive sensors are distinguished from resistive sensors because they change the resistance to crushing. Piezo-resistive coating is combined with high-resilience materials such as foam or nonwoven fabric. The main characteristics sought are a reduction in the electrical resistance caused by the compression of the material. There are also fibers with similar properties (cf: ...). To manufacture this type of sensor, it is possible to use anti-static foams used to pack electronic components. This type of sensor act like a potentiometer.



Electrical characteristics

The resistance of a resistive or piezo-resistive sensor varies in proportion to the pressure they receive. In the first case this variation is caused by the variation of the size of the contact between the different layers of the sensor, in the second, it is the crushing of the material which is at the origin of the variation of resistance. In both cases, the highest resistance value corresponds to the rest position (sensor released), and the lowest resistance value, to the sensor in working situation (sensor in limit of support). To interface these sensors it is necessary to build a voltage divider bridge by adding a fixed value resistor. The choice of this resistor determines the range of voltage variation at the output of the voltage divider bridge. (See: TODO, diagram and rule of the voltage divider bridge).

Surface pressure sensors

To deduce the position of objects in support and movement on resistive or piezo-resistive pressure sensor surfaces you will need to play on several parameters. The implementation of lines and columns mastering. The electric connections between the matrix and the electronic PCB. The image analyzing techniques for fingers tracking. The inter-digitization technique (overlap between the rows and columns), etc, etc.