END SEMESTER ASSESSMENT (ESA)
B.TECH. (CSE)
IV SEMESTER

UE18CS256 – MICROPROCESSOR AND COMPUTER ARCHITECTURE LABORATORY

MINI PROJECT REPORT

ON

SOCIAL DISTANCING INDICATOR

SUBMITTED BY

NAME	SRN
1) Trisha Jain	PES1UG19CS542
2) Uma H Gond	PES1UG19CS547

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
RR CAMPUS,
BENGALURU – 560100, KARNATAKA, INDIA

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ABSTRACT OF THE PROJECT:

With the rising spread of the Corona Virus all over the world it has become necessary to follow precautions to slow down the spread of this virus. One of the most effective ways to do so is to maintain social distancing.

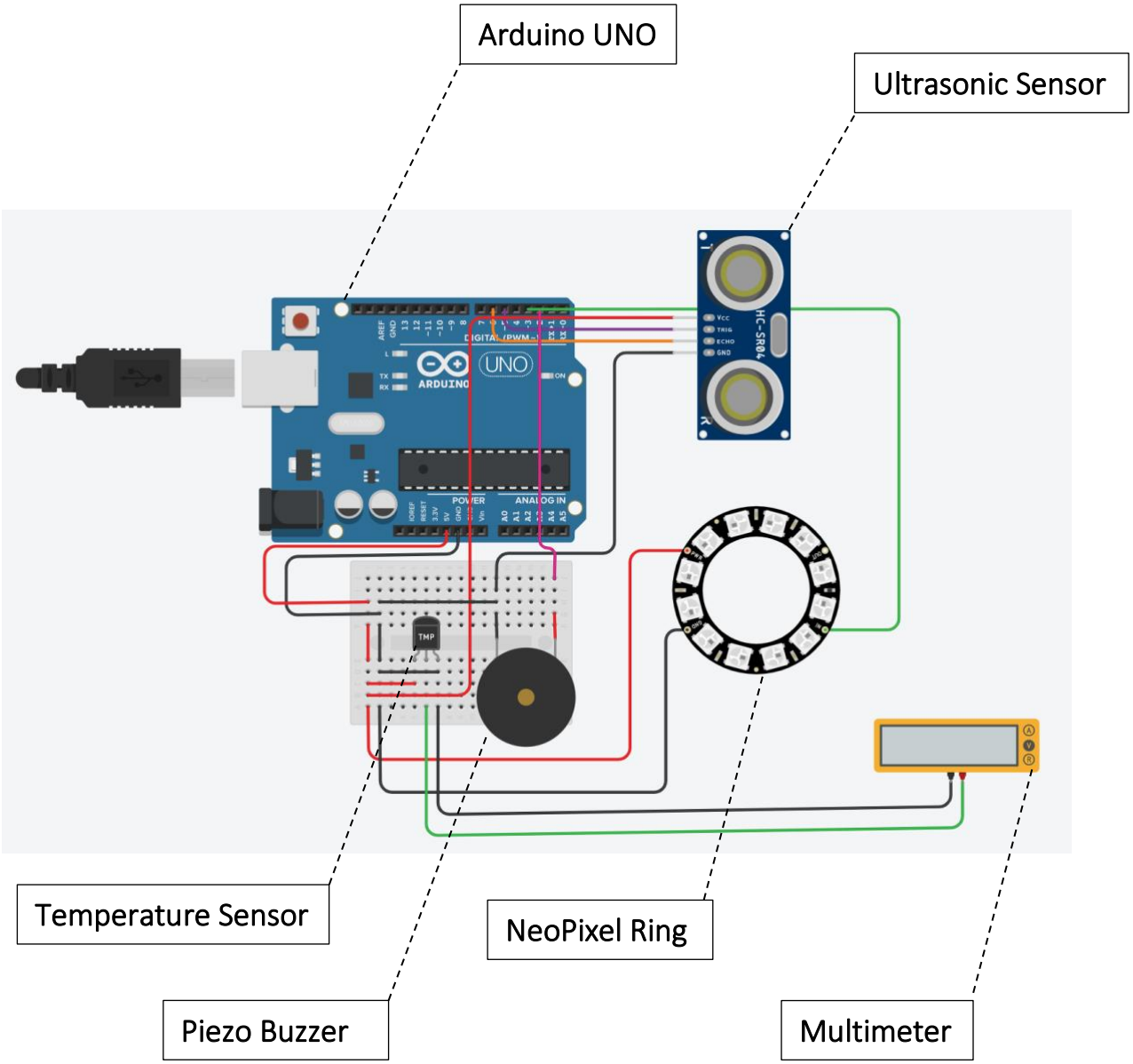
This project aims to help maintain social distancing by using an audio and visual alarming system.

It is developed using Tinkercad as a simulation tool. The circuit components used to build this project are Arduino UNO, Ultrasonic Sensor, NeoPixel 12 RGB LEDs Ring, Piezo buzzer, temperature sensor, multiplexer and Breadboard.

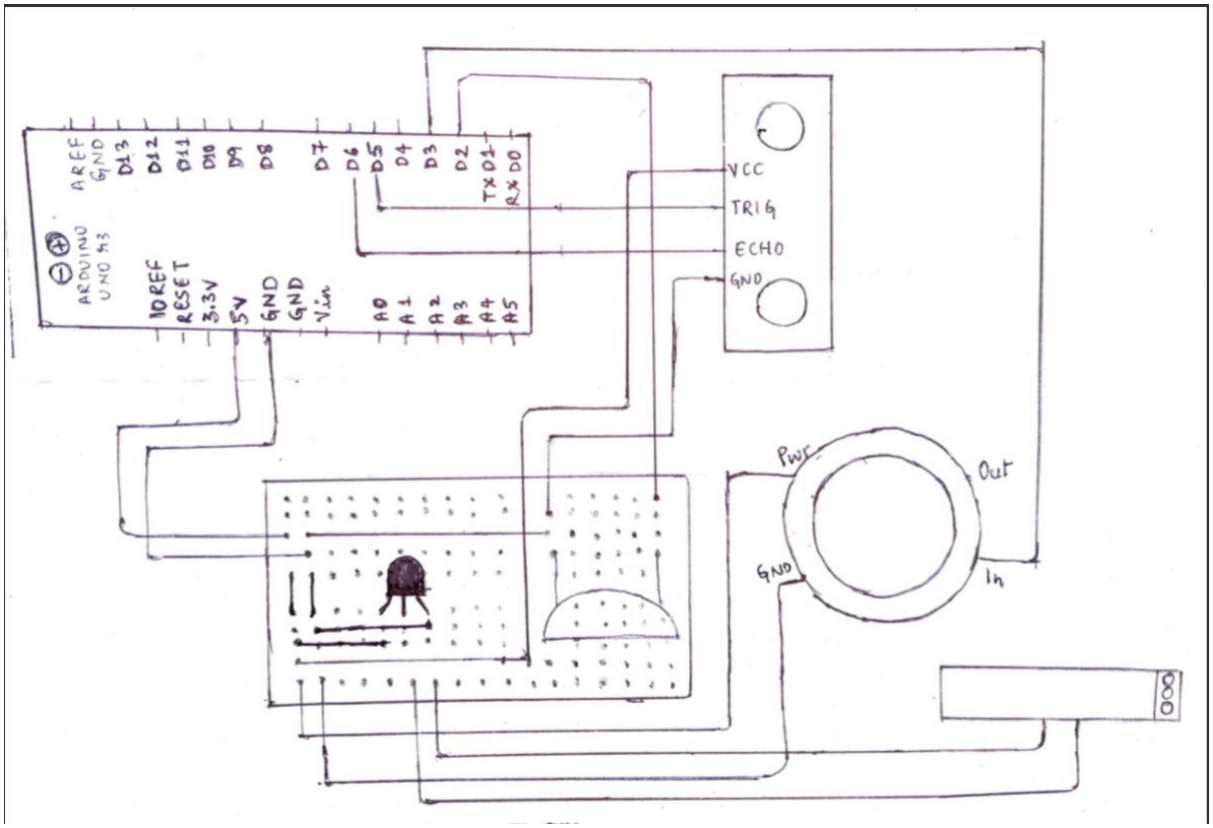
The working principle behind this project is that the ultrasonic sensor is used to detect the distance of the target(person) from the sensor. Based on the distance calculated by the ultrasonic sensor, the NeoPixel 12 RGB LED Ring lights up and the buzzer rings. As the target moves closer to the sensor, the number of LEDs in the NeoPixel 12 RGB LED Ring that light up increase and when the target is closest (minDistance = 100) to the sensor, the buzzer starts ringing and all the LEDs of the Ring light up. Thus, it provides a visual alarm(with the help of the NeoPixel Ring) and an audio alarm(with the help of the Piezo Buzzer) to help maintain social distancing at all times. It also senses the temperature using a temperature sensor and displays the temperature on the serial monitor and the voltage value on the multimeter. Higher the voltage higher the temperature.

This can be implemented on hardware and be used at helpdesks in Banks and billing counters in supermarkets to ensure social distancing.

CIRCUIT DIAGRAM:



BLOCK DIAGRAM:



ARDUINO CODE:

```
#include <Adafruit_NeoPixel.h>

int ledPin= 3;
int ledNo= 12;

Adafruit_NeoPixel strip= Adafruit_NeoPixel(ledNo,ledPin,NEO_RGB+NEO_KHZ800);


int buzzerPin= 2;
int echoPin= 6;
int trigPin= 5;
int minDistance = 100;
int maxDistance = 300;

void setup()
{
  pinMode(buzzerPin, OUTPUT);
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);
  Serial. begin(9600);
  strip.begin();
  for(int i = 0; i < ledNo; i++)
  {
   strip.setPixelColor(i,strip.Color(0,0,0));
  }
  strip.show();
}

void loop()
{
  int distance = calcDistance();
  Serial.println(distance);
  int ledsToGlow = map(distance, minDistance, maxDistance, ledNo, 1);
  Serial.println(ledsToGlow);
  if(ledsToGlow == 12)
  {
    digitalWrite(buzzerPin, HIGH);
  }
  else
  {
    digitalWrite(buzzerPin, LOW);
  }
  for(int i = 0; i < ledsToGlow; i++)
  {
    if(i < 4)
    {
      strip.setPixelColor(i,strip.Color(50,0,0));//green,red,blue
    }
    else if(i >= 4 && i < 8)
    {
      strip.setPixelColor(i,strip.Color(50,50,0));//green,red,blue
```

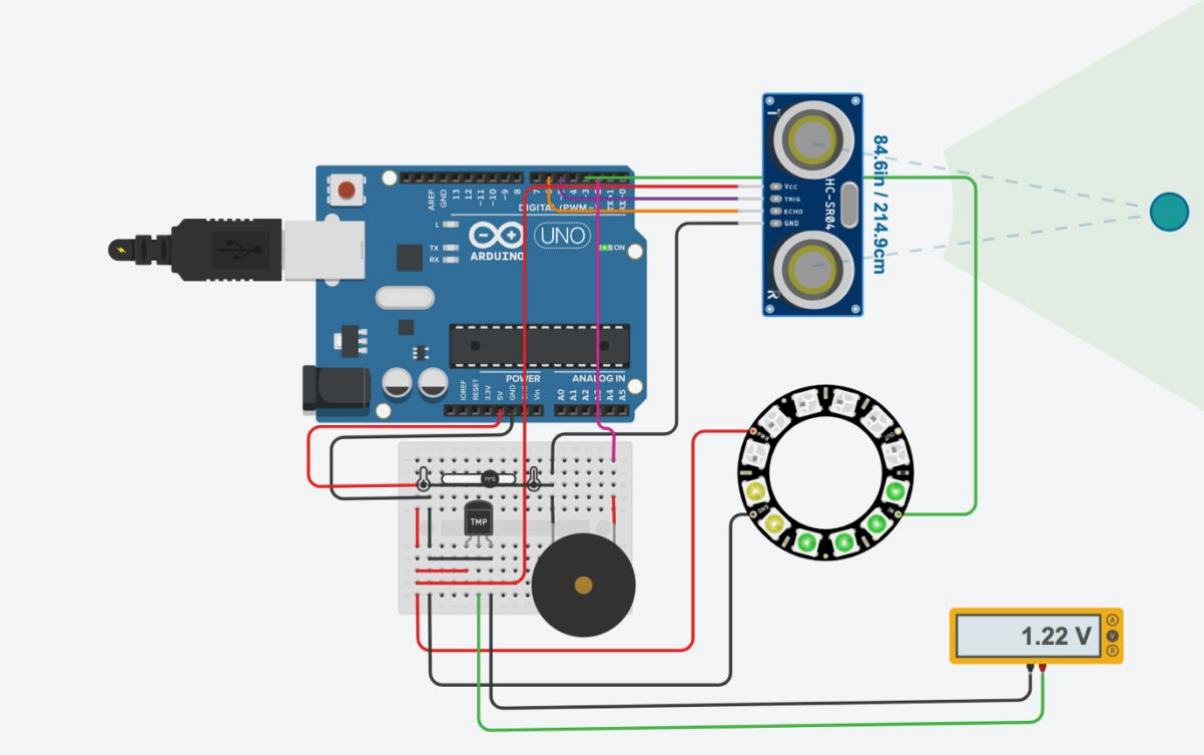
```
    }
    else if(i >= 8 && i < 12)
    {
      strip.setPixelColor(i,strip.Color(0,50,0));//green,red,blue
    }
  }
  for(int i = ledsToGlow; i < ledNo; i++)
  {
    strip.setPixelColor(i,strip.Color(0,0,0));
  }
  strip.show();
  int reading = analogRead(sensorPin);
  float voltage = reading * 4.68;
  voltage /= 1024.0;

  float temperatureC = (voltage - 0.5) * 100;
  Serial.print(temperatureC);
  Serial.println(" degrees C");
  delay(50);
  delay(50);
}

int calcDistance()
{
  long distance,duration;
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);
  duration = pulseIn(echoPin, HIGH);
  distance = duration/29/2;
  if(distance >= maxDistance)
  {
    distance = maxDistance;
  }
  if(distance <= minDistance)
  {
    distance = minDistance;
  }
  return distance;
}
```

