DLD Mini-Project

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Section: A

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Project Title: Social Distancing Alarm using Arduino

Abstract:

With the prevalent situation of pandemic, it is evident that the only way of rescue is self-awareness and cleanliness. Social-distancing has been one of the inevitable traits to follow to break the chain of the propagation of the virus, hence flattening down the curve of pandemic.

As to cope with drastic decline in the economy of the country, the office and other public sectors have been opened. Maintaining a distance of at least 6 feet, though necessary, is turning out to be quite challenging in everyday life of the commoners.

In this project, I have tried to address this alarming problem with a very simple approach and a low-budget target. The model described here will trigger an alarm when distance from another person will be less than the safe limit of distance instructed.

Specifications of the components used:

- Micro-controller Circuit (Arduino Uno R3)
  Processor: ATmega328 @ 16 MHz
  RAM: 2048 bytes
  Program Size: 31.5 Kilobytes
  I/O lines: 20
  Max current in single I/O: 40 mA
  Max Operating Voltage: 12V
- Connecting wires
- Breadboard
- 9V battery (DC power source)
- Neo Pixel Ring (12 LEDs)
- Piezo Buzzer
- Ultrasonic Distance Sensor

Program for the Arduino:

This program can be executed using the .ino extension.

```
#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
    }
```

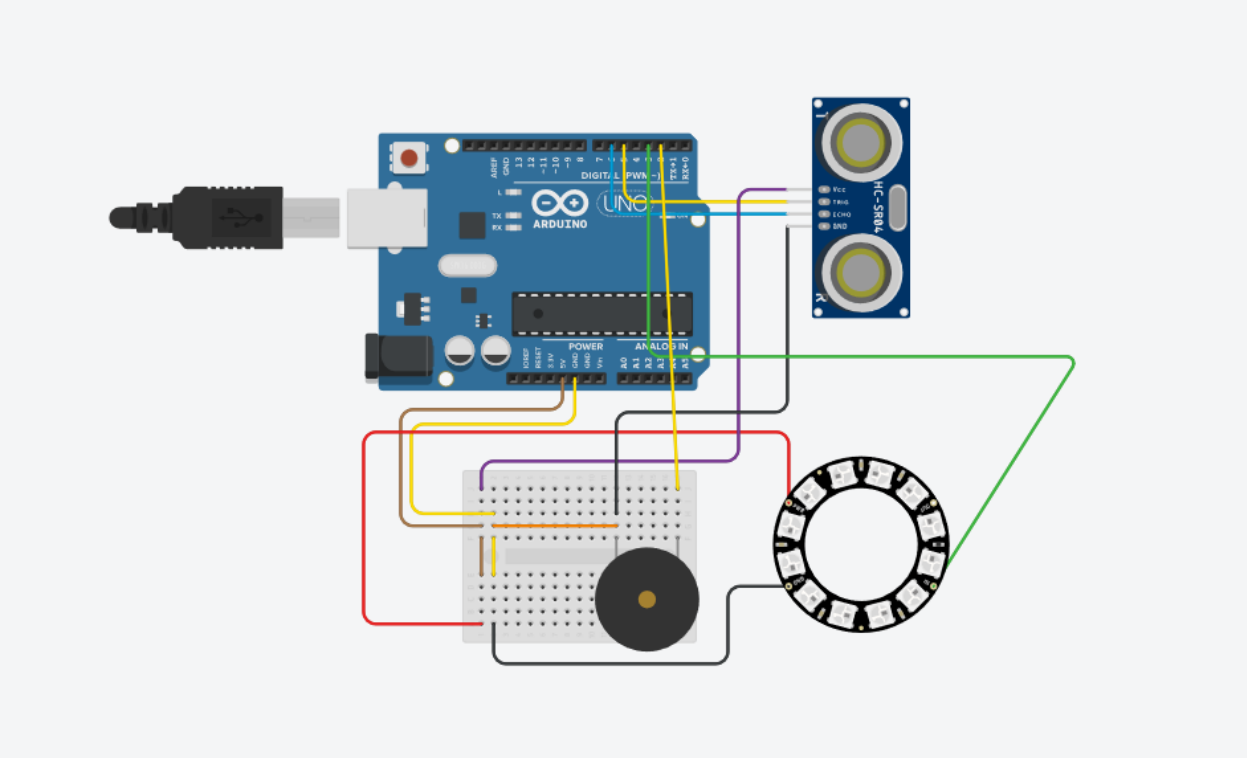
```
    else if(i >= 4 && i < 8)
    {
      strip.setPixelColor(i,strip.Color(50,50,0));//green,red,blue
    }
    else if(i >= 8 && i < 12)
    {
      strip.setPixelColor(i,strip.Color(0,50,0));//green,red,blue
    }
  }
  for(int i = ledsToGlow; i < ledNo; i++)
  {
    strip.setPixelColor(i,strip.Color(0,0,0));
  }
  strip.show();
  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;
}
```

