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NAAC Accredited Autonomous Institution

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ANTI CAR DOORLOCK SAFETY SYSTEM

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ARDUINO ULTRASONIC DISTANCE SENSOR

- The Ultrasonic sensor or HC-SRO4 is used to measure the distance of the object using SONAR.
- It emits the Ultrasound at a frequency of **40KHZ or 40000 Hz**. The frequency travels through the air and strikes the object on its path. The rays bounce back from the object and reach back to the module.
- The four terminals of HC-SRO4 are VCC, TRIG, ECHO, and GND. The voltage supply or VCC is +5V. We can connect the ECHO and TRIG terminal to any of the digital I/O pin on the specific Arduino board.
- The Ultrasonic sensors work best for medium ranges.

- The resolution is **0.3cm**.
- The medium ranges of the sensor are **10cm** to **3m**. It works best at this duration.
- The maximum range the sensor may detect is **4.5m**.

Example

- Let's consider an example.
- **An object is 40cm away from the Ultrasonic sensor. The speed of sound in air is 340m/s. We need to calculate the time (in Microseconds).**

Structure of Ultrasonic Sensor

- The structure of HC-SRO4 is shown below:

Ultrasonic sensor Timing Diagram

- We will set the TRIG pin to HIGH for some time (about 3 to 100 microseconds). As soon the TRIG pin is LOW, the Ultrasonic sensor sends the pulses and sets the ECHO pin to HIGH. When the sensor gets the reflected pulses, it sets the ECHO pin to LOW. We need to measure the time for which the ECHO pin was HIGH.

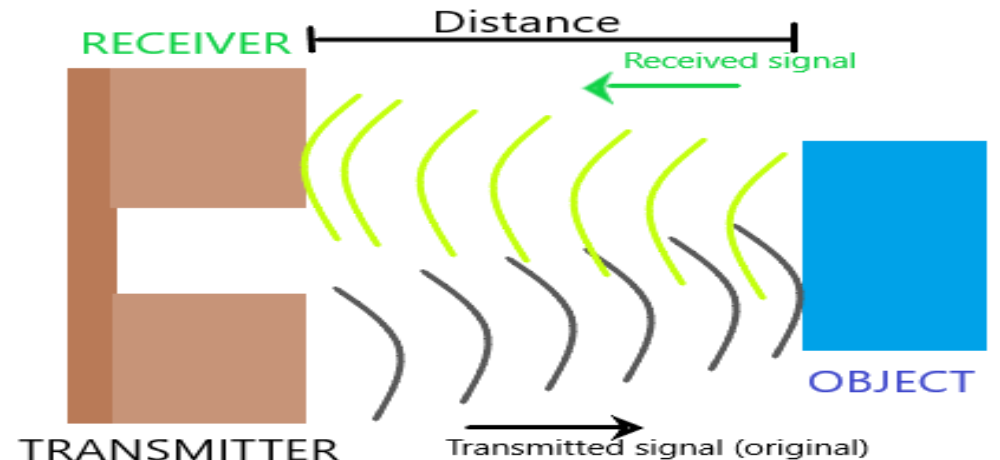


Hardware Required

- The components required to create the project are listed below:
- Arduino UNO R3 board (We can also use any Arduino board)
- Jump wires
- Ultrasonic sensor HC-SRO4
- Breadboard

Principle

- We need to first set the **TRIG** (triggered) pin at **HIGH**. It will send out the burst of 8 cycles called the sonic burst, which will travel at the sound speed. It will be further received by the ECHO pin. The time traveled by the sound wave is considered the ECHO pin's output time in microseconds.
- We will use the `PulseIn()` function to read the time from the output of the ECHO pin. It will wait for the specified pin to go HIGH and LOW. The function would return the timing at the end.
- The TRIG pin is set LOW for 4 microseconds and then HIGH for 15 microseconds.
- The timing will be calculated in microseconds



Procedure

- The steps to connect the Ultrasonic sensor to the board are listed below:
- Connect the VCC pin of HC-SRO4 to 5V of the Arduino board.
- Connect the GND pin of HC-SRO4 to GND of the Arduino board.
- Connect the TRIG pin of HC-SRO4 to pin 6 of the Arduino board.

ARDUINO DC MOTOR

- The DC motor is considered as the simplest motor, which has various applications ranging from households to industries. Example includes an **electric window in cars, electric vehicles, elevators, etc.**
- The principle of the DC motors is based on Electromagnetic Induction. It means that *the rotation of the motor depends on the force generated by the magnetic fields*. It converts electrical energy into mechanical energy. Such motors can be powered from the direct current.

• Working of DC Motor

- The armature present in the DC motor carries the alternating current. Electrical energy is converted into mechanical energy in the form of torque by the armature. It further transfers this mechanical energy via shaft.
- The commutator is defined as the electrical switch. It can also reverse the direction of the current. The DC motor consists of a **stator, rotor, armature, and a commutator**. The commutator comes with brushes. There are two stationary magnets in the stator that are responsible for producing the magnetic field.
- Contact between the external circuit and the motor. The brushes act as an intermediate between the external power supply and the rotating coils.

THANK YOU