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EXPERIMENT 2.1

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Branch: CSE   **Section/Group:** 626-B
Semester: 5th   **Date of Performance:** 05/09/23
Subject Name: Internet of Things Lab   **Subject Code:** 21CSP-344

Aim : Formulate distance of an object using an ultrasonic sensor.

Objectives : Learn about Working Principle of Ultrasonic Sensor.

Hardware and Software : Arduino Uno R3 board, Ultrasonic sensor (HC-SR04), 16×2 LCD I2C Display, Jumper Wires.

Description:

Ultrasonic sensors measure distance by sending and receiving the ultrasonic wave. The ultrasonic sensor has a sender to emit the ultrasonic waves and a receiver to receive the ultrasonic waves. The transmitted ultrasonic wave travels through the air and is reflected by hitting the Object. Arduino calculates the time taken by the ultrasonic pulse wave to reach the receiver from the sender.

Connections:

- Connect the Echo pin of the sensor to the D2 pin of the Arduino.
- Connect the Trig pin of the sensor to the D3 pin of the Arduino.
- Navigate to Tools and select board and port.
- Verify and compile the code, then upload the code to the Arduino Uno R3 board.
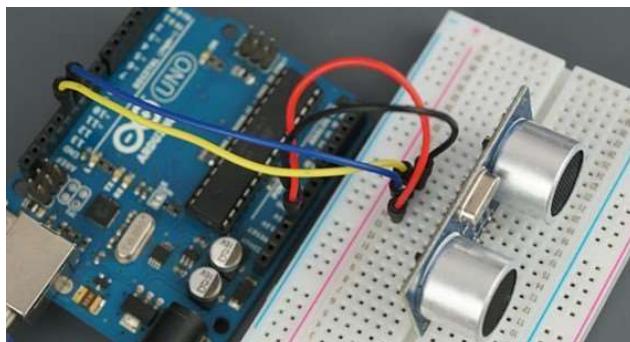- Monitor the output in the Serial monitor.

The code for this traffic light controller is simple and easy to understand. We have exhibited traffic lights for a three-way road. The LEDs will be glowing in a particular sequence to form an actual traffic light controller system. At a time, two red LEDs will glow, and one Green LED will be ON. Also, two yellow LEDs will be ON for one second. Yellow LED will Glow on each transition between RED to GREEN. In short first REDLED will glow for 5 Seconds, then YELLOW for 1 second, and then Green LED will ON for 5 seconds.

In the void setup of the code, we have defined the pins for the LEDs as outputs from 2 to 10. In the void loop section, we have defined the functions to turn LEDs ON and OFF into the sequence.

Code:

```
const int trigPin = 2; //D4
const int echoPin = 0;  //D3
// defines variables
long duration;
int distance;
void setup() {
pinMode(trigPin, OUTPUT); // Sets the trigPin as an Output
pinMode(echoPin, INPUT); // Sets the echoPin as an Input
Serial.begin(9600); // Starts the serial communication
}
```

```
void loop() {
    digitalWrite(trigPin, LOW);
    delayMicroseconds(2);
    digitalWrite(trigPin, HIGH);
    delayMicroseconds(10);
    digitalWrite(trigPin, LOW);
    duration = pulseIn(echoPin, HIGH);
    distance= duration*0.034/2;
    Serial.print("Distance: ");
    Serial.println(distance);
    delay(2000);
}
```

Output: