DIY GROUP PROJECT

TEAM – V

AUTOMATIC SANITIZATION MACHINE USING UV - C LIGHT

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Introduction

Main Idea of the project: In this project we are trying to make a sanitization machine which will sanitize any product using the UV-C light and it will work on the commands of the user. It will be a mobile covid sanitization machine where user does not have to operate it manually.

Unique features of the machine:

1) It will be a no-touch sanitization machine.
2) It will do complete 360-degree sanitization.
3) It will be a portable machine.
4) As it uses UV-C light, it kills the germs completely.
5) We can set the time of sanitizing according to our own will.

Extra Benefit of the project:

UV-C kills the germs by rupturing their cell membrane and altering their DNA/RNA. UV disinfecting chambers have already hit the market, but one of the main feature that they all lacked was the 360-degree all-surface disinfection. This project overcomes those limitations and disinfects all the surfaces by flipping the items automatically after disinfecting one surface.

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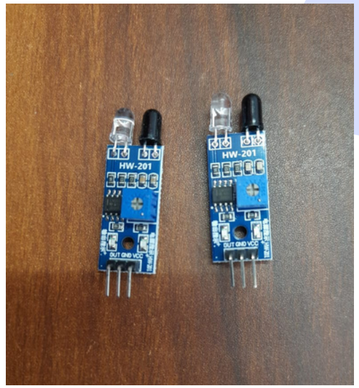
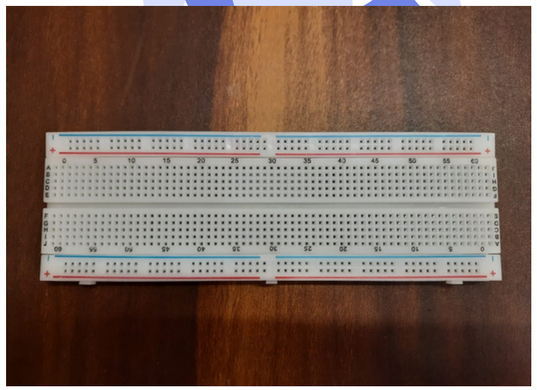
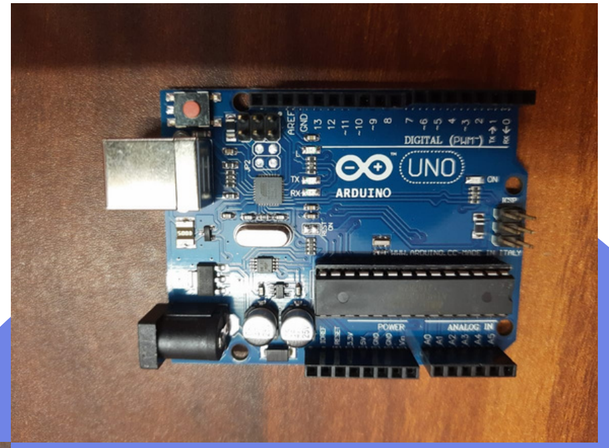
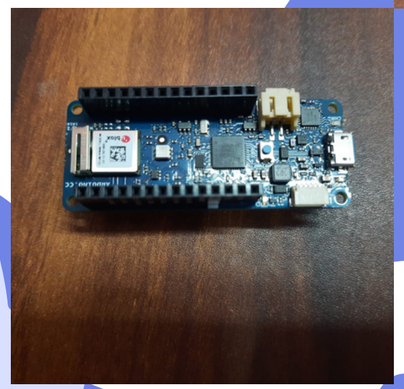
Significance of this project in the current scenario of pandemic

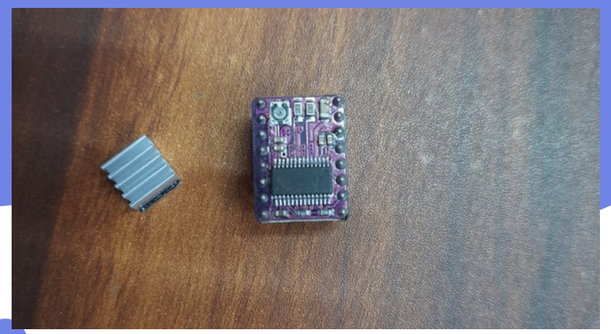
This project, if implemented correctly, can be of great use in the current scenario. As the virus is spreading by the surface contamination , we can use this machine to sanitize all the surfaces in daily life. Also we can use it to sanitize the used face masks . That will decrease the chance of spreading and cost for the masks as well. Also this machine will be made with no touch controls , so there will be no chance of contamination from the machine itself. Last but not the least it is portable and cheap as well . For this the machine can be successfully implemented among the common mass. We hope to make this project able to serve the community.





