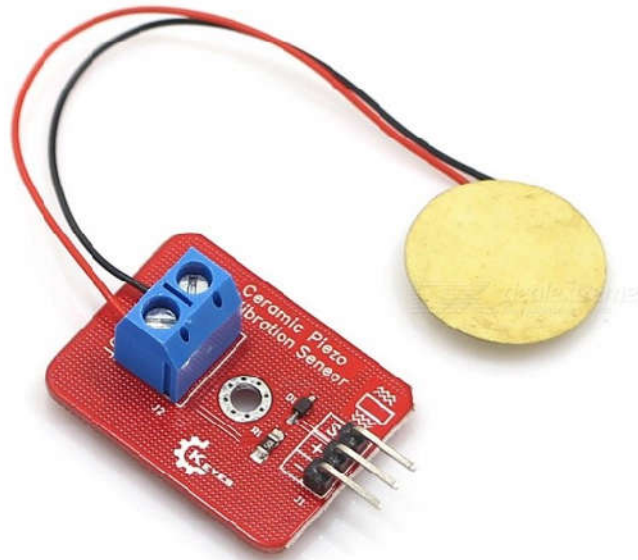


Piezoelectric Vibration Sensor Module



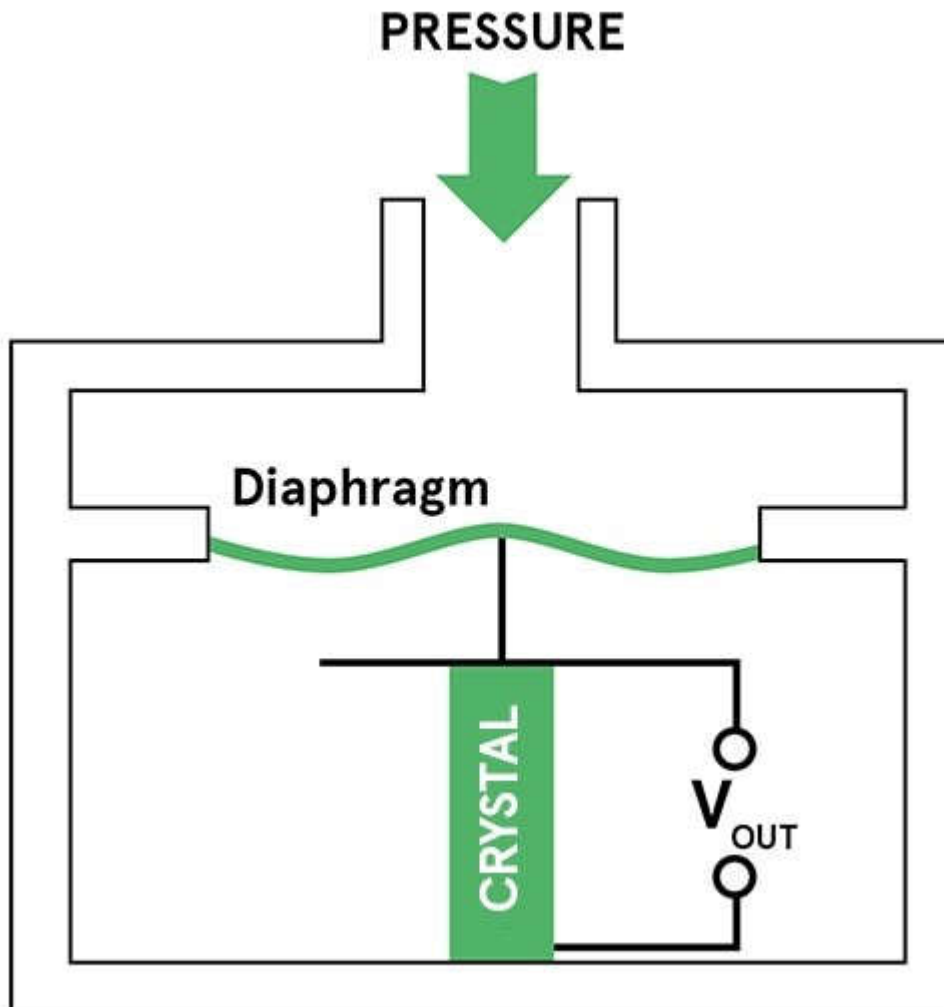
Piezoelectric Vibration Sensor

A **piezoelectric sensor** is a device that uses a piezoelectric effect to measure the changes in pressure, acceleration, temperature, strain, or force by converting them to an electrical charge.



