# Dispenser Using Arduino

(Automatic Hand Sanitizer Dispenser)

**Group No :- 43**

# Introduction

- Now we are going through horrendous situation. The whole world is striving against deadly COVID-19. In this pandemic we came up with an idea to sanitize our hand effectively and smartly. Now whenever we go outside the home for buying essentials, on returning we have to sanitize our hand in fact nowadays sensitization is compulsory and every where we can find sanitizers.
- But there is a problem that we observed and that is , for sanitizing hand one has to press the lid of sanitizer, and again another person come and press the same lid so there may be a chance contamination and even some person may forget to sanitize their hand. In order to overcome this problem we take this initiative to design a machine that will automatically sanitize a person's hand and even inform the person and owner if he/she forget to sanitize.

# Existing work with limitations

- In current time a similar project is there which uses Arduino to sanitize human hand but it is not able to inform the owner whether a person sanitized his/her hand or not. Infact, If a person forget to sanitize then also it will not put any kind of alarm or inform that person.

# • Methodology –

- **1. Hardware part-**

a. Firstly the **HCSR04** ultrasonic sensor is used to detect the presence of hand in front of the device/ nozzle (general range is 20 cm from the sensor).

b. Secondly- After detecting the hand 12 V Peristaltic pump is employed to eject the right amount of liquid at the right time. i.e. when the hands are placed in the 20 cm range. And if anybody forget to sanitize their hand then it will start beeping as well as it will inform the owner by displaying the alert message .

[ For the above two steps an Arduino UNO board controls the pump based on the distance obtained from the ultrasonic sensor. ]

# Proposed work and methodology

- **Proposed Work –**

- Our project is designed in such a manner that when a person brings his/her hand near to the

**HCSR04 Ultrasonic Sensor** then it will automatically detect that and then the sprayer will spray sanitizer , which is controlled by Peristaltic Pump(12v).

- Infect we can use a solenoid valve in place of Peristaltic pump that will control the flow of sanitizer, which when energized the sanitizer will flow out and when de-energized the flow of sanitizer will be stopped.
- So we will write an Arduino program which always checks that if any hand is near the nozzle , if yes then the solenoid will be turned on and wait till the object is removed or else we will set a time after which solenoid will turn off automatically thus closing the supply of sanitizer . And if anybody forget to sanitize their hand then it will start beeping as well as it will inform the owner by displaying the alert message (For Future Purpose).

- The peristaltic pump is controlled via NPN Transistor (BC 547), a flyback diode (1N4007) is connected in parallel with the motor. The diode protects the Arduino from the back emf produced by the pump.
- An adapter (12 V 1 A DC Output) is used to power the Arduino, which in turn controls the 12 V Pump.
- We have to make sure the U. S. sensor is placed just above the outlet of the peristaltic pump so that it can detect the hands kept under the outlet.

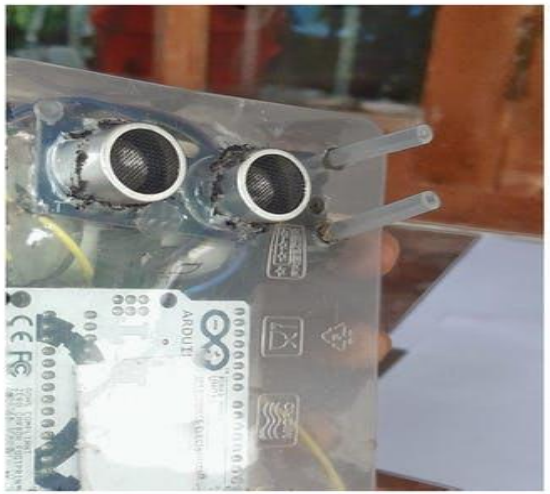


Fig :- Right Position Of the U.S sensor

## 2. Coding Part –

For coding we can use download Arduino IDE from (https://www.arduino.cc/en/main/software) else we can use Arduino online editor for writing the code online (https://create.arduino.cc/).

Basically we will use c/c++ (any other language can be used based on requirements) language for writing the code

Here there will be set of codes like-

i. Code that will work to distance measured by U.S sensor.

ii. Code that will run the Arduino and thus decide when to spray, when to stop, when to beep and put alert messages etc.

**A model code is given in the next slide.**

# Novelty of the project

- As already in the 5th slide under proposed work section we have discussed about the innovative idea which is not present in the current project i.e. we will modify it such that if a person forget to sanitize their hand then it will beep and as well as it will inform the owner.

In fact this simple machine can be installed anywhere like outside our building i.e. near the main entrance , infact many shopping malls, restaurants , hotels may adopt our device, since it will be more effective in sanitizing hand. So, this is the novelty of our project.

# Real time usage

- They're useful in the hospital, to help prevent the transfer of viruses and bacteria from one patient to another by hospital personnel. The spread of virus now can also spread from the container of sanitizer due to contact of many patients and hospital personals. Beyond a hospital setting, it's very difficult to show that hand sanitizing products are useful.

- That’s why an Automatic Hand Sanitizer is very much useful for the public places like Hospitals, offices, or in entrances of any public gathering. The automatic hand sanitizers do have a role during peak respiratory virus season (COVID-19 Pandemic) because they make it much easier to clean your hands without touching the container of hand sanitizer.

- It's much more difficult when you sneeze to wash your hands than it is to use an Automatic hand sanitizer, especially when you are outdoors or in a car i.e. we can use sanitizer without touching it. The Automatic hand sanitizers are much more convenient, so they make it more likely that people will clean their hands, and that's better than not cleaning at all.

- Due to its automatic sensing function, when your hands are away from the sensor, the soap Dispenser stops. No water liquid or soap drops. You don't need to touch the soap dispenser, So as to avoid cross infection effectively. This product can be installed in a variety of ways, Such as table-top, wall-mounted, in car, etc.

- This is a product which we should use at our home also. Because we can’t stop peoples from coming, and now its normal after this situation to keep Hand Sanitizer, so that anyone who’s Entering our house is safe.

- This AUTOMATIC HAND SENITIZER is the improved way to using hand sanitizer in more safer way.

# Hardware & software requirements

## 1. Hardware required

- **Arduino Uno**

- **Peristaltic Pump 12 V**


- **Ultrasonic Sensor - HC-SR04 (Generic)**

- **BC 547 NPN Transistor**

- **1N4007 – High Voltage, High Current Rated Diode**

- **Jumper wires (generic)**

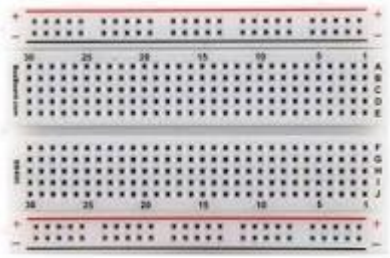
- **Hook Up Wire Kit, 18 AWG**

- **IRF540 MOSFET**

- **Solenoid Valve**

- **1k and 10k Resistor (may or may not be used)**

- **Breadboard (may or may not be used)**

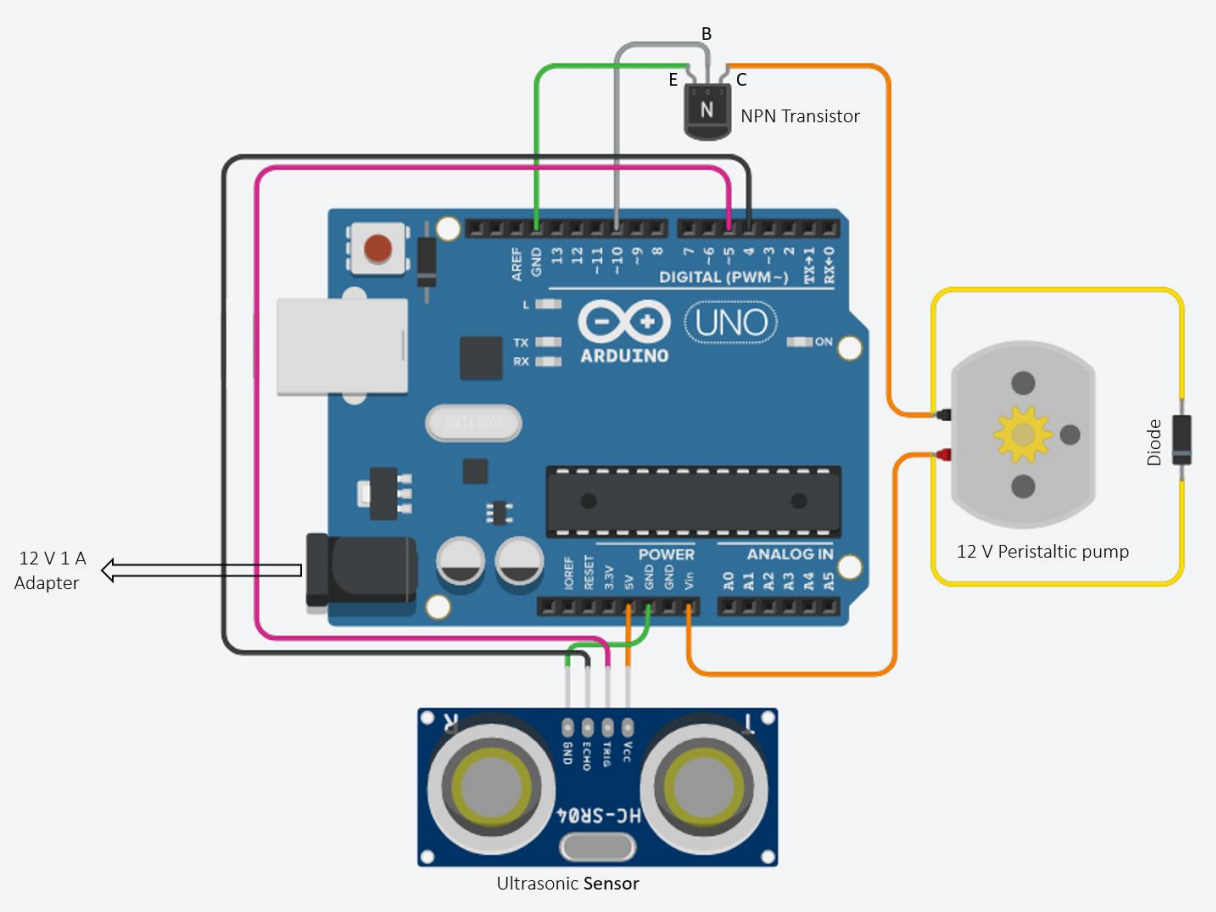


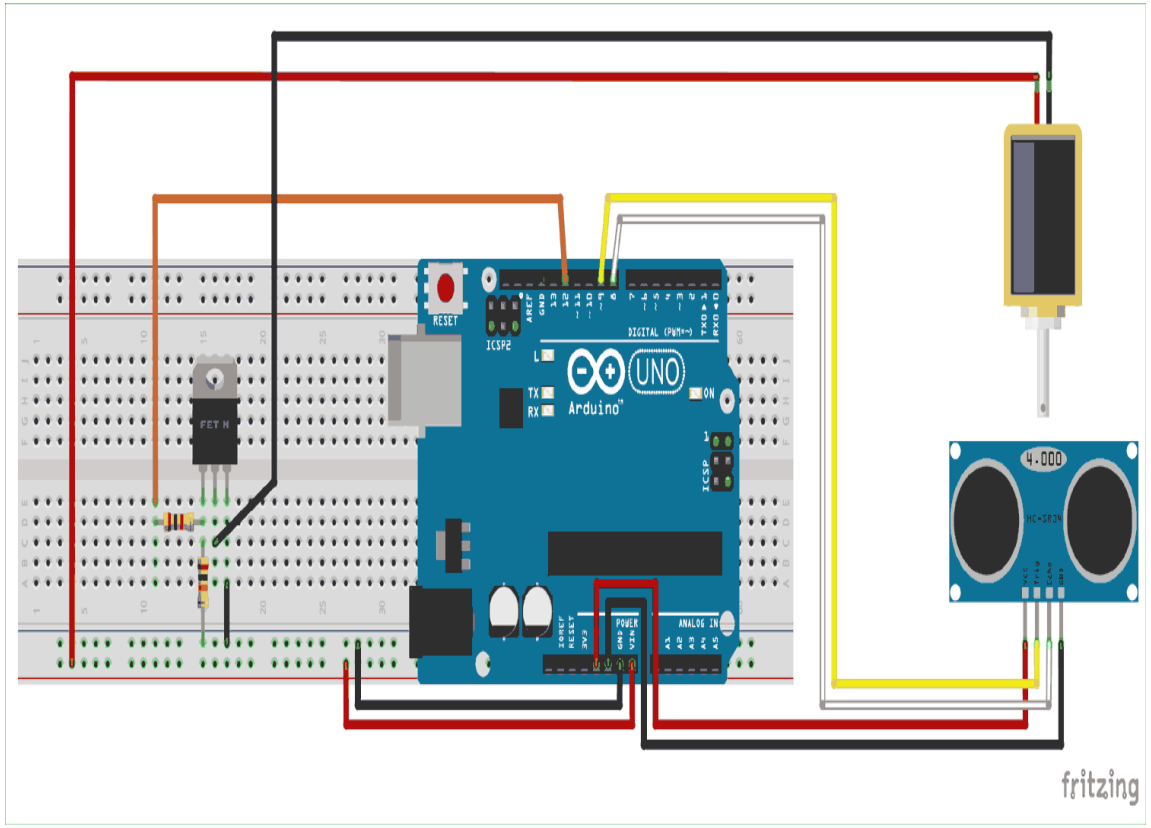
- **12 V 1 A Adapter**