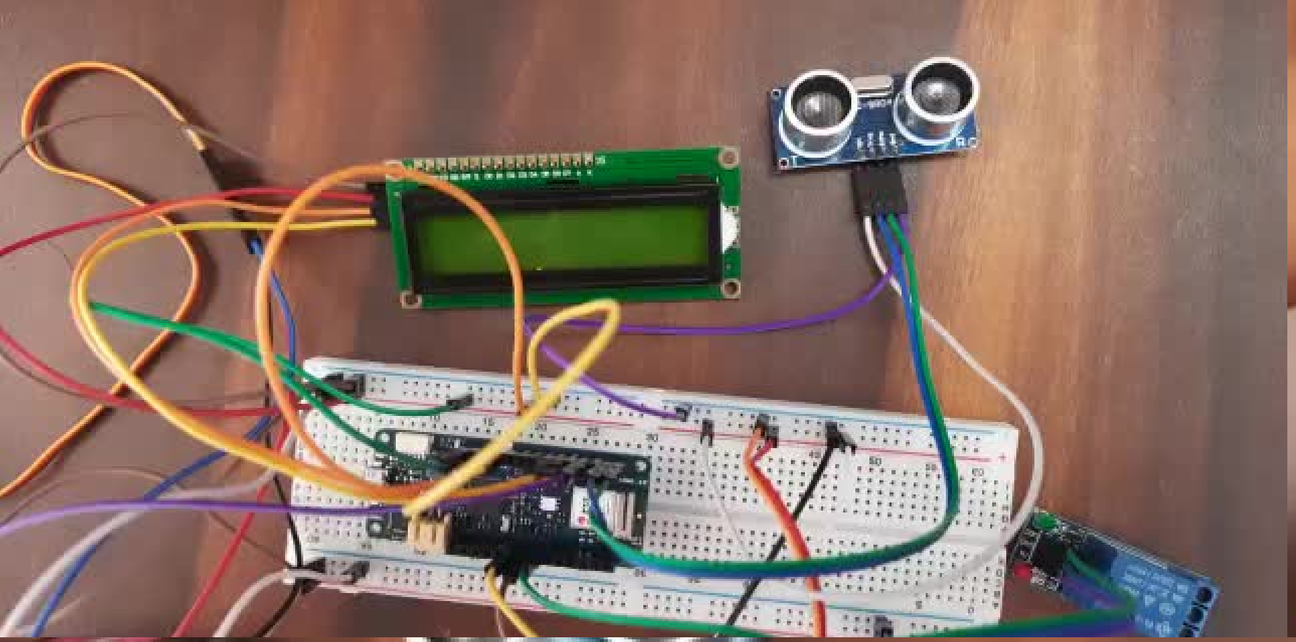


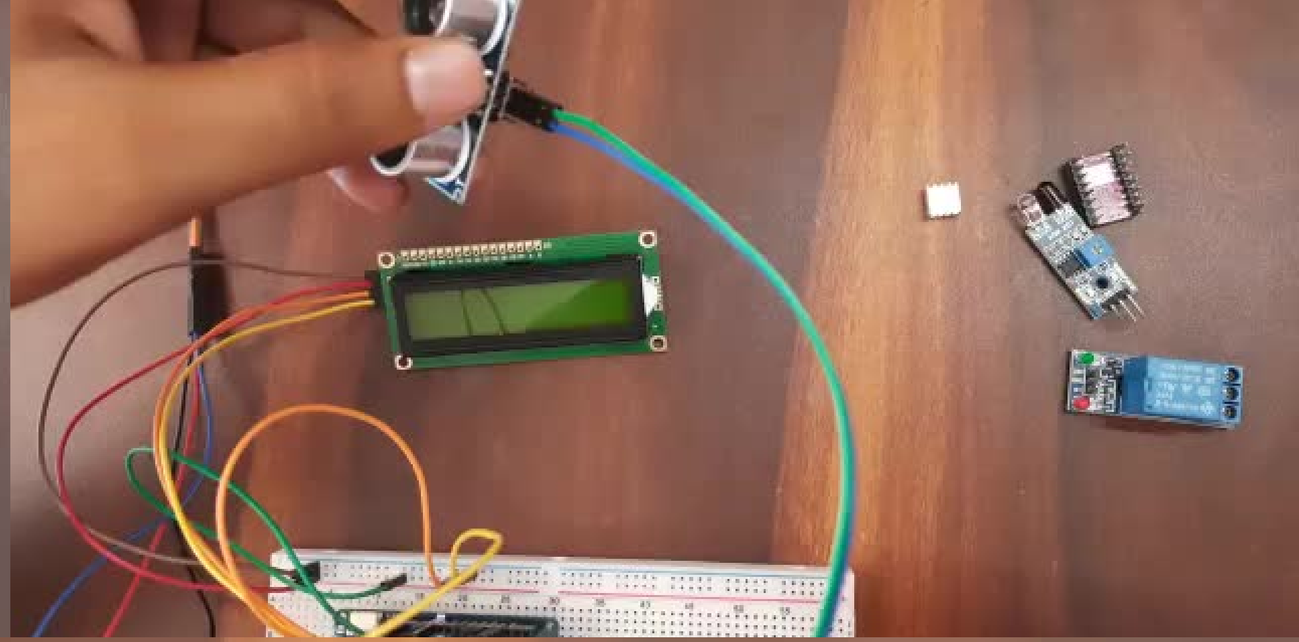


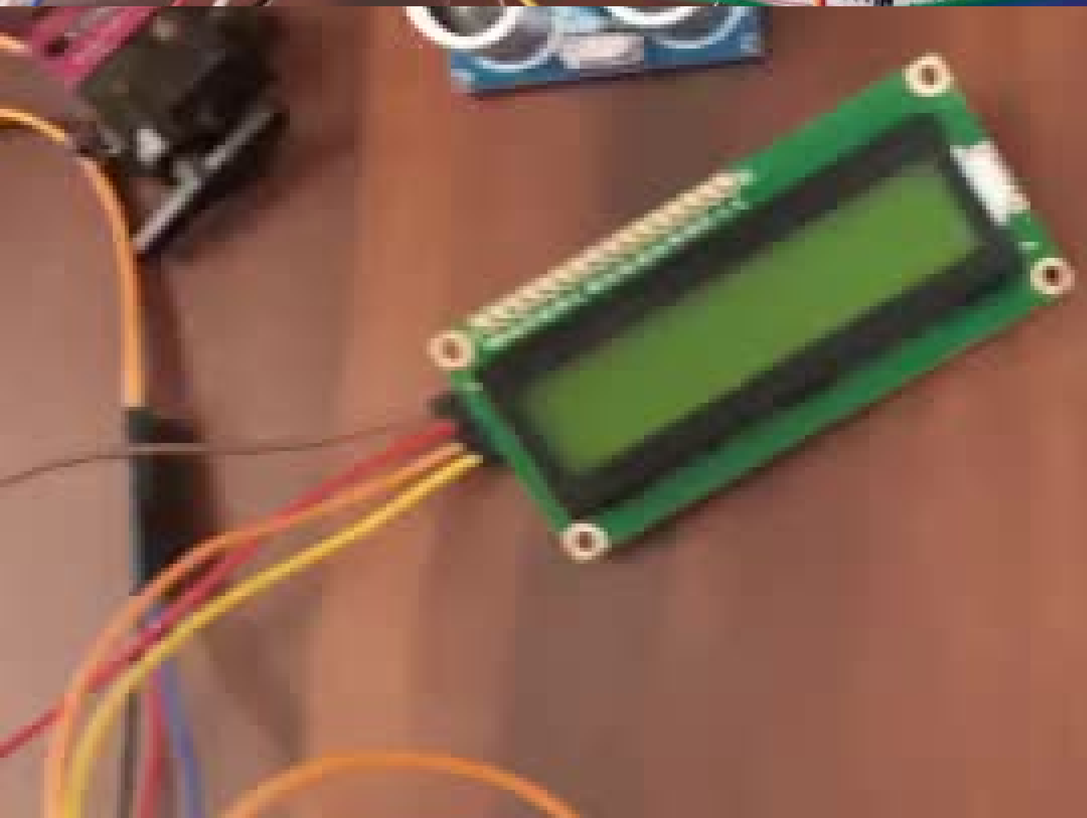


Hardware parts for the project

- Arduino MKR wifi 1010
- Arduino UNO Rev3
