Indian Institute of Technology Jodhpur

EEL2060 – Embedded system and Iot
LAB Report

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Name - Akarshan
Roll No - B20MT004

Task - 1

- **Problem Statement** - Using Arduino to

  1) Using Arduino, Design a security system that alerts the personnel during their movement in variable temperature zone.

  2) If the temperature of the system is more than 100 degrees Celsius then switch on a RED LED.

  3) In such conditions any motion of a person is observed within its 1m distance then operate an alarm and display: You are entering in a hot zone. An only authorized person is allowed with Proper PPE.

- **Components used -** Arduino UNO R3 , Resistors , Piezo Buzzer ,LED, Temperature Sensor, Ultrasonic Distance sensor, Breadboard , Wire
- **Specification of component used -**

  Ultrasonic distance sensor used to detect an object in its vicinity.

  Piezo buzzer used to play the alarm when distance reaches a certain threshold.

  Temperature sensor used to detect temperature of surrounding.

  Led used to indicate the reaching of the critical temperature.

  Breadboard used to make connection.

- **Working -** negative terminal of piezo buzzer connected via resistor to ground , Vout pin of temperature sensor connected to analog pin A0 , positive terminal of piezo buzzer connected to PWM pin 8.,anode of red led connected to pin 4 and cathode connected to ground by resistor ,Vcc of ultrasonic distance sensor connected to 5V,echo pin connected to pin 6,trig pin connected to pin 7,ground pin connected to ground.

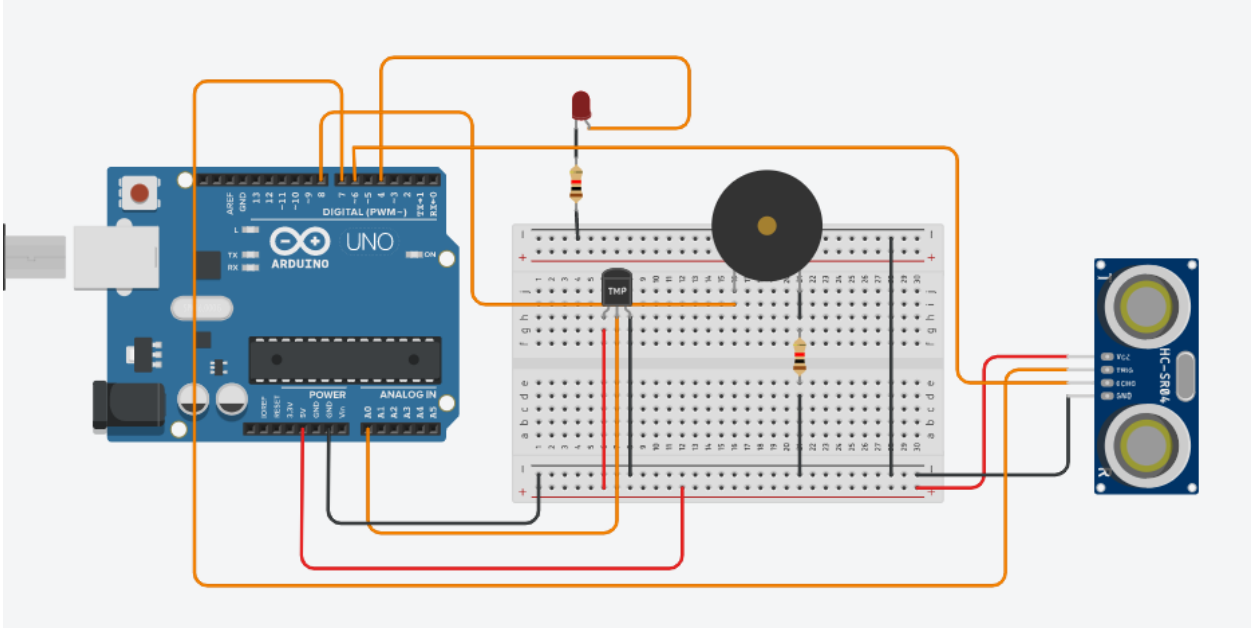
- We move the object and if the temperature near it is greater than 100 degree C then we turn on the red Led and if the distance is less than 1m set the buzzer on and use tone(buzzer pin,sound) with sound 350 and print "You are entering in a hot zone. An only authorized person is allowed with Proper PPE.".
- **Code -**

```
int baselineTemp = 0;
int celsius = 0;
const int buzzer = 8;
int echopin = 6;
int trigpin = 7;

int mesafe;
int sure;
void setup()
{
 Serial.begin(9600);
 pinMode(A0, INPUT);
 pinMode(4, OUTPUT);
 pinMode(buzzer, OUTPUT);
 pinMode(trigpin, OUTPUT);
 pinMode(echopin, INPUT);
}

void loop()
{
 baselineTemp = 100;
 celsius = map(((analogRead(A0) - 20) * 3.04), 0, 1023, -40, 125);
 Serial.print(celsius);
 Serial.println(" C, ");
```

```
  digitalWrite(trigpin,LOW);
  delayMicroseconds(2);
  digitalWrite(trigpin,HIGH);
  delayMicroseconds(10);
  digitalWrite(trigpin,LOW);
  sure = pulseIn(echopin,HIGH);
  mesafe = (sure/2)/29.0;
  if (celsius >= baselineTemp) {
    digitalWrite(4, HIGH);
    if(mesafe<=100)
      {
      int sound = 350;
      digitalWrite(buzzer,HIGH);
      tone(buzzer ,sound);
      delay(200);
      noTone(buzzer);
      Serial.print(mesafe);
        Serial.println("cm");
       Serial.println("You are entering in a hot zone. An only authorized person is allowed with
Proper PPE.");
      tone(buzzer ,sound);
      }
    else{
      digitalWrite(buzzer,LOW);
      noTone(buzzer);
    }
  }
  else{
    digitalWrite(4, LOW);
```

```
    digitalWrite(buzzer,LOW);
    noTone(buzzer);
  }
}
```

