

Advantages and Disadvantages of Ultrasonic Sensor

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Ultrasonic sensors are used in many applications. One of their most common applications is in robotics. That is because they are easy to interface and comprehend. **Ultrasonic sensors contain ultrasonic transducers.** A transducer can convert one energy form to another. The transducer is the reason why a sensor can emit a sonic pulse. An echo is then created once the emitted pulse reflects off an entity. The original sonic pulse and the echo determine how far the entity is from the sensor. The value of the distance is based on the amount of time that the pulse has travelled from the sensor and back.

Types of Ultrasonic Transducers Used in Ultrasonic Sensors

The two transducer types that are usually used in ultrasonic sensors are [piezoelectric transducer](#) and **electrostatic transducer**. These two have many differences.

Piezoelectric Transducers

A crystal or ceramic is used by a sensor as a transducer. These materials possess the piezoelectric effect, which is the ability to produce electric charge when stressed. Ultrasonic pulses are created and measured using the piezoelectric effect. To use crystals or ceramics as transducers, they are attached to a case or cone that is made of metal. The ceramic or crystal has to be stimulated by a signal to cause pulse emission. Once a signal stimulates the piezoelectric material, the material grows or shrinks. When this happens, ultrasonic pulses are emitted.

Electrostatic Transducers

There are two plates that compose an electrostatic transducer. One plate is immovable while the other is movable. More often than not, aluminum is the material used to make the immovable plate. The movable plate, on the other hand, is made of coated Kapton. Kapton is an insulating material. A layer of gold is used to coat Kapton. When a signal is transmitted to the movable and immovable plates, the plates become drawn towards each other. This causes sonic impulses. [caption id="attachment_1501" align="alignnone" width="230"] Electrostatic Transducers Schematic[/caption]

Disadvantages of Ultrasonic Sensors

Ultrasonic sensors have a few disadvantages. One of these disadvantages is they cannot tell small and big objects apart. The reason for this is the cone shape of the emitted pulse. No matter what the size of an object is, it will return an echo due to the shape of the pulse. To remedy this issue, either multiple or rotating sensors are used.

Beijing Ultrasonic

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