- MG90S Micro servo motors
- Breadboard
- Jumper Wires
- UV-C lamp
- Adafruit RGB Backlight LCD – 16X2
- Digilent IR proximity sensor
- Ultrasonic sensor – HC-SR04
- Stepper motor driver board A4988
- 1Channel signal relay







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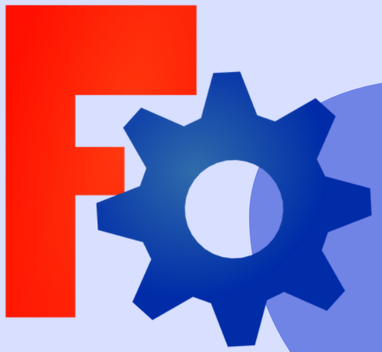
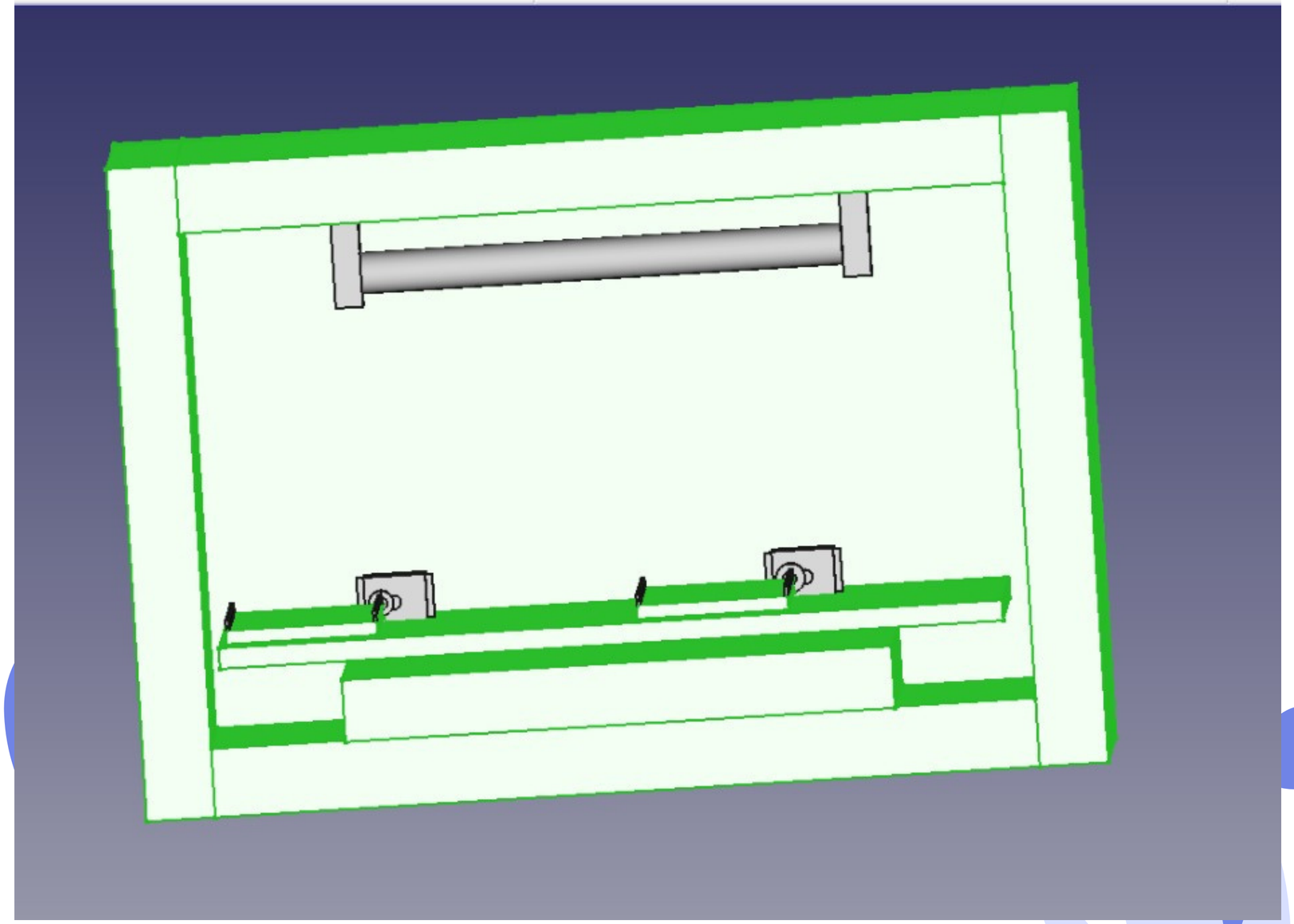
Softwares required for the project