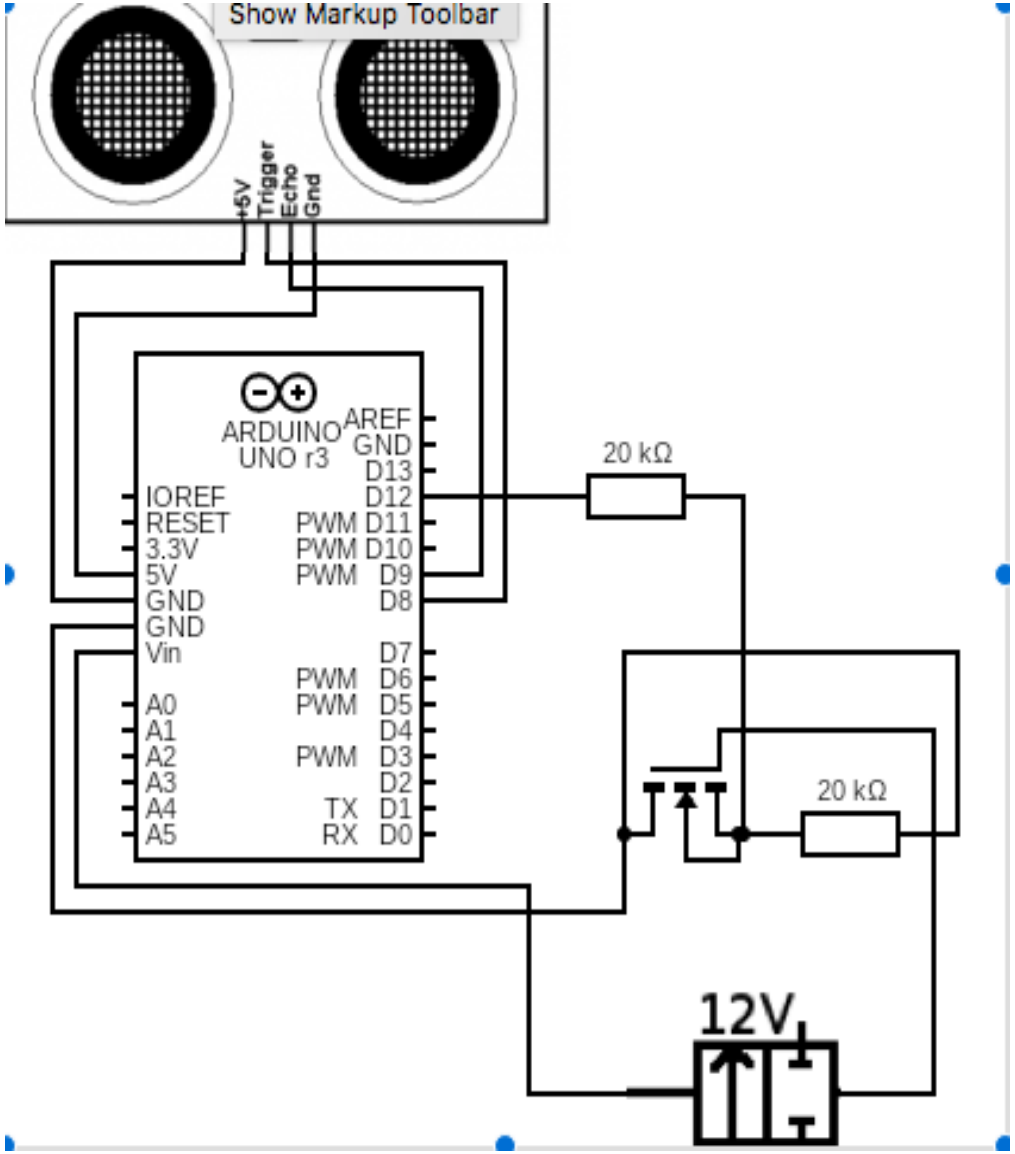
# Software required

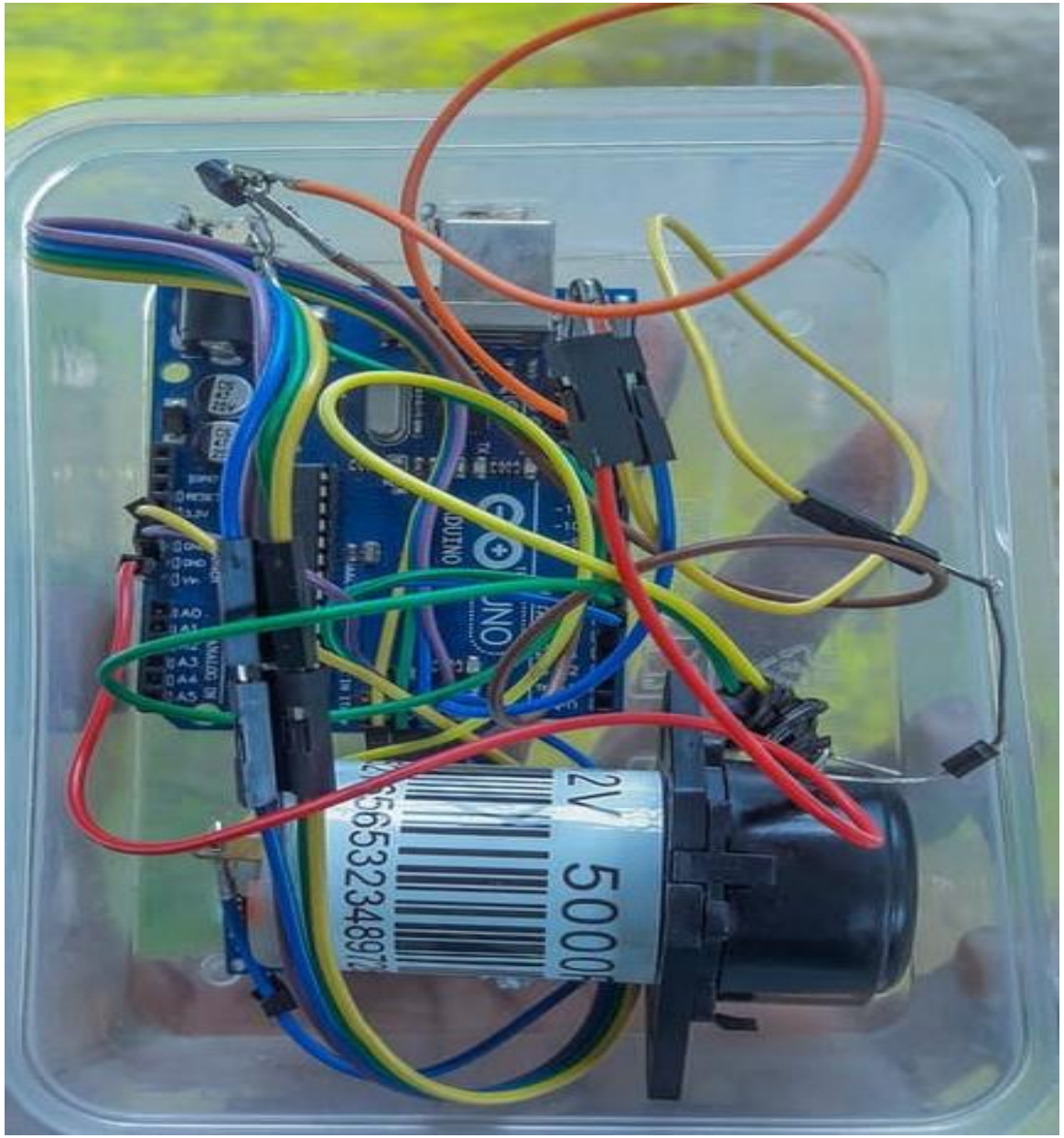
For coding we can download  Arduino IDE from(https://www.arduino.cc/en/main/software) else we can use Arduino online editor for writing the code online (https://create.arduino.cc/).

# Overall system architecture diagram




Show Markup Toolbar
+5V
Trigger
Echo
Gnd
ARDUINO
UNO r3
AREF
GND
D13
D12
PWM D11
PWM D10
PWM D9
D8
D7
PWM D6
PWM D5
D4
PWM D3
D2
TX D1
RX D0
IOREF
RESET
3.3V
5V
GND
GND
Vin
A0
A1
A2
A3
A4
A5
20 kΩ
20 kΩ
12V



# Literature review

- In Realtime almost similar type of project is available over the Internet and the link is https://bit.ly/3koNd89.
- In fact almost a device is also created by a 12 years old kid in India named as Sampreeth Nataraj https://bit.ly/3kpRxUX

## Description

The existing devices can effectively sanitize human hand but it could not able to identify the person who didn’t sanitise their hand .

# Module description

For our convenience we have divided our project into 2 main parts

1. Primary Part
2. Secondary Part

## Primary Part

- It consists of U.S sensor and Arduino UNO board. They are considered as primary parts because firstly the U.S sensor will detect the location of human hand and then it will pass the information to the Arduino.
- Now the Arduino will decide according to the distance measured that whether to spray sanitizer or not.

# Secondary Part

- It consists of NPN transistor , peristaltic pump , flyback diode ,led bulb.
- Now as soon  as the distance measured by U.S matches with our predefined distance then only the Arduino will set the base of the NPN transistor as high , that means NPN will turn to switch on condition and as result it will power the Peristaltic pump and the led bulb.

# Module work flow explanation.


1. Vcc
2. Trigger
3. Eho
4. Ground

5V

Grounded

9th Digital pin

10th Digital pin

Sends U.S waves

Receives U.S

(distance<=20)

true

Digital pin = 12,7,4 will set to high and thus buzzer, pump, led will work.

false

Pin = 12,7,4 will set to low and no work will be performed.

END

# Implementation and coding.

- Basically any Arduino program is divided into 3 parts like,

```
#define
```

Here we define pin and variables.

```
void setup()
    {
    the


    }
```

Here we define pins as input or output pins. This can be done by help of pinMode() method like , pinMode(13,OUTPUT) , i.e. more precisely here we define the pin mode.

```
void loop()
    {


    }
```

Here we write the Main program ,commands and Logic of what do?

Using-Ultrasonic-Sensor-HC-SR04 | Arduino 1.8.13

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Using-Ultrasonic-Sensor-HC-SR04 §

```
//code for Dispenser Using Arduino(Automatic Hand Sanitizer Dispenser)
// defines pins numbers
#define led  12
#define buzzer 4
#define trigPin 9
# define echoPin 10
// defines variables
long duration;
int distance;

void setup() {
pinMode(trigPin, OUTPUT); // Sets the trigPin as an Output
pinMode(echoPin, INPUT); // Sets the echoPin as an Input
pinMode(led,OUTPUT);     // here we define the pinmode of led i.e 12th digital pin
pinMode(7,OUTPUT);      // so here we have connected the base of NPN tansistor at 7th digital pin
```

Done printing.

```
pinMode(buzzer,OUTPUT); // here we define the pinmode of buzzer i.e 4th digital pin
Serial.begin(9600);     // Starts the serial communication
}

void loop() {
// Clears the trigPin
digitalWrite(trigPin, LOW);
delayMicroseconds(2);

// Sets the trigPin on HIGH state for 10 micro seconds
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin, LOW);

// Reads the echoPin, returns the sound wave travel time in microseconds
```

```
duration = pulseIn(echoPin, HIGH);

// Calculating the distance
distance= duration*0.034/2;

// Prints the distance on the Serial Monitor
Serial.print("Distance: "); // it will show us the distance measured in the serial moniter
Serial.println(distance);

if(distance<=20)                // checking the presence of hands in 20 cm limit
  {
    digitalWrite(7,HIGH);     // if present motor operates for some time
    delay(900);                 // delay value to changes the operating time
    digitalWrite(7,LOW);      // pump stop working for some time
    delay(1000);                // some delay prevents continous operation
```