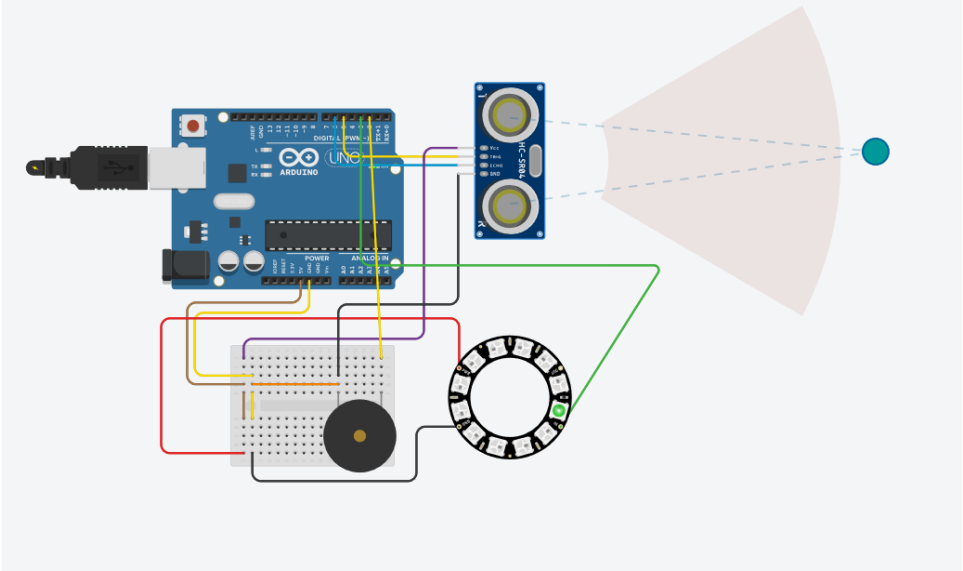
Circuit Explanation:

1. Ground connections of Buzzer, Neo Pixel Ring and the ultrasonic Sensor are made with the GND terminal of Arduino through breadboard.
2. The power terminal of Neo Pixel Ring, the Vcc of the ultrasonic sensor are connected to the 5V terminal of Arduino with the help of the breadboard.
3. The input terminal of the Neo pixel ring is connected to –3 pin of the digital PWM of the Arduino.
4. The trigger of the ultrasonic sensor is connected to –5 pin of the digital PWM of Arduino. The echo pin is connected to –6 pin of the digital PWM.
5. The positive terminal of the buzzer is connected to the 2 pin of the digital PWM of the Arduino.