- Arduino IDE
- FreeCAD
- Fritzing



FreeCAD model of the project



Glimpses from the code

```
void loop()
{
  do
  {
    value = digitalRead(input);
  } while (value == 0);
  time1 = millis();
  while (value == 1)
  {
    value = digitalRead(input);
    time2 = millis();
    if( (time2-time1) > timer)
    {
      flip();
      break;
    }
  }
}

void flip()
{
  ServoControl(1);
  delay(1000);
  ServoControl(2);
  delay(1000);
}

void ServoControl (int x)
{
  if (x == 1)
  {
    pos2 = 166;
    for (pos1 = 178; pos1 >= 30; pos1 -= 1)
    {
      servo1.write (pos1);
      servo2.write (pos2);
      delay (15);
    }
    delay(250);
```

```
void setup()
{

  pinMode (stepPin,OUTPUT);
  pinMode (dirPin,OUTPUT);

  pinMode (b_ls, INPUT_PULLDOWN);

  digitalWrite (dirPin,LOW);

  while (bls_val == LOW)
  {
    digitalWrite (stepPin,HIGH);
    delay (1);
    digitalWrite (stepPin,LOW);
    delay (1);

    bls_val = digitalRead (b_ls);
  }

  lcd.begin (16,2);
  lcd.clear ();
  lcd.home ();
  lcd.print ("UVC Based");
  lcd.setCursor (0,1);
  lcd.print ("Disinfector");
  delay(4000);

  pinMode (pingPin, OUTPUT);
  pinMode (echoPin, INPUT);

  pinMode (ir1, INPUT);
  pinMode (ir2, INPUT);

  pinMode (uv_pin, OUTPUT);

  pinMode( servopin, OUTPUT);
  digitalWrite(servopin, LOW);
```

```
void loop()
{
  execute();
}


void execute()
{
  DisplayControl (1);
  delay(1000);
  sense_1();
    DisplayControl (2);
    TraverserControl (1);
    DisplayControl (3);
  sense_2();
    DisplayControl (9);
    TraverserControl (0);
    DisplayControl (4);
    int val = sense_1_2_();
    if (val == 0)
    {
      DisplayControl (5);
      disinfect();
    }
    else
    {
      changeTime();
      DisplayControl (5);
      disinfect();
    }
  sense_1();
    DisplayControl (6);
    TraverserControl (1);
  sense_1();
    DisplayControl (9);
    TraverserControl (0);
    DisplayControl (7);
}
```

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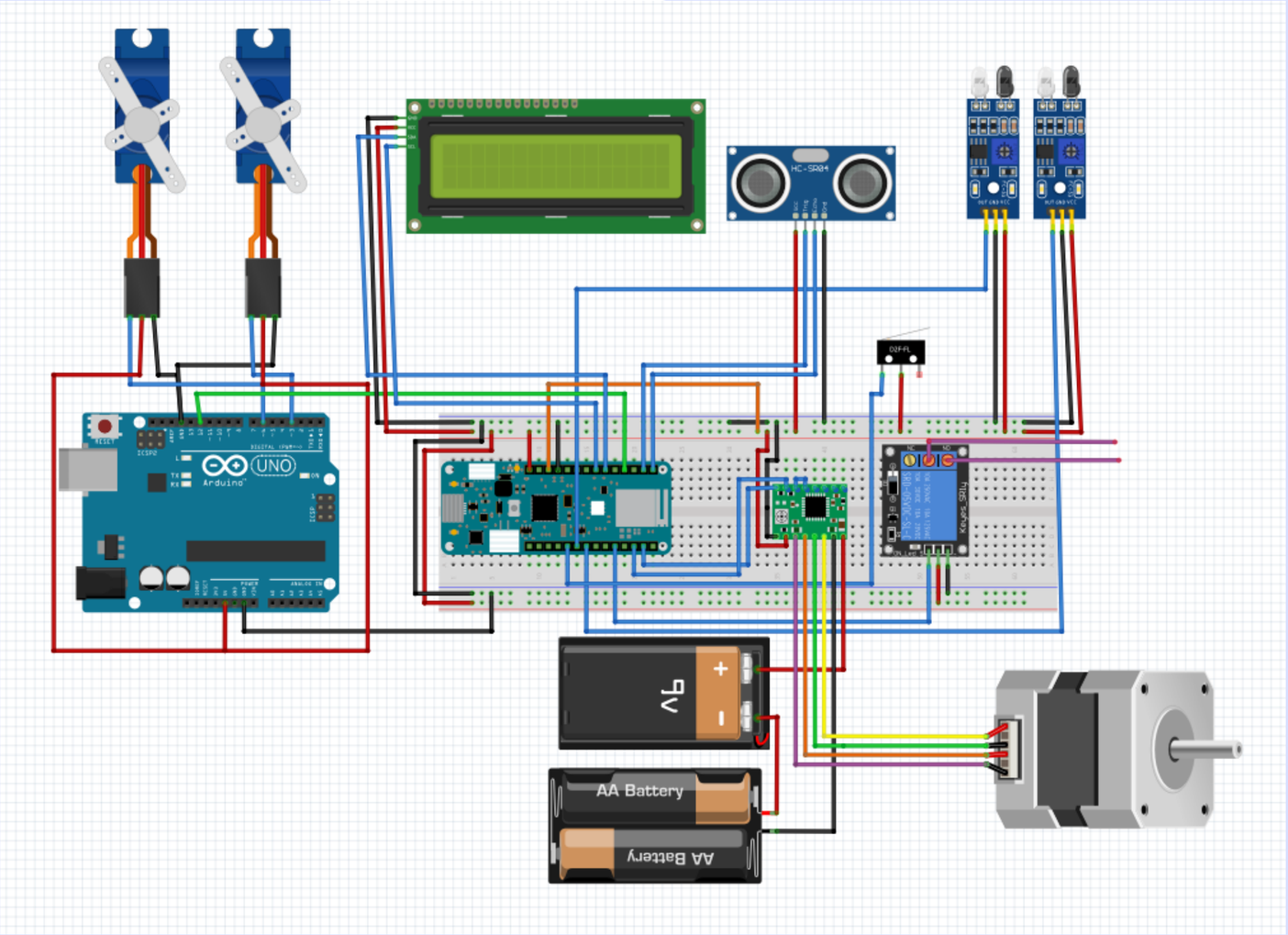
Circuit simulation of the project in Fritzing



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Working principle of the project

The micro-controller continuously monitors for any obstacles in the proximity of the IR sensors. Once there is an obstacle in close proximity, for the required amount of time (1.5 seconds in this case) an event is triggered, based on what's displayed in the LCD.

When the open tray event is triggered, the stepper motor is driven by the required number of steps to open the tray.

In the same way, when the close tray event is triggered, the stepper is driven until the limit switch shows a red flag (the switch changes its state) so that the tray is closed.