Using-Ultrasonic-Sensor-HC-SR04 | Arduino 1.8.13

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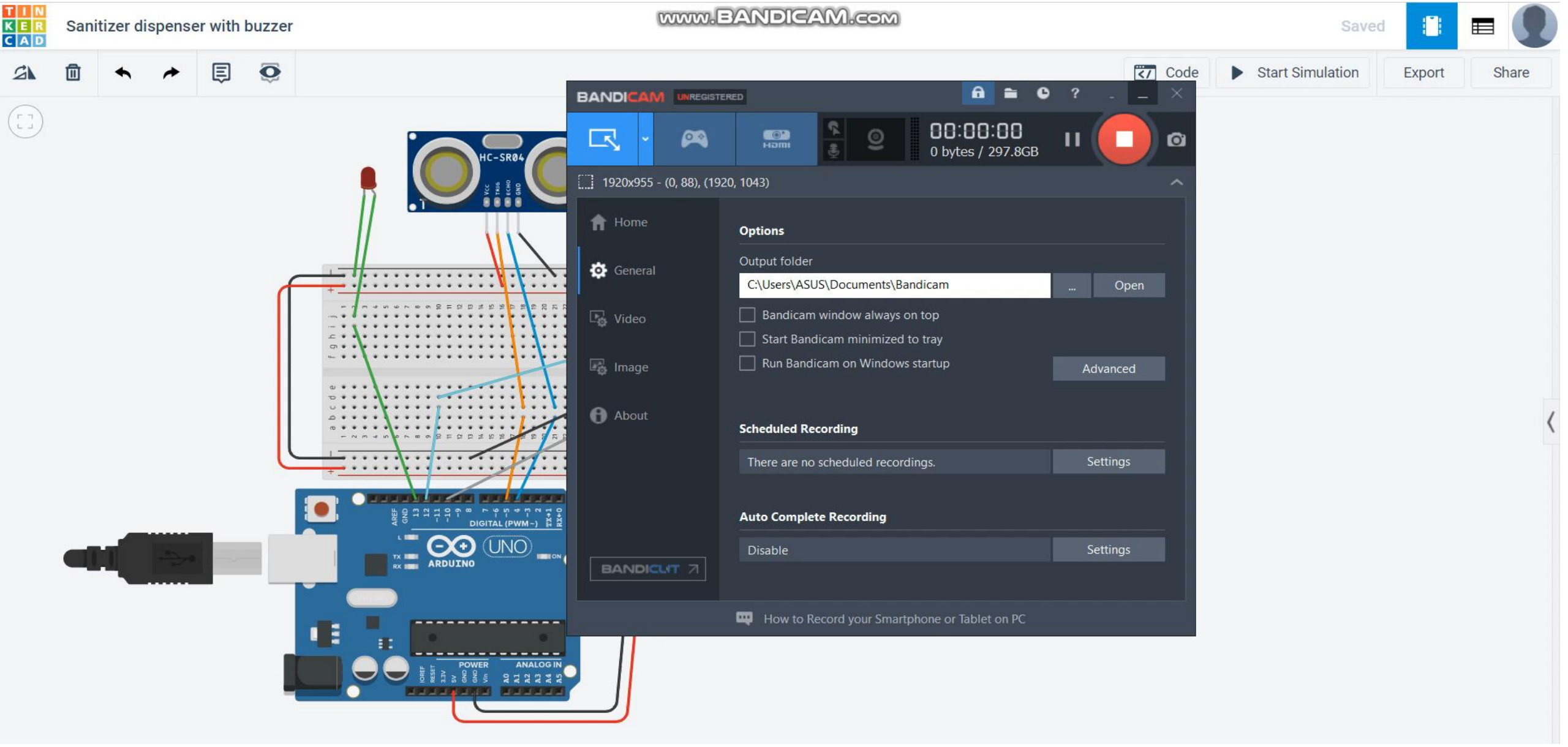
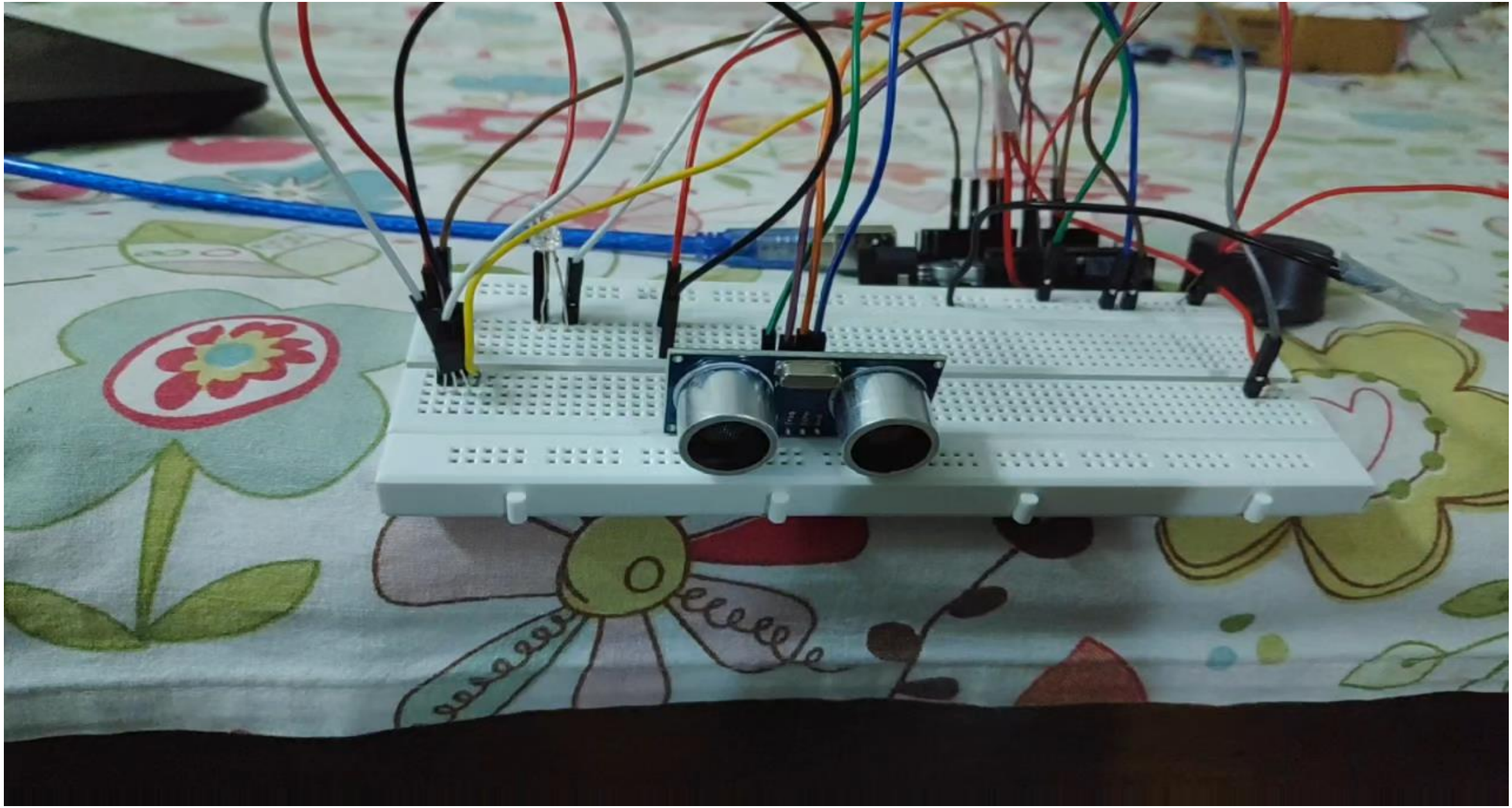
Using-Ultrasonic-Sensor-HC-SR04 §

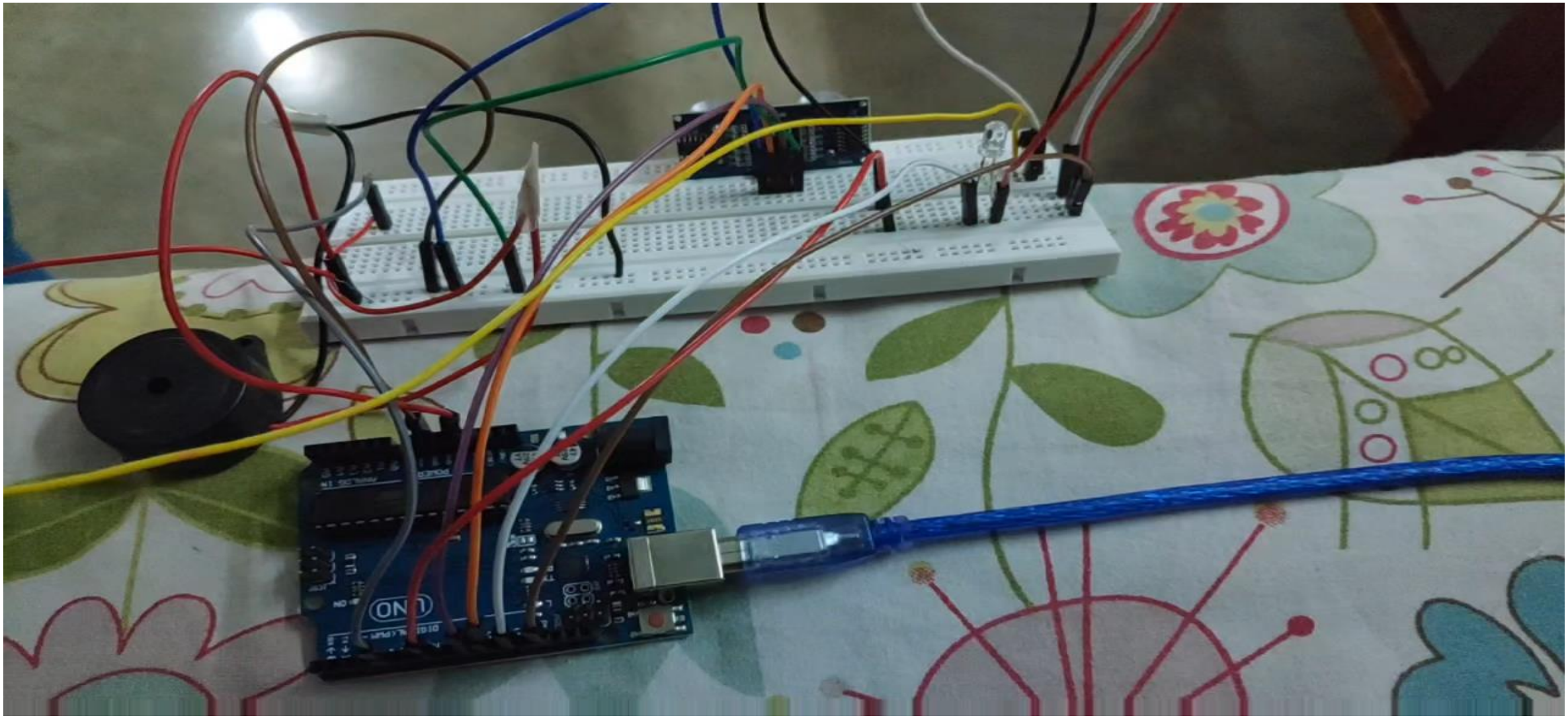
```
    digitalWrite(led,LOW);
    delay(1000);
    tone(buzzer,2000);  // so here buzzer will start beeping at a frequency of 2000Hz
    delay(900);
    noTone(buzzer);
    }
  else
  {
    digitalWrite(7,LOW);      // if no hands detected - no operation
    digitalWrite(led,LOW);
    digitalWrite(buzzer,LOW);
  }
  delay(1000);          // delay of 1second pis given so that the whole system comes back to original
                        // original state
}
```

Done printing.

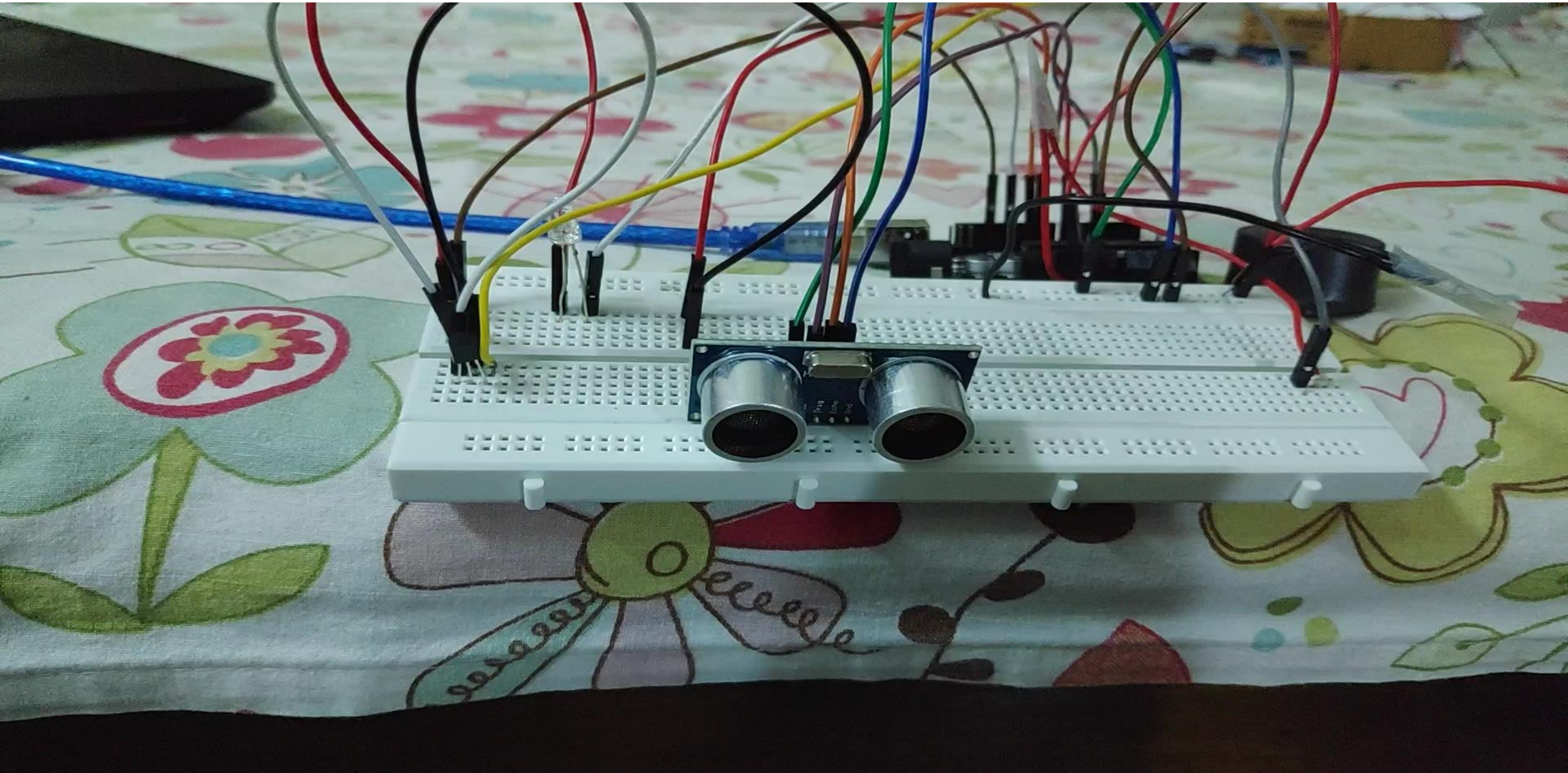
# Demo video(simulation)

