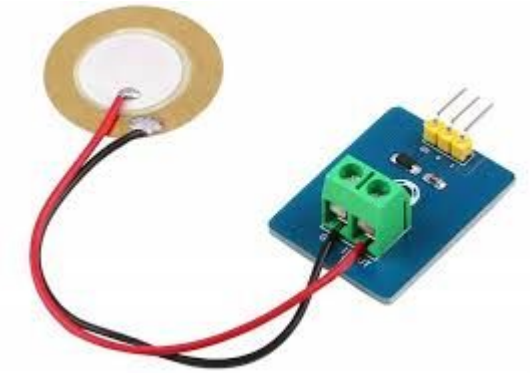
Piezoelectric Sensor

(Technical Note)

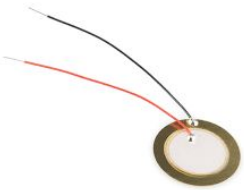
What is Piezoelectric Sensor?

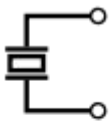


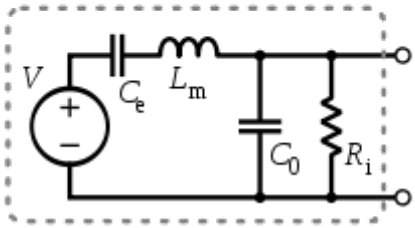
Piezoelectric sensors are used to detect the change in force, pressure, strain, and acceleration by converting it into electrical energy. Based on the basic principle of energy conservation i.e. it converts any type of energy provided on its surface into electrical form, it can primarily be termed as a transducer. Commonly used to find quantities like pressure and acceleration, its application can be extended in speakers, printers, and ultrasound imaging. It could be used to convert pressure and vibration to electrical signals, and electrical signals to mechanical movement.

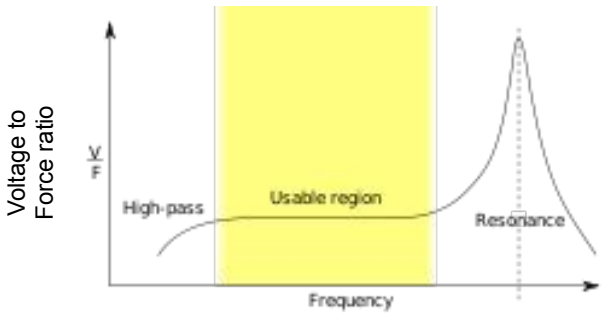
Scientific Fact and Applications

A piezoelectric sensor responds to changes in temperature, pressure, and other parameters. As pressure is applied to the thin membrane, it transfers the force to the sensor to electric voltage. It could be used to create an accelerometer where attached seismic mass transfers the force and generates the response.









Applications:

Engine Knock Sensors

Piezoelectric with their properties can detect detonation in tires early and can help in taking predictive measures avoiding engine knockdown.

Sonar Equipments

Depth sounders and other sonar equipments use a piezoelectric sensor that has high power density and helps in easy transmission.

Piezoelectric Speakers and Buzzer

Piezoelectric energy are converted into sound energy using piezoelectric sensors over a wide range of frequencies.

Z2M Part Number:
EMS-00022-A
EDT-00003-A

Piezoelectric Sensor

(Application Note)

Project

To light up the on-board LED when pressure is exerted on the piezoelectric sensor.

Components Required

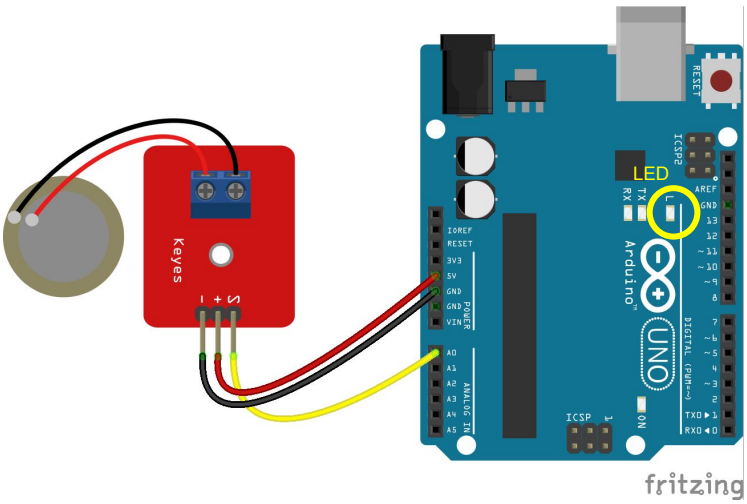
Component	Part No.	Qty
Arduino UNO	EMX-00001-A	1
Piezoelectric disc	EMS-00022-A	1

Procedure

Piezo Sensor

1. Connect **VCC (+)** of sensor to **5V** of Arduino
2. Connect **GND (-)** of sensor to **GND** pin of Arduino
3. Connect **Pin S** of sensor to **Pin A0** of Arduino

Schematic



Code

```
int piezo_out = A0;

int led_out = 13;

int threshold = 100;

void setup()

{

pinMode(led_out, OUTPUT);

Serial.begin(9600);

}

void loop()

{

int value = analogRead(piezo_out);

/* Function to read analog voltage from
sensor*/

Serial.println(value);

if (value >= threshold)
/* Checks for analog voltage is greater than
the threshold value*/

        {

        digitalWrite(led_out, HIGH);   /* Sets
        LED to ON state*/

        }

        else

        digitalWrite(led_out, LOW);

        delay(100);

}
```

Challenge Yourself

1. Create an electronic drum using a piezoelectric sensor and a speaker
2. Create a safe that opens only to a secret knock pattern