Working principle

When a force is applied to a piezoelectric material, an electric charge is generated across the faces of the crystal. This can be measured as a signal or voltage proportional to the pressure.



Material Used

Two main sensing materials are used for piezoelectric sensors:

- Piezoelectric ceramics (such as PZT ceramic)
- Single-crystal materials (such as quartz).

The sensitivity of ceramic materials is superior to that of natural single-crystal materials, but their high sensitivity degrades over time.

Specifications

There are two types of piezoelectric sensor based on the connection design:

- Lead type
- Pin type

Their specifications are listed as:

Parameter	Description
Operating voltage	3 to 24 V
Rated voltage	12 V
Rated current	10mAmp
Resonant frequency	3,5 kHz
Pin spacing	15mm
Outer diameter	23 mm
Min sound pressure level	85 dB

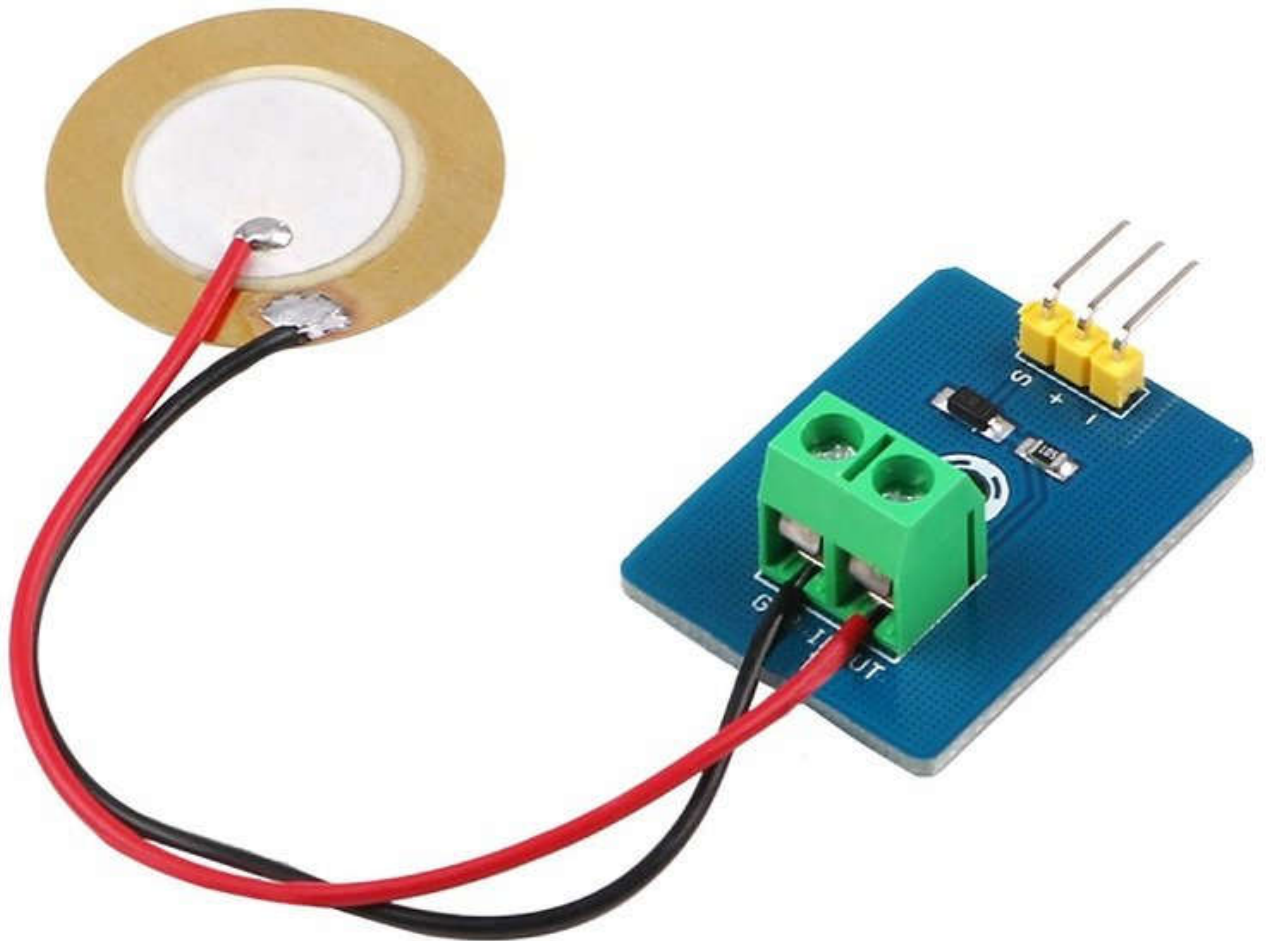
Advantages of Piezoelectric Sensor

- One of the main advantages of piezoelectric sensors is their ruggedness. This makes them suitable for use in a variety of harsh environments.
- Piezoelectric sensors can be used at high temperatures. They can work up to 1,000°C.
- They are low-power devices since the output signal is generated by the piezoelectric element itself.
- The sensing element of a piezoelectric sensor is insensitive to electromagnetic interference and radiation.