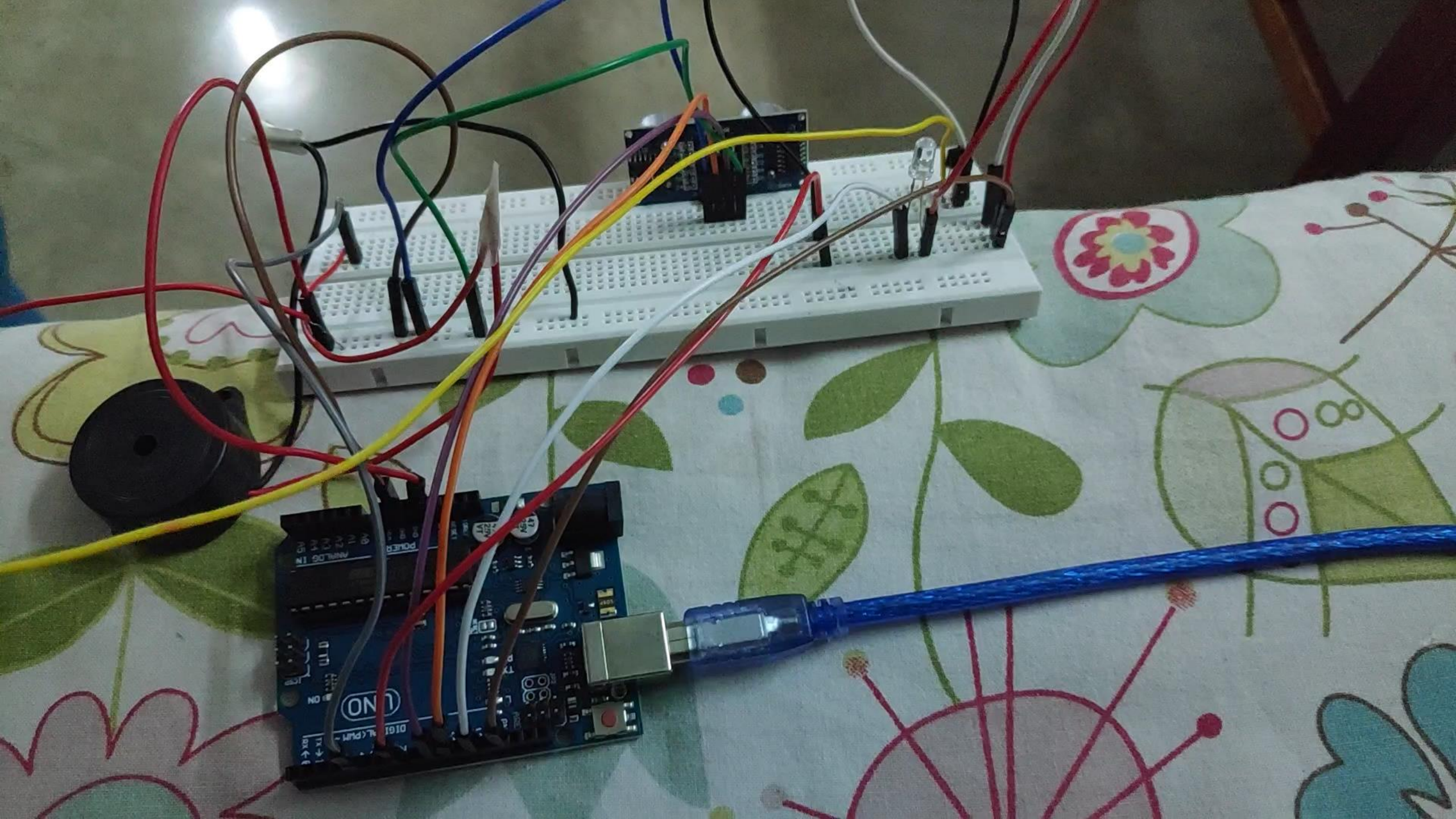






# Snap shots of our project





# Result and Discussion (Input and output)

- **INPUT :-** According to our project, input is nothing but the distance measured by the U.S sensor.
- **OUTPUT :-** Now Arduino will take the input and process it and accordingly it will give output by spraying the sanitiser.
- **DISCUSSION** :- If the distance measured lies in the prescribed range i.e. less than or equal to 20 cm then only Arduino will start processing it by setting NPN transistor high and accordingly the peristaltic pump and led bulb will work , otherwise they will not work.

# Conclusion

- This project has discussed the effective as well as smart technique to sanitize human hand during this pandemic situation.
- The objectives of this project were to develop a hardware that can effectively execute our idea and vision.
- [project summary and goals] Both objectives were met.
- [overall results] Whenever a person brigs his\her hand at a favorable distance then only it will spray the sanitizer otherwise not.
- [Futuristic plans] we have designed our system in such a way that it will be easy to modify and bring further development ,like one can implement some kind of notification or alarm system instead of glowing that that led bulb by interfacing a WIFI module.