
LAB - 12

Smart Dustin using Ultrasonic Sensor



Ultrasonic Sensor (HC SR04 Module) module Overview

HC-SR04 Module is an Ultrasonic Distance Sensor that can report the range of objects up to 13 feet away.

At its core, the HC-SR04 Ultrasonic distance sensor consists of two ultrasonic transducers. The one acts as a transmitter which converts electrical signals into 40 KHz ultrasonic sound pulses. The receiver listens for the transmitted pulses. If it receives them it produces an output pulse whose width can be used to determine the distance the pulse travelled.

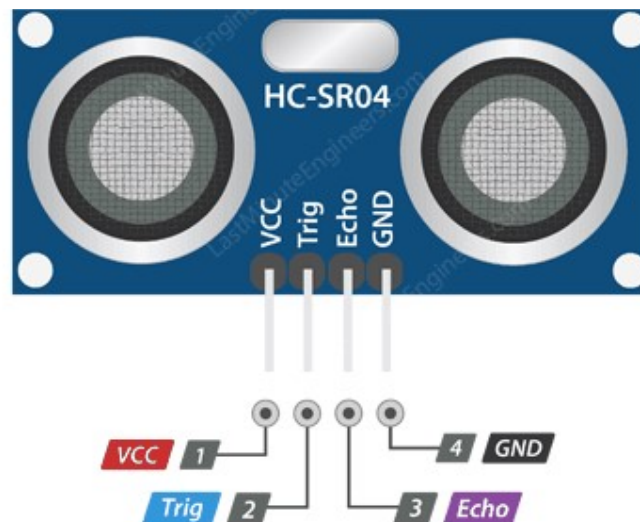
The sensor is small, easy to use in any robotics project and offers excellent non-contact range detection between 2 cm to 400 cm (that's about an inch to 13 feet) with an accuracy of 3mm. Since it operates on 5 volts, it can be hooked directly to an Arduino or any other 5V logic microcontrollers.

Here are complete specifications:

Operating Voltage	DC 5V
Operating Current	15mA
Operating Frequency	40KHz
Max Range	4m

Min Range	2cm
Ranging Accuracy	3mm
Measuring Angle	15 degree
Trigger Input Signal	10 μ S TTL pulse
Dimension	45 x 20 x 15mm

HC-SR04 Ultrasonic Sensor Pinout

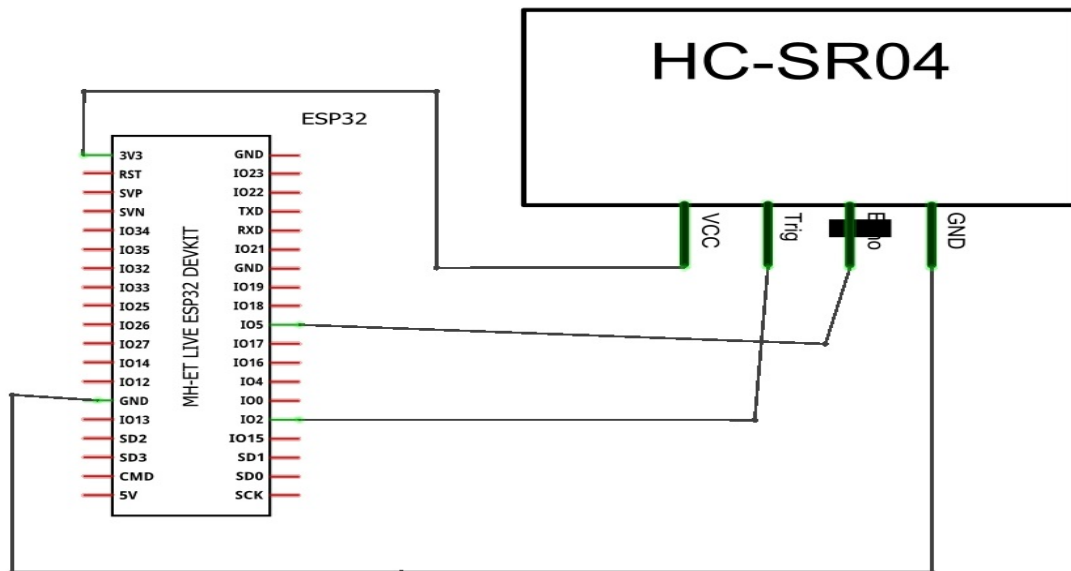


VCC is the power supply for HC-SR04 Ultrasonic distance sensor which we connect the 5V pin on the Arduino.

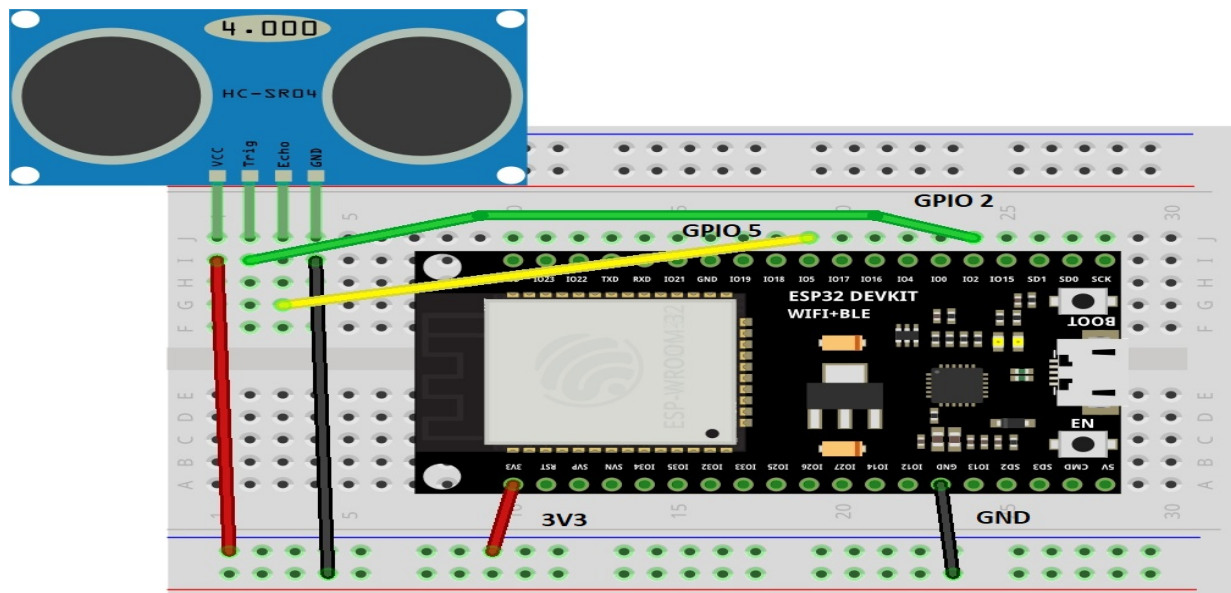
Trig (Trigger) pin is used to trigger the ultrasonic sound pulses.

Echo pin produces a pulse when the reflected signal is received. The length of the pulse is proportional to the time it took for the transmitted signal to be detected.

GND should be connected to the ground of Arduino.



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1. Connect the **VCC** pin of HC-SR04 to 3.3V on the arduino
2. Connect the **GND** pin of HC-SR04 to ground on the arduino
3. Connect the **Trig** pin of HC-SR04 to D2 on the arduino
4. Connect the **Echo** pin of HC-SR04 to D5 on the arduino

Code:

```
const int trigPin=12;
const int echoPin=8;

float duration;
float distance;
const int height = 100;
float threshold;

void setup() {
  // put your setup code here, to run once:
  pinMode(trigPin,OUTPUT);
  pinMode(echoPin, INPUT);
  Serial.begin(9600);
}

void loop() {
  // put your main code here, to run repeatedly:
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);

  digitalWrite(trigPin,HIGH);
  delayMicroseconds(10);

  duration=pulseIn(echoPin,HIGH);
  distance=duration*0.034/2;
  threshold=height*0.20;
  if(distance<=threshold){
    Serial.print("Full and distance is : ");
    Serial.println(distance);
  }
  delay(2000);
}
```

Output:

Full and Distance is 17.86

Full and Distance is 20.97

Full and Distance is 18.33

Full and Distance is 18.55

Result:

Thus the interfacing with Ultrasonic sensor is done successfully.