

PRACTICAL 6 : Calculate Distance

Aim : To measure distance using an ultrasonic sensor and display the result.

Overview :

This project involves using an ultrasonic sensor to measure the distance of an object from the sensor. The measured distance is displayed on a serial monitor or LCD. This practical introduces the concept of using sound waves for distance measurement and helps in understanding sensor-based automation.

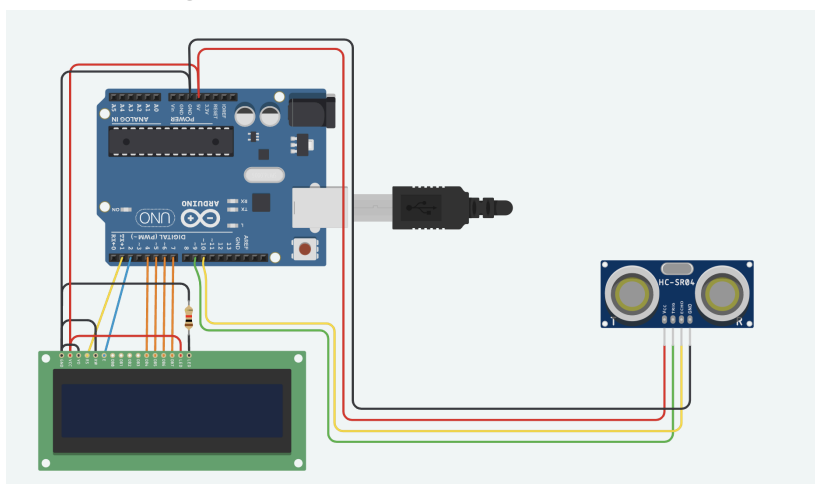
Materials Required :

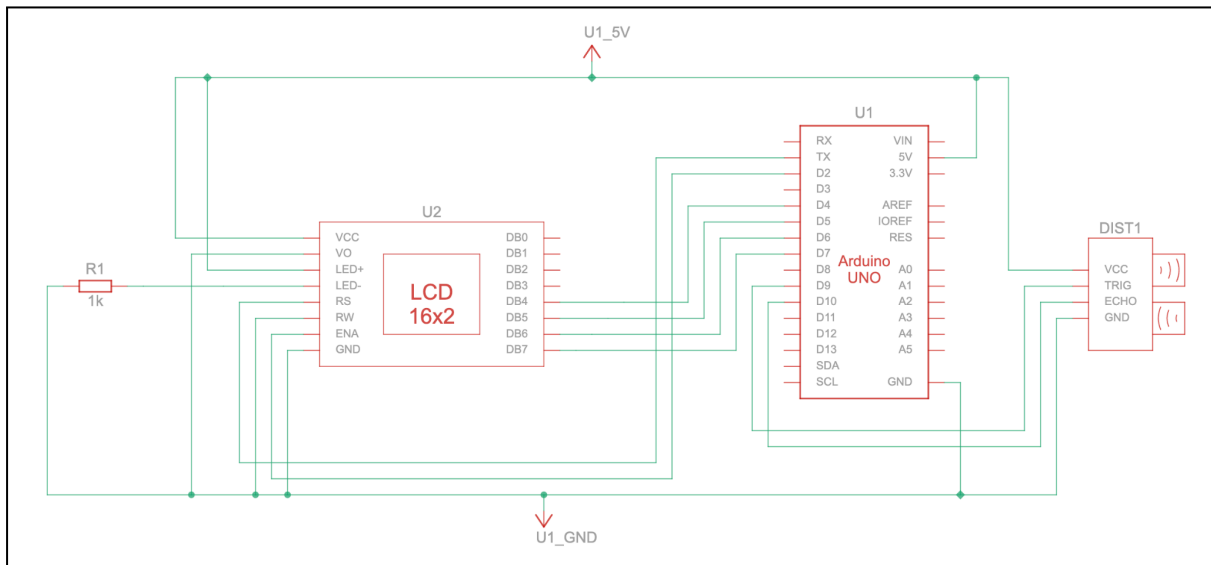
- Arduino Uno R3
- 1 x 1 k Ω Resistor
- LCD 16x2
- Ultrasonic Distance Sensor (4-pin)
- Jumper Wires
- Arduino IDE (Installed on your Computer)

Circuit Connection and Steps :

- 1. Connect the Ultrasonic Sensor (HC-SR04) :**
 - VCC → 5V, GND → GND
 - Trig → D9, Echo → D10 (Arduino).
- 2. Connect the 16x2 LCD Display:**
 - RS → D7, E → D8, D4-D7 → D4-D7 (Arduino).
 - VSS, RW, K → GND, VDD, A → 5V.
 - V0 → Potentiometer (Middle Pin) for contrast control.
- 3. Set up the Arduino environment :**
 - Open **Arduino IDE**, select the correct **board** and **port** under "Tools".

Circuit Diagram :

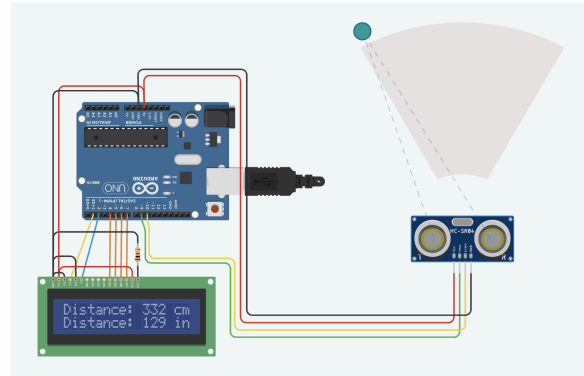
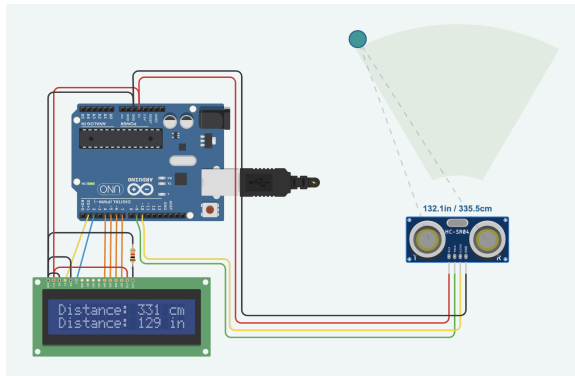


Schematic Diagram :**Code :**

```
#include <LiquidCrystal.h> // includes the LiquidCrystal Library
LiquidCrystal lcd(1, 2, 4, 5, 6, 7); // Creates an LCD object. Parameters:
(rs, enable, d4, d5, d6, d7)
const int trigPin = 9;
const int echoPin = 10;
long duration;
int distanceCm, distanceInch;
void setup() {
    lcd.begin(16,2); // Initializes the interface to the LCD screen and
    specifies the dimensions (width and height) of the display
    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); // Sets the location at which subsequent text
    written to the LCD will be displayed
    lcd.print("Distance: "); // Prints string "Distance" on the LCD
    lcd.print(distanceCm); // Prints the distance value from the sensor
    lcd.print(" cm");
    delay(10);
}
```

```
    lcd.setCursor(0,1);  
    lcd.print("Distance: ");  
    lcd.print(distanceInch);  
    lcd.print(" inch");  
    delay(10);  
}
```

Results :



Conclusion :

The Distance Calculation project successfully measures and displays distance using an ultrasonic sensor. It introduces the concept of sound wave-based sensing and real-time measurement. This project forms the basis for applications like smart parking systems, automated doors and obstacle detection.