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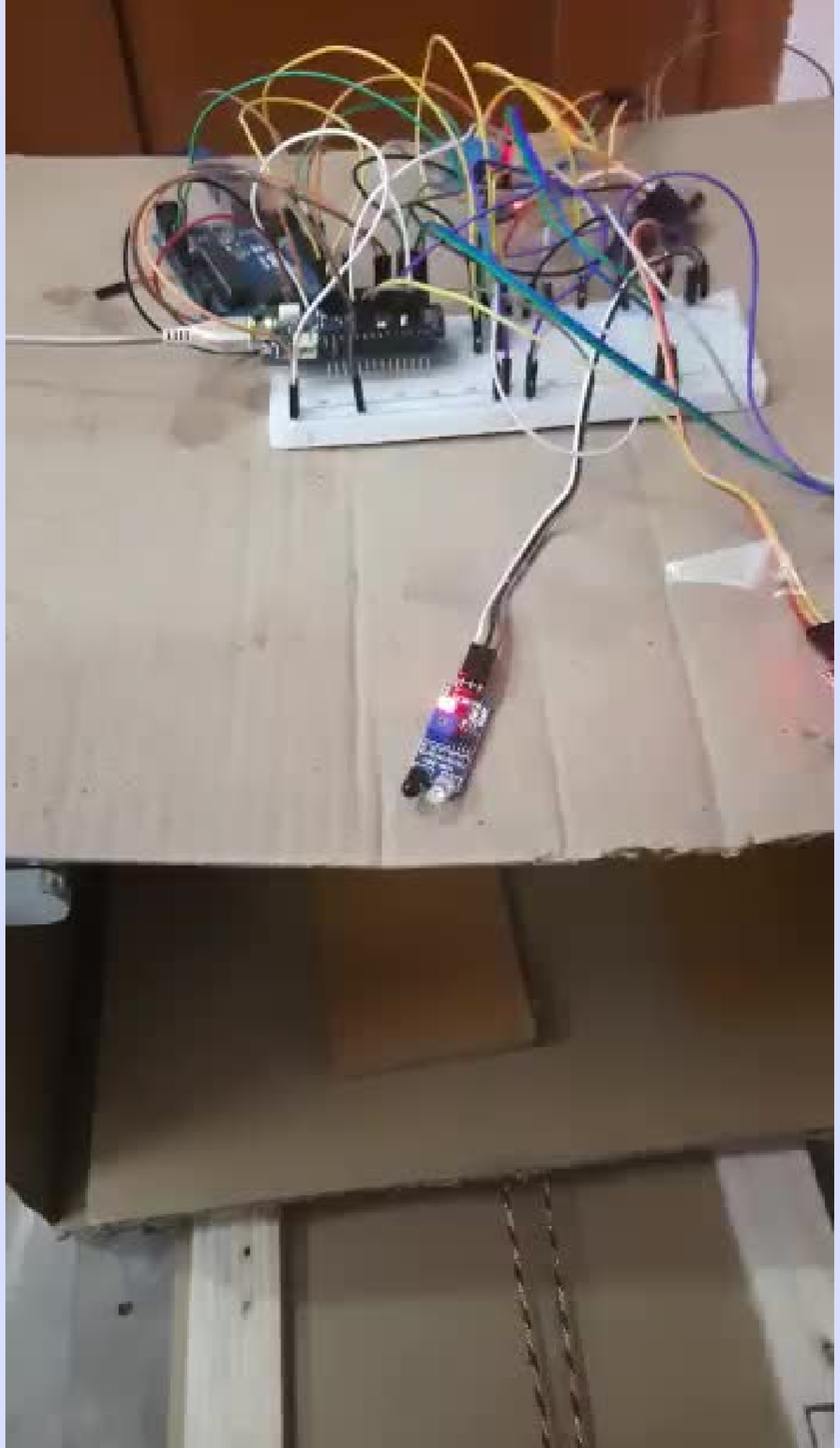
Working principle of the project

The timer is set either to default or by measuring the distance between the ultrasonic sensor and the hand.

After choosing the disinfect option, the relay is turned ON, thus turning on the UV-C lamp. After disinfecting one surface, the items are automatically flipped with the help of servo motors while the UV is still ON.

Lastly, after disinfection, the tray is again opened by the stepper motor.



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WORK DIVISION OF THE TEAM MEMBERS

Satvik Yadav

Making the hardware representation of the project, combining the hardware and software part and running the tests, video recording.

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Swabhiman Swain

Making the Fritzing model of the circuit, video editing and making the PowerPoint presentation.

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Devraj Das Adhikary

Dividing work among team members, running the simulations, video recording and editing, coding.

Bolmala Manoj Raj

Making the FreeCAD model of the Machine, , helping in searching the relevant information, Helping in background works.

Resources used:

- https://www.arduino.cc/
- Flipkart
- Amazon
- Robu.com
- Canva
- Youtube (for help in assembling)

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Thank you

Have a great day ahead.