Circuit -



- **Conclusion -** Initially when the tempeature is less than threshold(100degree in our case) then led does not glow and buzzer does not sound . When we bring the object near and temperature becomes greater than 100 then red led glows. and if the distance is less than 1m set the buzzer on and use tone(buzzer pin,sound) with sound 350 and print "You are entering in a hot zone. An only authorized person is allowed with Proper PPE.".

Task - 2

- **Problem Statement** - Using Arduino to

  Design a system in which a water tank motor is operated with button 1 of the remote and switched off automatically when the water level reaches 95% of the tank capacity. (Lets say the tank is 2m height)

- **Components used -** Arduino UNO R3 , Resistors , DC MOTOR,Ir Sensor, Ultrasonic Distance sensor, Breadboard , Wire, Ir Remote.
- **Specification of component used -**

  Ultrasonic distance sensor used to detect an object in its vicinity.

  Ir remote used to send Ir pulses.

  Ir sensor used to detect infrared.

  Breadboard used to make connection.
- **Working -** If we press 1 on the remote then the motor is started . If the water level reaches a level greater than 95% of the max limit then we turn off the motor.If the water level becomes lower than 20% of the max limit then motor is automatically turned on.(Even if we don't press 1 on the Ir remote).

  .
- **Code -**

```
#include <IRremote.h>

int motor_pin = 6;

int RECV_PIN = 12;

int pingPin = 8;

IRrecv irrecv(RECV_PIN);

decode_results results;


void setup()

{

  pinMode(motor_pin,OUTPUT);


  Serial.begin(9600);

  irrecv.enableIRIn();

}


void loop()
```

```
{
   long duration,cm;
   pinMode(pingPin,OUTPUT);
   digitalWrite(pingPin,LOW);
   delayMicroseconds(2);
   digitalWrite(pingPin,HIGH);
   delayMicroseconds(5);
   digitalWrite(pingPin,LOW);

   pinMode(pingPin,INPUT);
   duration = pulseIn(pingPin,HIGH);

   cm = microsecondsToCentimeters(duration);

   if(irrecv.decode(&results)){
      int value = results.value;
      if(value==2295){
         digitalWrite(motor_pin,HIGH);
      }
      irrecv.resume();
   }
   if(cm>=190){
      digitalWrite(motor_pin,LOW);
   }
   if(cm<=40){
      digitalWrite(motor_pin,HIGH);
   }
}
```

- **Conclusion -** Initially when the water level is less than 95% of max limit(190 cm in our case) and greater than 20% of the maximum limit then if we press 1 on the remote motor starts and continues on until 95% level is reached.
- If water level is less than 20% then motor automatically starts.