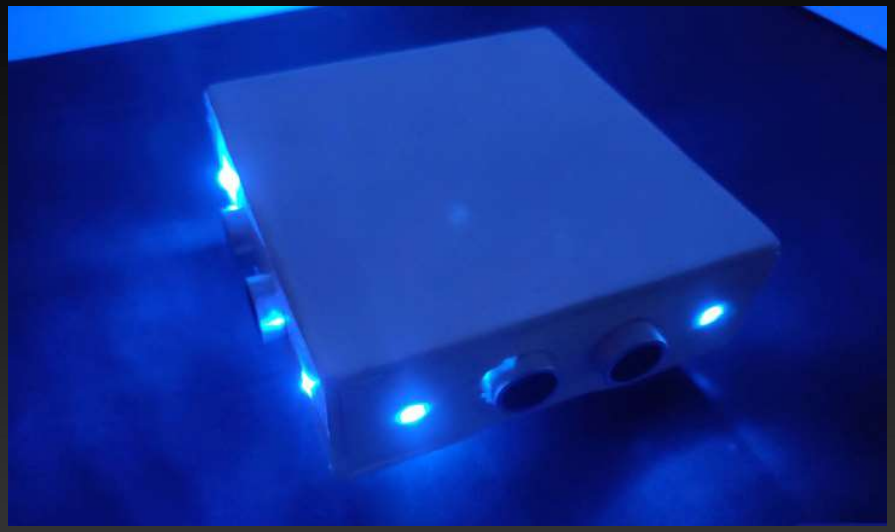


Surface disinfecting robot

-KANISHKAR (20BEC0625)

-PRANESH P (20BEC0616)

-KANISHKA RITHU (20BEC0730)

Objective

- COVID-19 pandemic has rerouted our lives in various ways, and its very important for us to stay safe. Hygiene is one of the key concern to prevent getting in contact with the virus. This robot is used to sanitize without the presence of a human to minimalize exposure to the virus.

Introduction

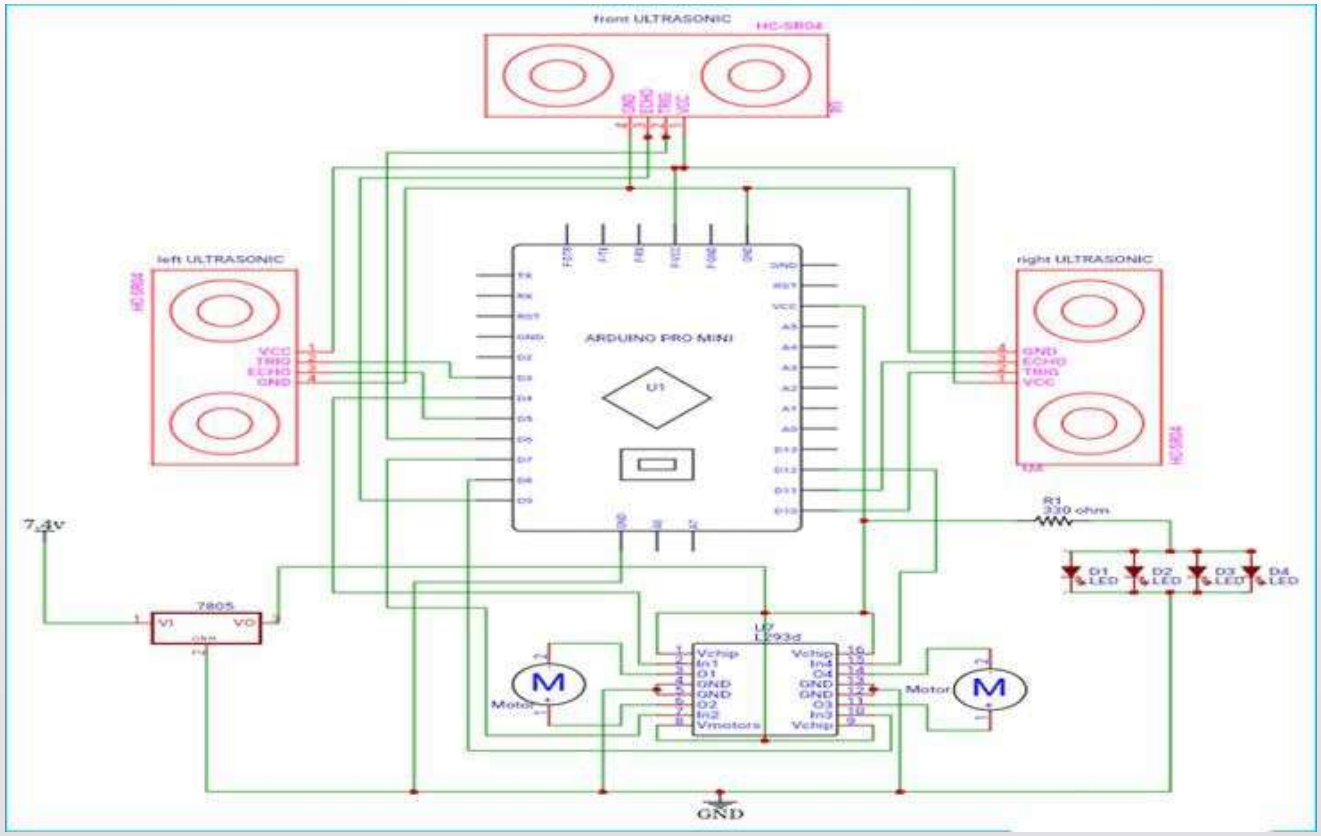
The primary function of the robot is to disinfect a room or a flat surface using ultraviolet germicidal irradiation. The robot has **ultraviolet LEDs** which is responsible for killing the virus. Bio-organisms such as bacteria, viruses are known to be deactivated when exposed to **UV light**. Ultraviolet light destroys the genetic material in pathogens—DNA in bacteria and RNA in viruses thus preventing them from reproducing.

This robot is completely automatic and it will detect obstacles and avoid those before a collision happen. There are many options to detect an obstacle, but for this project, we have chosen to do it with an **ultrasonic sensor module** because it has a lot more advantages over conventional IR based **obstacle avoidance sensors**

Innovation component

- Automatic cleansing without human intervention in hospitals, which prevents nurses and doctor to avoid contact with the virus

Sample diagram:



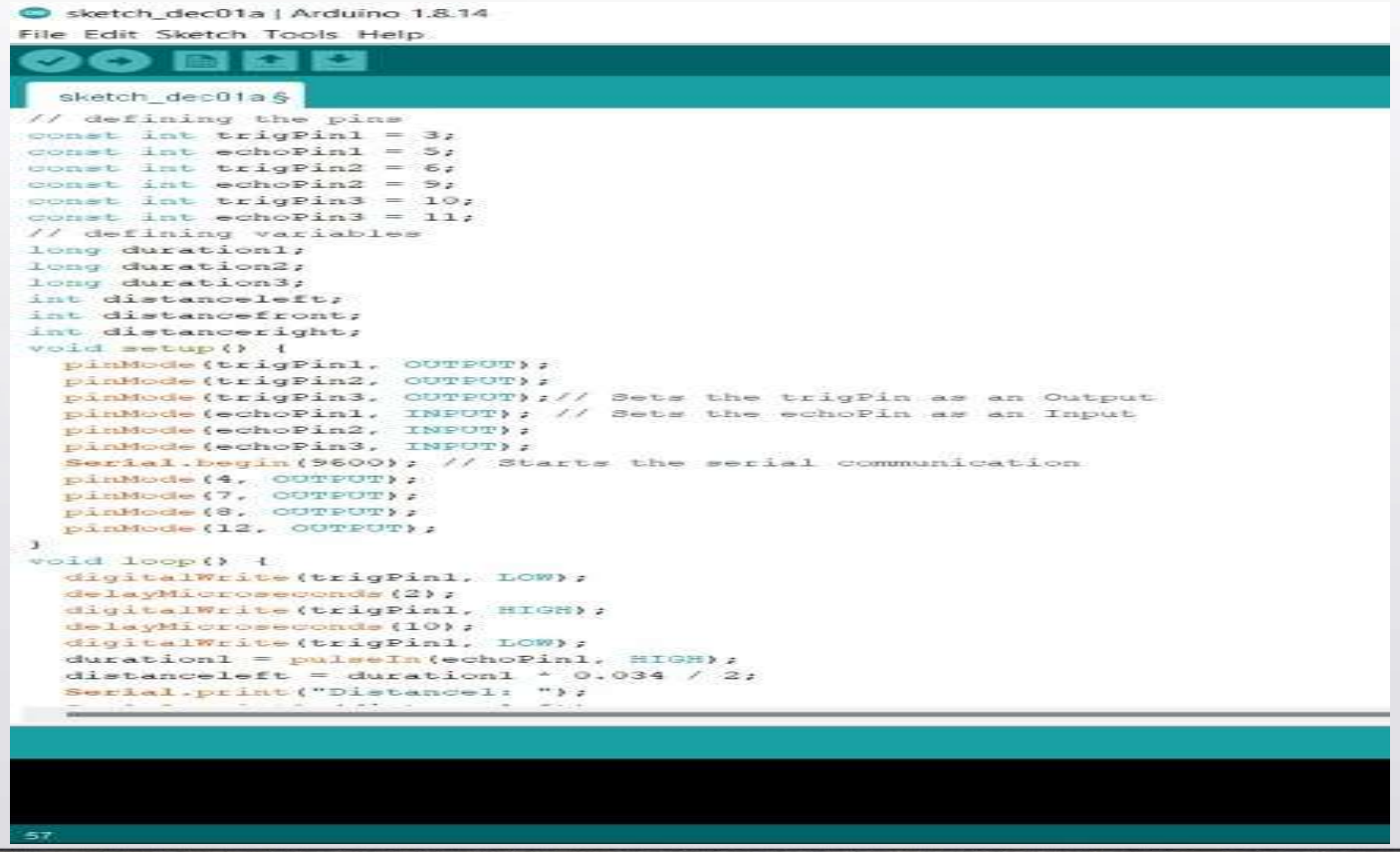
Components

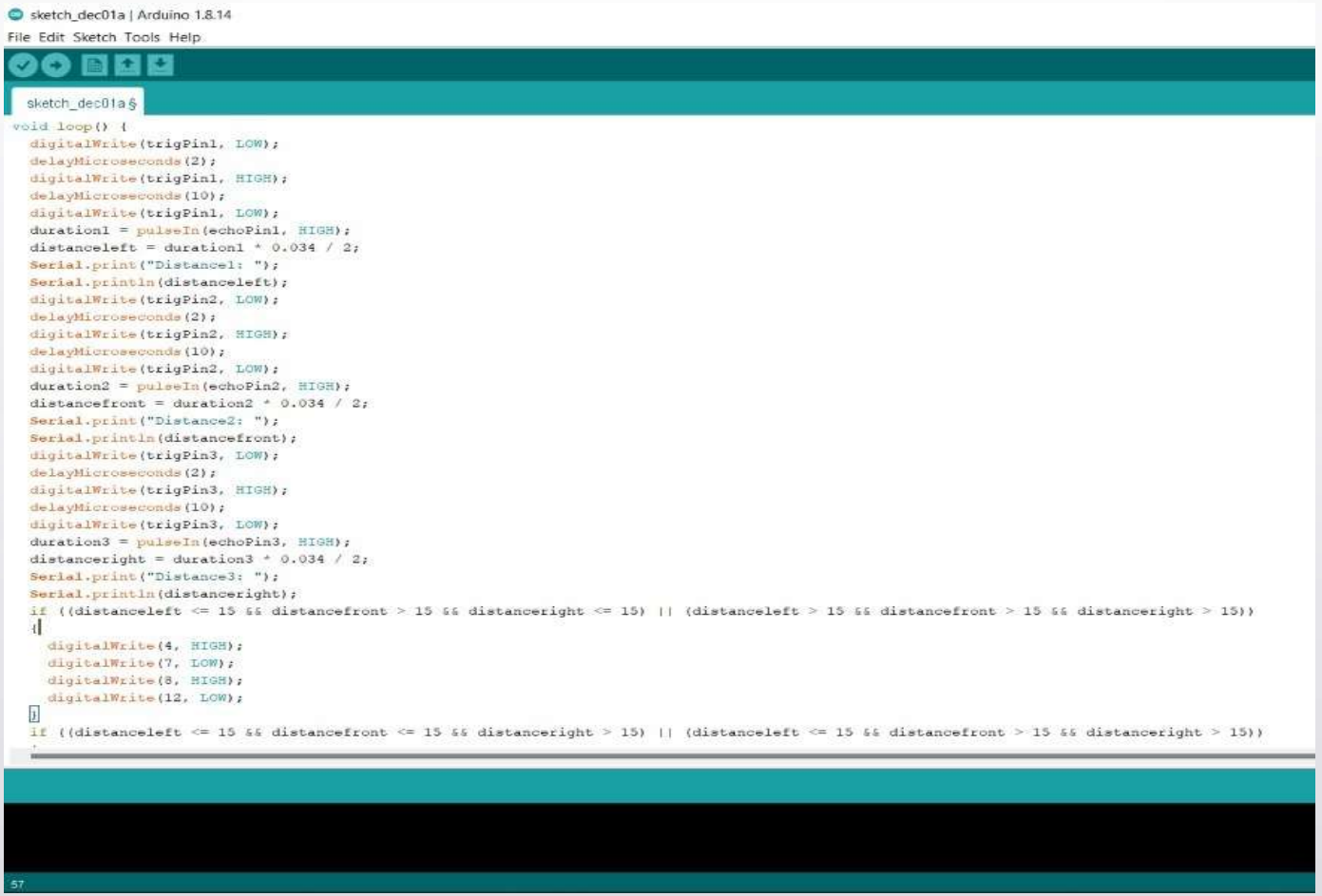
- 2x UV sensors (HCSr501)
- 1x Arduino mini pro (ADU-0002)
- 2x motors
- Resistors
- Li-ion battery

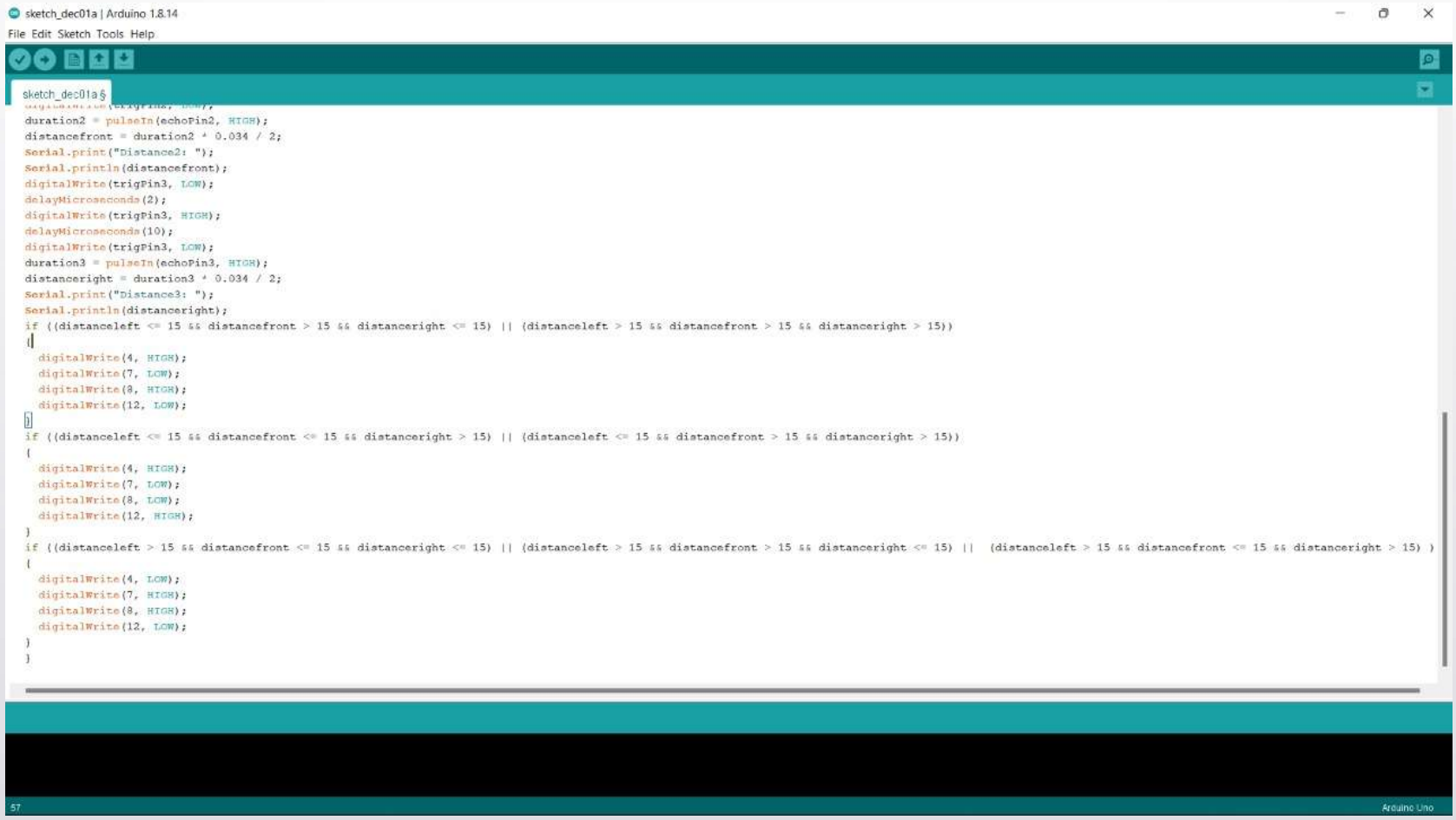
Methodology

- Integrate the coding for automatic motion detection to the Arduino UNO
- Connect the UV sensors to the Arduino board
- Connect the motors to the Arduino board
- Connect the motors to the castor wheels

Code


sketch_dec01a | Arduino 1.8.14
File Edit Sketch Tools Help
sketch_dec01a§
// defining the pins
const int trigPin1 = 3;
const int echoPin1 = 5;
const int trigPin2 = 6;
const int echoPin2 = 9;
const int trigPin3 = 10;
const int echoPin3 = 11;
// defining variables
long duration1;
long duration2;
long duration3;
int distanceleft;
int distancefront;
int distanceright;
void setup() {
pinMode(trigPin1, OUTPUT);
pinMode(trigPin2, OUTPUT);
pinMode(trigPin3, OUTPUT);// Sets the trigPin as an Output
pinMode(echoPin1, INPUT); // Sets the echoPin as an Input
pinMode(echoPin2, INPUT);
pinMode(echoPin3, INPUT);
Serial.begin(9600); // Starts the serial communication
pinMode(4, OUTPUT);
pinMode(7, OUTPUT);
pinMode(8, OUTPUT);
pinMode(12, OUTPUT);
}
void loop() {
digitalWrite(trigPin1, LOW);
delayMicroseconds(2);
digitalWrite(trigPin1, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin1, LOW);
duration1 = pulseIn(echoPin1, HIGH);
distanceleft = duration1 * 0.034 / 2;
Serial.print("Distance1: ");
57


