Experiment: 4

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Branch: B.E(CSE)   **Section/Group: IOT_627-B**
Semester: Fifth   **Date of Performance:09/08/24**
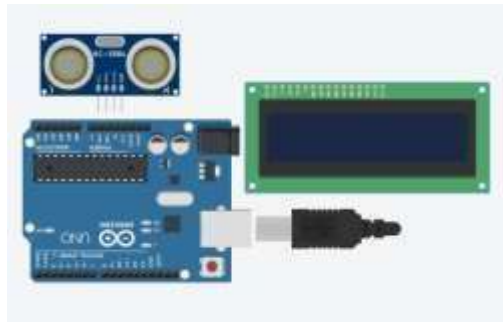**Subject Name: IOT LAB**   **Subject Code: 22CSP-329**

1. Aim: To Formulate distance using ultrasonic sensor.

2. Objective:
   The objective of this experiment is to measure the distance to an object using an ultrasonic sensor by emitting sound waves and calculating the time taken for the echo to return.

   Software Required:
   1. TinkerCAD
   2. Arduino Uno
   3. Ultrasonic sensor
   4. LCD

3. Procedure :

Ultrasonic Sensor (HC-SR04): An ultrasonic Sensor is a device used to measure the distance between the sensor and an object without physical contact. 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. Distance of the obstacle from the sensor is simply calculated by the formula:

Distance=(Time*Speed)/2

There are only four pins on the HC-SR04:
   • VCC: It is the power supply for Ultrasonic sensor which is connected to 5Vof the Arduino.
   • Trig (Trigger): This pin is used to trigger the ultrasonic sound pulses.
   • Echo: It produces a pulse when the reflected signal is received.
   • GND: Ground should be connected to the ground of Arduino.

Set up the Pins:
Define the TRIG pin as an output and the ECHO pin as an input.

Send the Trigger Pulse:
Send a 10 μs HIGH pulse to the TRIG pin to initiate the measurement.

Measure the Echo Time:
Wait for the ECHO pin to go HIGH, then measure the time it stays HIGH. This time represents the round-trip travel time of the ultrasonic pulse.

Calculate Distance:
The speed of sound is approximately 343 meters per second in air (this can vary with temperature and humidity).

Use the formula:
Distance=(Time*Speed)/2

4. Code:

```
#include <LiquidCrystal.h>

LiquidCrystal lcd(1, 2, 4, 5, 6, 7);

const int trigPin = 9;

const int echoPin = 10;

long duration;

int distanceCm, distanceInch;

void setup() {

lcd.begin(16,2);

pinMode(trigPin, OUTPUT);

pinMode(echoPin, INPUT);

}

void loop() {

digitalWrite(trigPin, LOW);

delayMicroseconds(2);

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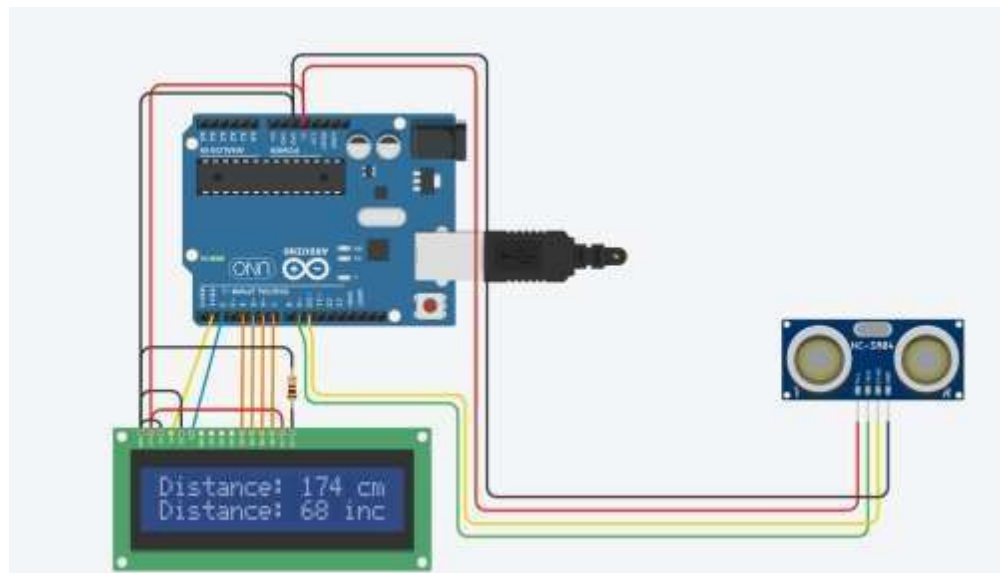
```
delayMicroseconds(10);

digitalWrite(trigPin, LOW);

duration = pulseIn(echoPin, HIGH);

distanceCm= duration*0.034/2;

distanceInch = duration*0.0133/2;

lcd.setCursor(0,0); be displayed

lcd.print("Distance: ");

lcd.print(distanceCm);

lcd.print(" cm");

delay(10);

lcd.setCursor(0,1);

lcd.print("Distance: ");

lcd.print(distanceInch);

lcd.print(" inch");

delay(10);

}
```

5. Output:

6. Learning Outcomes:

- We learnt how to calculate distance between object and sensor using ultrasonic sensor.
- The time taken to reach the object is half of the time taken to reach the receiver.
  Distance=(speed*time)/2
- Learned about IoT programming.