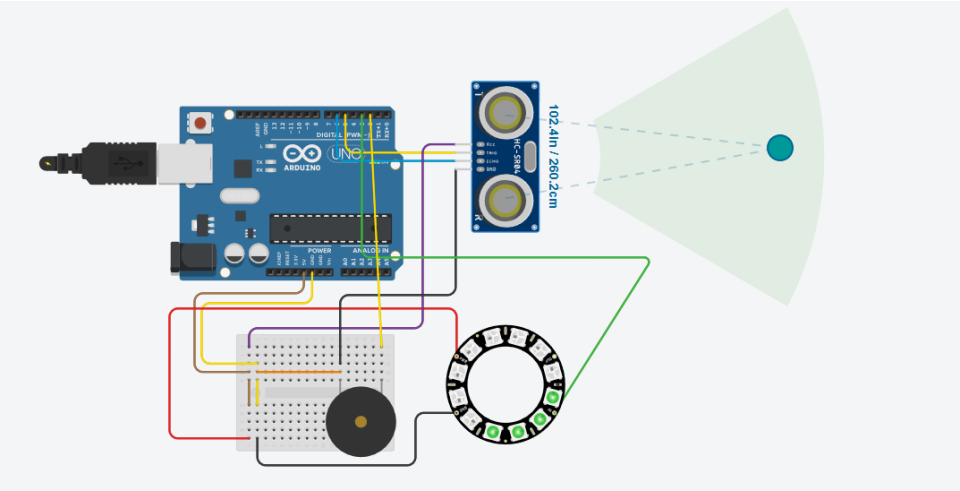


Circuit Diagram

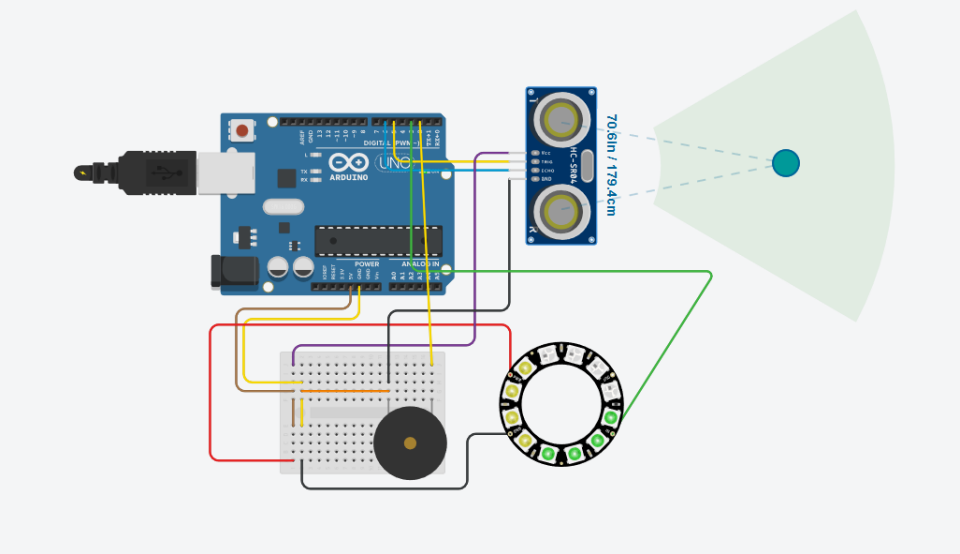
Simulation



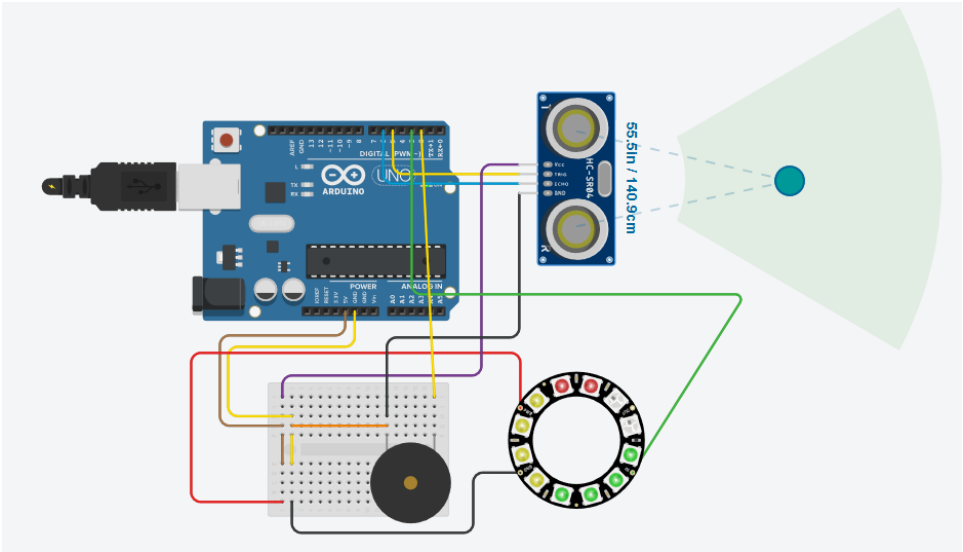
Case I: When the other person is beyond the safe limit



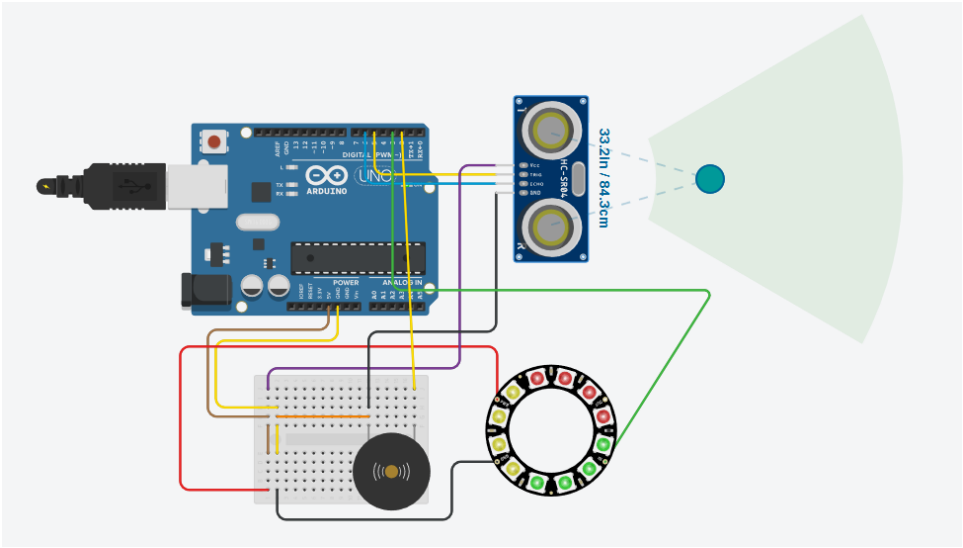
Case II: The other person comes closer but still out of the safe distance (Green indication intensifies)



Case III: The person comes even closer and yellow indication intensifies



Case IV: On the verge of the forbidden distance and Red indication triggers on and intensifies eventually



Case V: Within the forbidden distance and the Red indication reaches its highest and the buzzer alarm sets on