- Piezoelectric sensors can be easily made using inexpensive materials

Applications of Piezoelectric Sensor

- They can be used in a wide range of industrial and aerospace applications where they'll be exposed to high temperatures and pressures.
- They are frequently used for measuring dynamic pressure, for example in turbulence, blast, and engine combustion. These all require fast response, ruggedness and a wide range of operations.
- Their sensitivity and low power consumption make them useful for some medical applications.

This Analog Piezoelectric Ceramic Vibration Module buffers a piezoelectric transducer that responds to strain changes by generating a measurable output voltage change which is proportional with the strength of vibration also known as 'piezoelectric effect'. So you can know the extent of vibration. Different from digital vibration sensor that only accounts times, this analog one can tell extent of vibration.



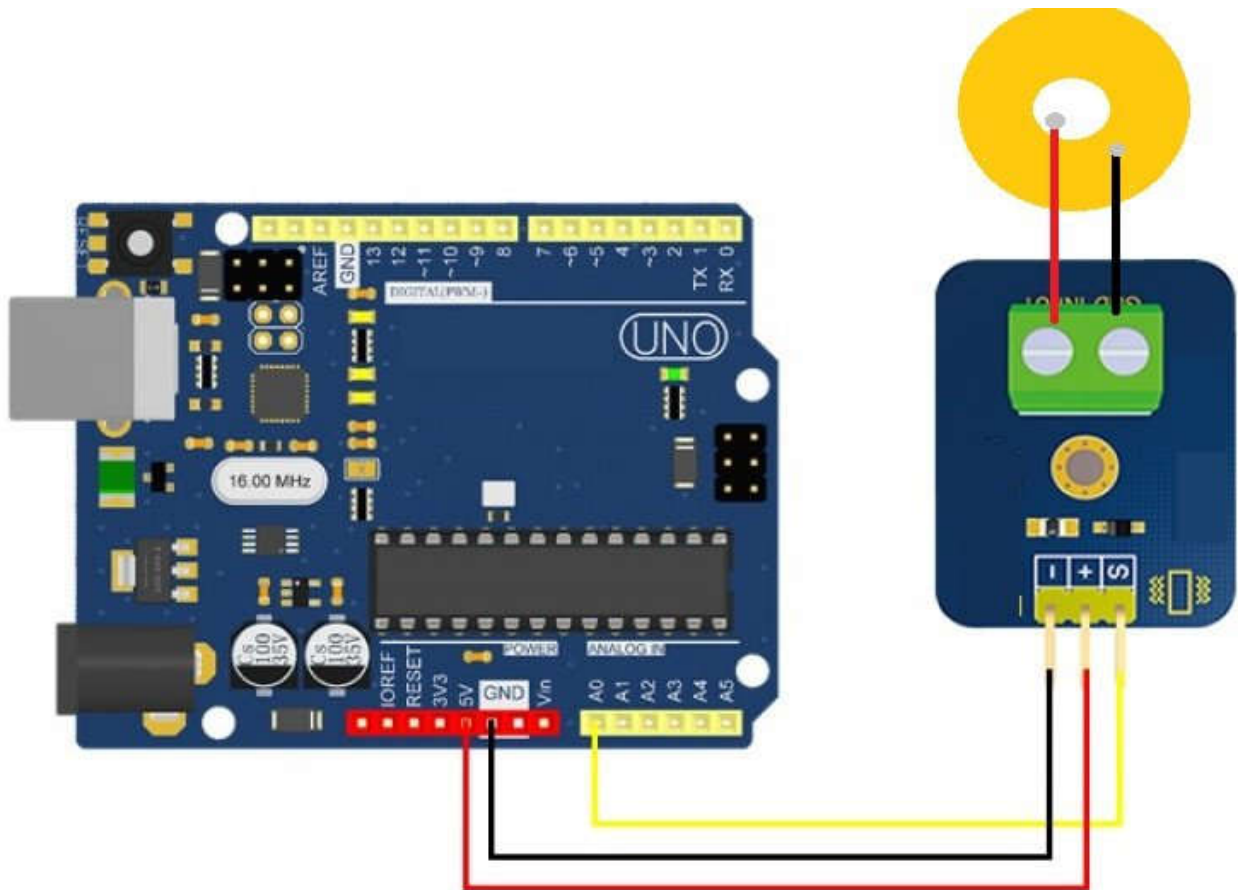
When the piezoelectric ceramic shocking will generate an electrical signal, controller analog port can be perceived slight vibration signals, also can be realized with vibration interactions related works, such as electronic drums. The output voltage is proportional to the strength of shock or vibration. So you can measure and characterize the vibration.

Features:

- Working Voltage: 3.3V or 5V
- Working Current: <1mA
- Operating Temperature Range: -10 °C ~ + 70 °C
- Interface Type: Analog Output
- Dimension (mm): 30 (L) x 23 (W) x 17 (H)
- Weight: 5g

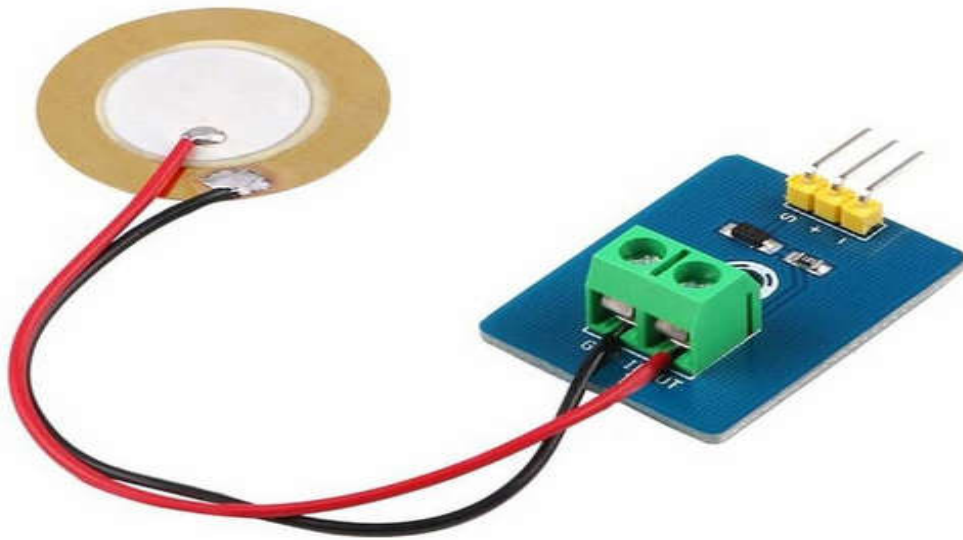
Pin definition:

- **S**: output signal from the sensor (connected to arduino analog input)
- **+**: Voltage supply (VCC = 3.3 - 5)
- **-**: Ground (GND)



How to Use:

To use a piezoelectric sensor is easy, just connect the positive and negative terminal to your module and press the top of sensor. By pressing, due to mechanical pressure it creates voltage at output which is further feed to the circuit. Connect the piezoelectric sensor, as shown in the video below.



