Marwadi University	**Marwadi University** **Faculty of Technology** **Department of Information and Communication Technology**	
Subject: Foundation Skills in Sensor Interfacing (01CT11032)	**Aim:** To interface ultrasonic sensor using Arduino UNO	
Experiment No: 01	**Date: 17-12-21**	**Enrolment No: 92100133020**

Aim: To interface ultrasonic sensor using Arduino UNO

Apparatus: Arduino UNO, Usb Cable, Breadboard, Ultrasonic Sensor, Resistor, Jumper wire, LED.

Theory:

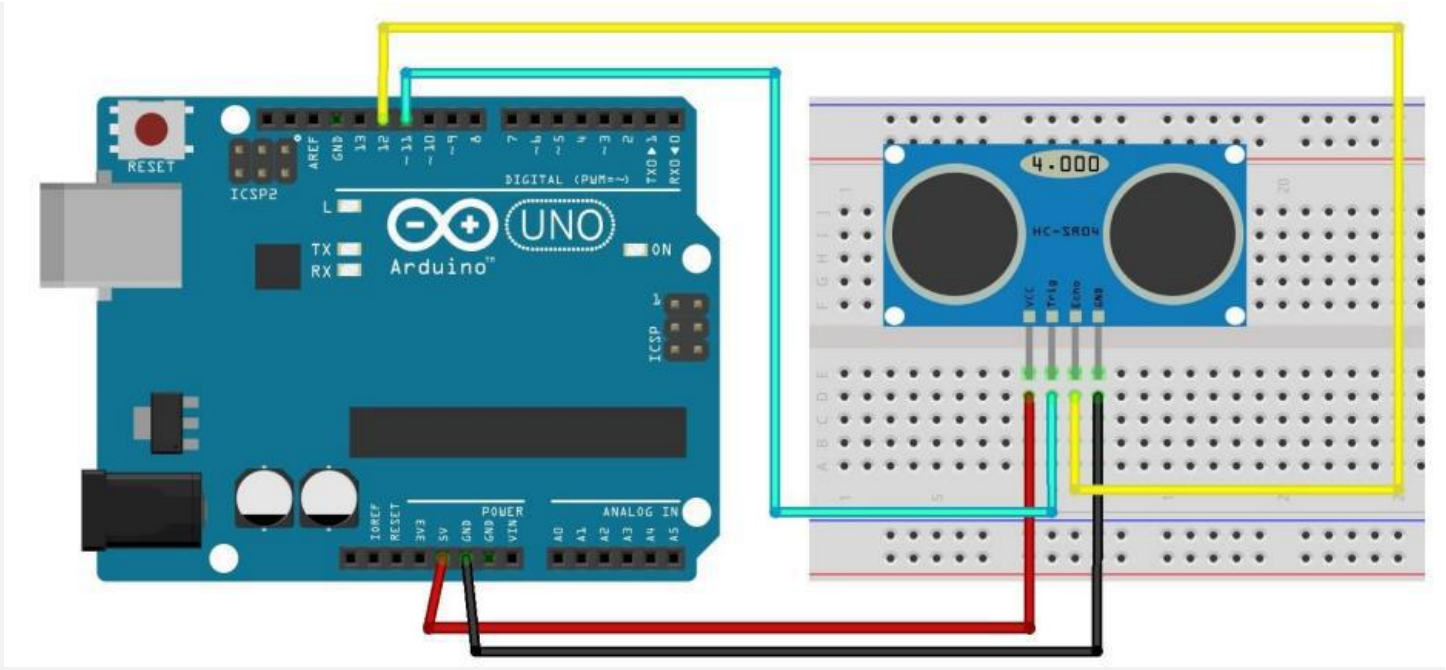
Ultrasonic sensor

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound. It uses transducer to send and receive ultrasonic pulses that relay back information about an object's proximity. High frequency sound waves reflect from boundaries to produce distinct echo patterns.

Working principle of Ultrasonic sensor :

The sensor works by sending a sound wave frequency. The transducer of the sensor acts as a microphone to receive and send ultrasonic sound. The sensor determines the distance to a target by measuring time interval between the sending and receiving of the ultrasonic pulse. The sensor offers excellent non-contact range detection between 2cm 400cm (about an inch to 13 feet). It operates on 5Volts

Interfacing Diagram:



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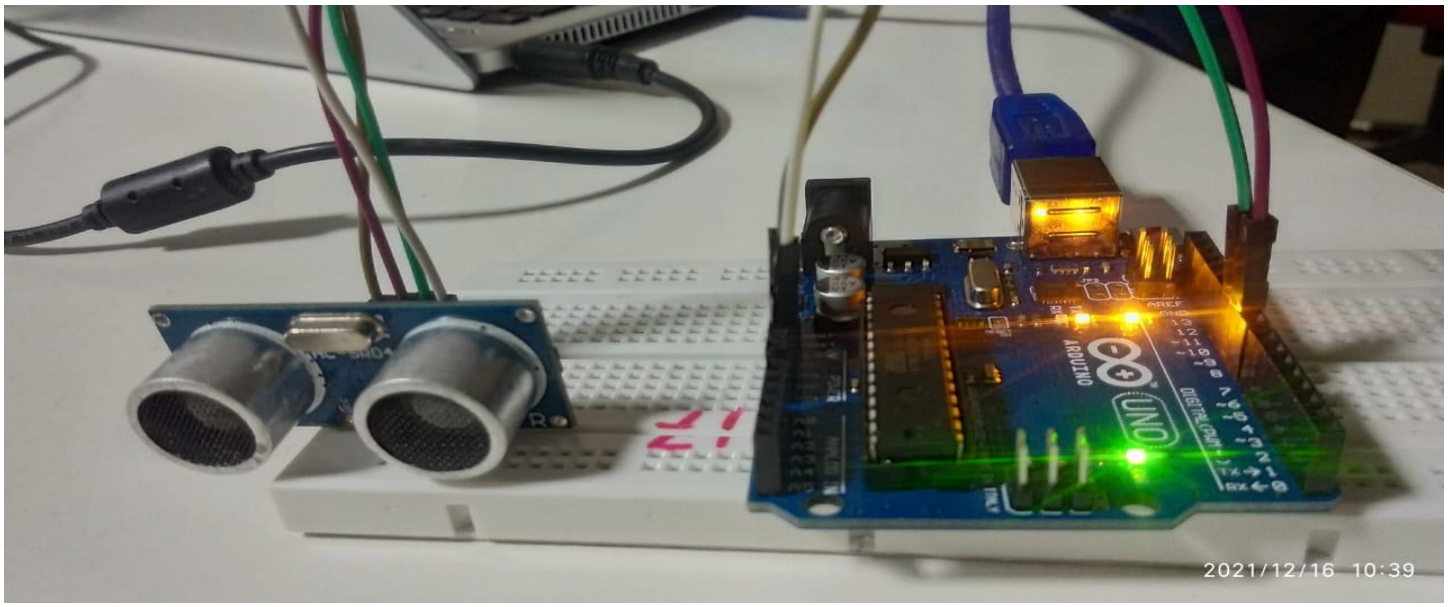
Code:

```
const int trigPin = 9;
const int echoPin = 10;
float duration, distance;
void setup() {
pinMode(trigPin, OUTPUT);
pinMode(echoPin, INPUT);
Serial.begin(9600);
}
void loop() {
digitalWrite(trigPin, LOW);
delayMicroseconds(2);
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin, LOW);
duration = pulseIn(echoPin, HIGH);
distance = (duration*0.343)/2; // in cm
Serial.println("Distance: ");
Serial.println(distance);
delay(100);
}
```

Output:



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Observations:

Ultrasonic sensor has 4 pins (VCC- For power, Trig – Trigger ultrasonic sound pulses, Echo – Produces pulse when reflected signal is received, GND- Ground). The sensor is limited to some extent like the area it covers. The sensor is very easy to use, cost effective and perfect for small projects. The sensor works on the principle of echo. This same principle is used in SONAR. This type of practices are being conducted to find the depth of the sea.

Conclusion:

From this we learned about Ultrasonic sensor and got to know about its use in real life. I also learnt about the pins of the sensor and the working of each and every pin

Post Session Exercise:

Task 1: Make reverse parking alarm system using the ultrasonic sensor and a buzzer.

Code :

```
//Reverse parking using a buzzer and ultrasonic sensor

const int trigpin = 9;

const int echopin = 10;

float duration,distance;

void setup()

{

pinMode(echopin, INPUT);

pinMode(trigpin, OUTPUT);

pinMode(5,OUTPUT);

 Serial.begin(9600);

}
```

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```
void loop()

{


digitalWrite(trigpin, LOW);

delayMicroseconds(2);

digitalWrite(trigpin, HIGH);

delayMicroseconds(10);

digitalWrite(trigpin, LOW);

delayMicroseconds(10);

duration = pulseIn(echopin, HIGH);

distance = (duration*.0343)/2;

Serial.print("DISTANCE:");

Serial.println(distance);

delay(100);


digitalWrite(5,LOW);


if(distance<10)

{

 digitalWrite(5,HIGH);

 delay(20);

 digitalWrite(5,LOW);;
```

```
  delay(20);
}
else if(distance>10 && distance<20)
{
  digitalWrite(5,HIGH);
  delay(100);
  digitalWrite(5,LOW);;
  delay(100);
}
else if(distance>20 && distance<30)
{
  digitalWrite(5,HIGH);
  delay(400);
  digitalWrite(5,LOW);;
  delay(400);
}
else{
  digitalWrite(5,LOW);
  delay(100);
}


}
```

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Output: