

Interfacing ultrasonic Sensor

An ultrasonic sensor is a device that measures distance to an object using sound waves. It works by sending out a sound wave at ultrasonic frequency and waits for it to bounce back from the object. Then, the time delay between transmission of sound & receiving of the sound is used to calculate the distance. It's done using the formula $\text{Distance} = (\text{Speed of sound} * \text{Time delay}) / 2$

HC SR04

The HC SR04 is a typical ultrasonic sensor which is used in many projects such as obstacle detector and electronic distance measurement tapes. In this instructable I'll teach you how to interface the HC SR04 with an Arduino Uno.

Physical Connection

In breadboard connect ultrasonic sensor

Back side pins of sensor

- 1) VCC to 5V in Arduino board
- 2) Trig to pin 13 of digital pin of Arduino
- 3) Echo to pin 12 of digital pin of Arduino
- 4) Gnd to Gnd of Arduino board.
connect USB from laptop to arduino

HC SR04

The HC SR04 is an ultrasonic ranging module. This economical sensor provides 2cm to 400cm of non contact measurement functionality, with a ranging accuracy that can reach up to 3mm. Each HC SR04 module includes an ultrasonic transmitter, a receiver & a control unit.

There are four pins on the HC SR04. :-

- Vcc (5V supply)
- Gnd (Ground)
- Trig (Trigger)
- Echo / Receive

Key features :-

- Operating voltage : 5V DC
- Operating Current : 15mA
- Measure angle : 15°
- Ranging Distance : 2cm - 4m

Serial Monitor

Its a part of the Arduino IDE. Its also available in the Web IDE. It allows you to send and receive data from the board connected via USB. This is using the concept of serial communication.

Q. Write a program for interfacing HC SR04 ultrasonic sensor works with Arduino

const int trigPin = 13;

const int echoPin = 12;

void setup () {

Serial.begin (9600); }

void loop ()

{

long duration, inches, cm;

pinMode (trigPin, OUTPUT);

digitalWrite (trigPin, LOW);

delayMicroseconds (2);

digitalWrite (trigPin, HIGH);

delayMicroseconds (10);

digitalWrite (trigPin, LOW);

pinMode (echoPin, INPUT);

duration = pulseIn (echoPin, HIGH);

inches = microsecondsToInches (duration);

cm = microsecondsToCentimeters (duration);

Serial.print (inches);

Serial.print ("in, ");

Serial.print (cm);

Serial.print ("cm.");

Serial.println();

delay (1000);

3

long microseconds To inches (long microseconds)

9

return microseconds * 74 / 2 ;

3

long microseconds To centimeters (long microseconds)

9

return microseconds / 29 / 2 ;

3

- verify your code in Arduino IDE that is sketch
- after uploading the code Arduino IDE
- after connecting all done
- Press Ctrl + Shift + M
- output window is displayed.

Output :-

- 77 in, 198 cm
- 77 in, 196 cm
- 907 in, 2316 cm
- 77 in, 197 cm
- 76 in, 196 cm
- 77 in, 198 cm
- 77 in, 198 cm
- 77 in, 199 cm
- 78 in, 201 cm
- 8 in, 22 cm
- 7 in, 19 cm
- 8 in, 21 cm
- 5 in, 13 cm