Abel Briones Galarza - Advanced Interface Design

Ultrasonic Rangefinder on Arduino

Description

This rangefinder can detect distances from 2cm to 400cm with an accuracy of ±3mm.

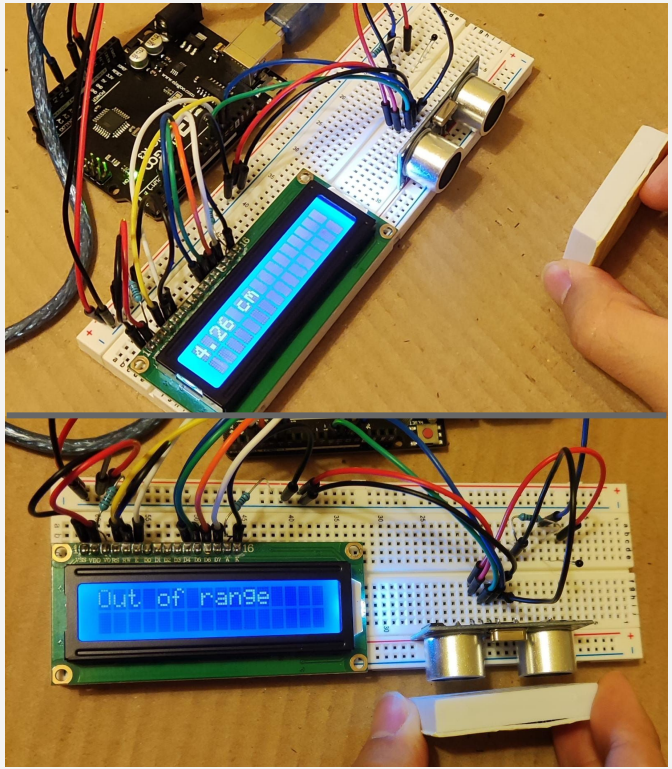
The detected distance is displayed on the LCD in real time. When the object is outside the detection range, the message '*Out of Range*' is displayed.

The thermistor allows for more accurate measurements by taking into account the temperature in the room and how it influences the speed of sound.

Material

- UNO R3 Controller Board
- Ultrasonic Sensor HC-SR04
- LCD1602 Module
- Thermistor
- Breadboard and jumper wires

Result



Code

```
#include <LiquidCrystal.h>
#include <math.h>
#define trigPin 10
#define echoPin 13

// setup the Thermistor
double Thermistor(int RawADC) {
  double Temp;
  Temp = log(10000.0*((1024.0/RawADC-1)));
  Temp = 1 / (0.001129148 + (0.000234125 + (0.0000000876741 * Temp * Temp ))
         * Temp );
  Temp = Temp - 273.15;
  return Temp;
}
// initialize the library by associating any needed LCD interface pin
// with the arduino pin number it is connected to
const int rs = 12, en = 11, d4 = 5, d5 = 4, d6 = 3, d7 = 2;
LiquidCrystal lcd(rs, en, d4, d5, d6, d7);

void setup() {
  Serial.begin(9600); // opens serial port, sets data rate to 9600 bps
  lcd.begin(16, 2); // set up the LCD's number of columns and rows:
  pinMode(trigPin, OUTPUT); pinMode(echoPin, INPUT); // set up the US Sensor
}

void loop() {
  int val0;
  double temp;
  val0=analogRead(0);   //connect ultrasonic sensor to Analog 1
  temp=Thermistor(val0);

  float duration, distance;
  float spdSnd;
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);

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

  duration = pulseIn(echoPin, HIGH);
  spdSnd = 331.4 + (0.606 * temp) + 0.62;
  distance = (duration / 2) * (spdSnd / 10000);

  lcd.setCursor(0,0);
  if (distance >= 400 || distance <= 2){
    lcd.print("Out of range");
    delay(500);
  }
  else {
    Serial.println(distance);
    lcd.print(distance);
    lcd.print(" cm");
    delay(500);
  }
  delay(500);
  lcd.clear();
}
```