sketch_dec01a | Arduino 1.8.14
File Edit Sketch Tools Help
sketch_dec01a §
void loop() {
digitalWrite(trigPin1, LOW);
delayMicroseconds(2);
digitalWrite(trigPin1, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin1, LOW);
duration1 = pulseIn(echoPin1, HIGH);
distanceleft = duration1 * 0.034 / 2;
Serial.print("Distance1: ");
Serial.println(distanceleft);
digitalWrite(trigPin2, LOW);
delayMicroseconds(2);
digitalWrite(trigPin2, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin2, LOW);
duration2 = pulseIn(echoPin2, HIGH);
distancefront = duration2 * 0.034 / 2;
Serial.print("Distance2: ");
Serial.println(distancefront);
digitalWrite(trigPin3, LOW);
delayMicroseconds(2);
digitalWrite(trigPin3, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin3, LOW);
duration3 = pulseIn(echoPin3, HIGH);
distanceright = duration3 * 0.034 / 2;
Serial.print("Distance3: ");
Serial.println(distanceright);
if ((distanceleft <= 15 && distancefront > 15 && distanceright <= 15) || (distanceleft > 15 && distancefront > 15 && distanceright > 15))
{
digitalWrite(4, HIGH);
digitalWrite(7, LOW);
digitalWrite(8, HIGH);
digitalWrite(12, LOW);
}
if ((distanceleft <= 15 && distancefront <= 15 && distanceright > 15) || (distanceleft <= 15 && distancefront > 15 && distanceright > 15))
57


sketch_dec01a | Arduino 1.8.14
File Edit Sketch Tools Help
sketch_dec01a §
duration2 = pulseIn(echoPin2, HIGH);
distancefront = duration2 * 0.034 / 2;
Serial.print("Distance2: ");
Serial.println(distancefront);
digitalWrite(trigPin3, LOW);
delayMicroseconds(2);
digitalWrite(trigPin3, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin3, LOW);
duration3 = pulseIn(echoPin3, HIGH);
distanceright = duration3 * 0.034 / 2;
Serial.print("Distance3: ");
Serial.println(distanceright);
if ((distanceleft <= 15 && distancefront > 15 && distanceright <= 15) || (distanceleft > 15 && distancefront > 15 && distanceright > 15))
{
digitalWrite(4, HIGH);
digitalWrite(7, LOW);
digitalWrite(8, HIGH);
digitalWrite(12, LOW);
}
if ((distanceleft <= 15 && distancefront <= 15 && distanceright > 15) || (distanceleft <= 15 && distancefront > 15 && distanceright > 15))
{
digitalWrite(4, HIGH);
digitalWrite(7, LOW);
digitalWrite(8, LOW);
digitalWrite(12, HIGH);
}
if ((distanceleft > 15 && distancefront <= 15 && distanceright <= 15) || (distanceleft > 15 && distancefront > 15 && distanceright <= 15) || (distanceleft > 15 && distancefront <= 15 && distanceright > 15))
{
digitalWrite(4, LOW);
digitalWrite(7, HIGH);
digitalWrite(8, HIGH);
digitalWrite(12, LOW);
}
}
57
Arduino Uno

References:

https://circuitdigest.com/microcontroller-projects/arduino-based-automatic-surface-disinfecting-robot-using-ultraviolet-lights

https://www.electronicsforu.com/electronics-projects/hospital-sanitizing-robot

Other references:

https://youtu.be/Vaewqekrupo

https://youtu.be/4l951sXWYu4

https://youtu.be/Hegy3692ggU

https://youtu.be/RYLjjXIESYQ