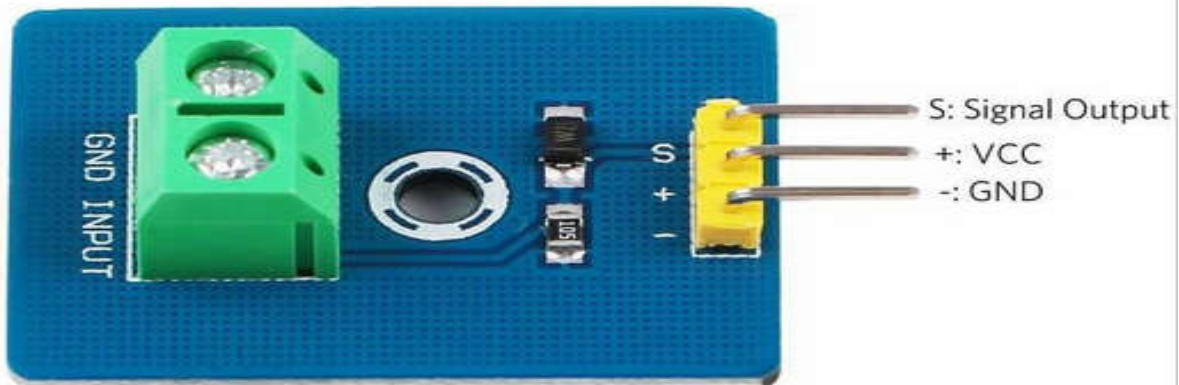
Red: Input

Black: GND

Input: Positive electrode of the piezoelectric ceramic

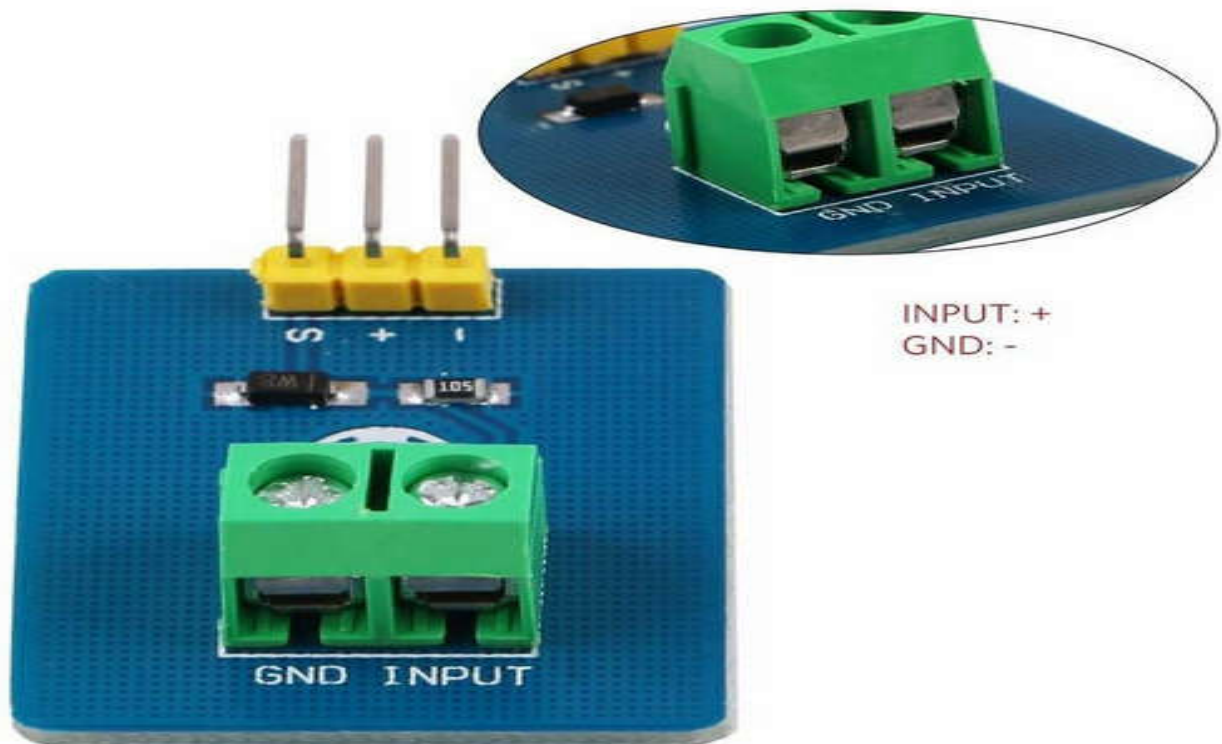
Gnd: Negative electrode of the piezoelectric ceramic

Interface Type: Analog Signal Output



1. S-port is connected with the controller's analog input pin.

2. 5V and GND are respectively connected the power supply of +5V and GND.



When the piezoelectric ceramic shocking will generate an electrical signal, Controller analog port can be perceived slight vibration signals. Also can be realized with vibration interactions related works, such as electronic drums.