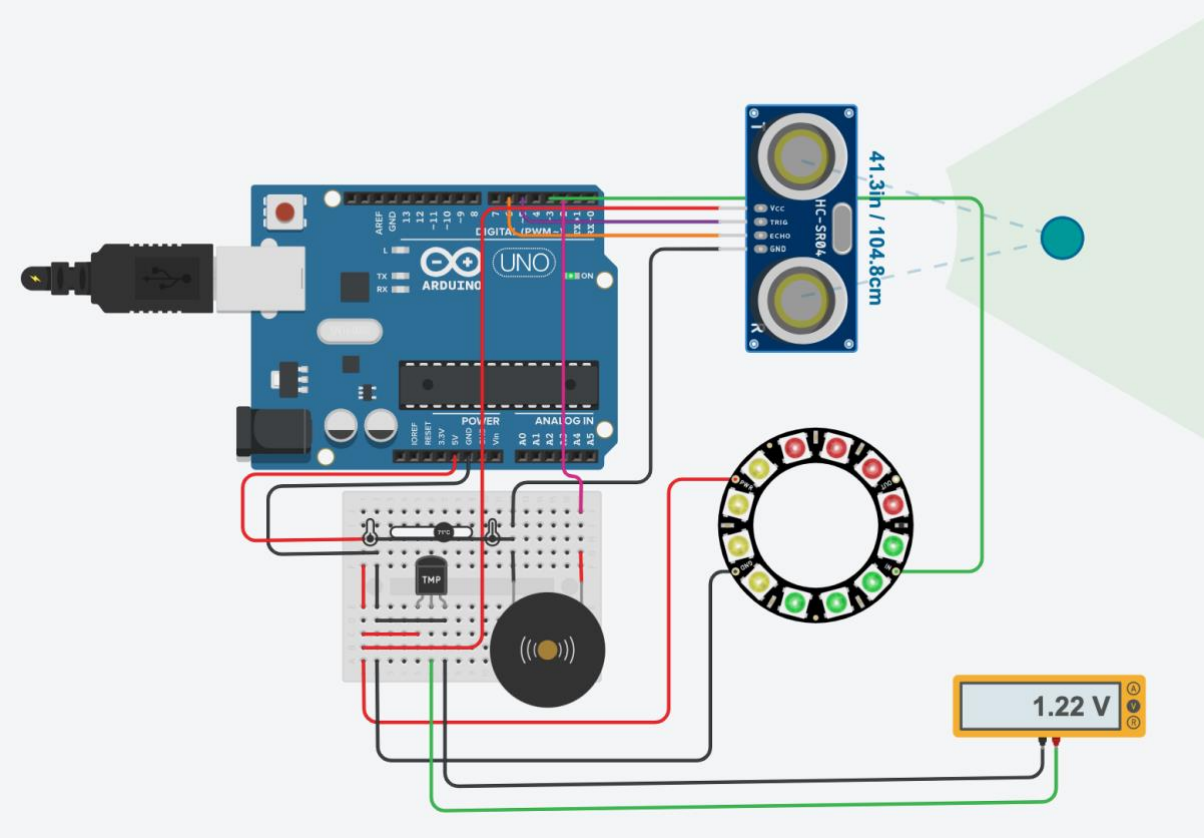
SCREEN SHOTS OF THE OUTPUT:

Social Distancing is being maintained :-



The buzzer does not ring in this case as can be seen by observing the piezo buzzer because the target is at a sufficient distance from the ultrasonic sensor which indicates that social distancing is being maintained.
And the NeoPixel Ring is also not lit up completely, only 6 LEDs are lit**.**
The temperature sensor displays the sensed voltage value using the multimeter and the temperature value is displayed on the serial monitor.

Social Distancing is not maintained :-



The buzzer rings in this case as can be seen by observing the piezo buzzer because the ultrasonic sensor senses the proximity of the target and accordingly signals the piezo buzzer to indicate the absence of social distancing.
And the Neo Pixel Ring is also lit up completely, all 12 LEDs are lit.
The temperature sensor displays the sensed voltage value using the multimeter and the temperature value is displayed on the serial monitor.

REFERENCES

1. https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/social-distancing.html

2. https://www.instructables.com/Ultrasonic-Distance-Sensor-Arduino-Tinkercad/

3. https://create.arduino.cc/projecthub/glowascii/neopixel-leds-arduino-basics-126d1a

4. https://www.tinkercad.com/things/ikdA3Clop1f-working-with-piezo-buzzer

5. https://create.arduino.cc/projecthub/diyelectronic/social-distancing-alarm-using-arduino-2a576f