# AUTOMATIC HAND SANITIZER DISPENSER

**A PROJECT REPORT**

*Submitted by*

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*in partial fulfillment for the award of*

Diploma

IN

INFORMATION TECHNOLOGY


DEPARTMENT OF INFORMATION TECHNOLOGY

GOVERNMENT POLYTECHNIC MUMBAI.

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# GOVERNMENT POLYTECHNIC MUMBAI

## DEPARTMENT OF INFORMATION TECHNOLOGY

## CERTIFICATE

This is to certify that the project entitled **"AUTOMATIC HAND SANITIZER DISPENSER"** is the bonafide work of **"SHAIKH ABDUL RAHIM USMAN(SS19IF008),MOHAMMED SAQLAIN SHAIKH(SS19IF009),ABID KHAN(SS19IF056)"** , submitted in partial fulfillment of the requirements for the award of Diploma in Information Technology of Government Polytechnic Mumbai.

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# DECLARATION

We hereby declare that the project entitled **"Automatic Hand Sanitizer Dispenser" being submitted by us towards the** partial fulfillment of the requirements for the award of Diploma in Information Technology is a project work carried by us under the supervision of Prof.Kunal Deokar and have not been submitted anywhere else.

We will be solely responsible if any kind of plagiarism is found.

Date:- 02/01/2022

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**ABSTRACT**

The government through the Ministry of Education and Culture has made a decision to suspend teaching and learning activities in schools. The learning process that starts face to face directly in the classroom turns into distance learning /brave. However, the government decided to reopen schools in the Covid-19 corona virus green zone for teaching and learning activities for students. The opening of special schools in the green zone will be held in mid-July 2022. School openings must be opened with strict health protocols, no updated potential for new Covid-19 clusters in schools. This is a form of application of the "New Normal" that is being adapted to the people of India. Indian people must consider the existence of this corona virus pandemic with new normalcy, such as using a compilation mask outside the home, always using a hand compass tool and using a loudspeaker and distance measuring device. The purpose of this study was to make an automated hand sanitizer design as an effort to improve the delivery of Covid-19 in schools. Automatic hand sanitizer is useful to facilitate the hand sanitizer liquid out of the bottle, so it is more effective to use and does not run out quickly. This study uses an Arduino Nano microcontroller as the main control, a human hand detection sensor, and a servo motor as an actuator that will activate the automatic bottle. The mouth of the hand sanitizer bottle uses an elastic hose that leads to the part where

the cleaning liquid comes out. This research uses the Research and Development (RnD) method. The result of this research is an automatic hand sanitizer with a large size hand sanitizer that can be mounted into a tool with a maximum of 500 ml. This automatic hand sanitizer will automatically release the hand sanitizer fluid which approves the sensor under the user's hand protective device.

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**I.Introduction**

1 Basic Idea: Over the last months the COVID-19 pandemic has been spreading chaos all around the world. There are countless infections and unfortunately many casualties. One of the most important measures suggested by the World Health Organization is constant hand washing with either soap or hand sanitizers. But one of the most significant problems is the way we do it and that is by physically touching the dispenser which eliminates the whole purpose of the action and even creates a great risk of infection. So I, decided to create something using an Arduino board that could combat this problem, but I also wanted it to be cheap and to be able to be attached to many different dispensers easily, quickly and effectively! And this is exactly what I made, an accessory that can be attached to most hand sanitizer/soap dispensers and turn them completely hands-free and automatic

The corona virus has caused the Covid-19 pandemic in the world. The virus, which was first discovered in Wuhan City, China at the end of December 2019, has had a tremendous impact on the survival of world citizens. The reason is, this virus spreads quickly and has spread to almost all citizens of the country, including India. The government through the Ministry of Education and Culture and the Ministry of Religion has opened school in the green zone during the Covid-19 pandemic starting July 2020 in several regions in India.

The opening of the school must be accompanied by stringent health protocols, that is not found potential

new cluster Covid-19 in school.

This is a form of application of the "New Normality" which is being adapted to Indonesian society. "New Normal" means a new normal state (never existed before). The Indian people must adapt to the corona virus pandemic with new norms, such as wearing a mask when going outside, always washing hands or using a hand sanitizer and maintaining physical distance when in a crowded place.To welcome the implementation of the "New Normality", schools are obliged to prepare proper and strict health protocols. Apart from providing soap and Advances in Engineering Research,running water for washing hands, of course schools also have to provide a hand sanitizer in each classroom or room that is easily accessible and frequently used. Hand sanitizer is an instant hand sanitizer that can kill germs without using water and can be used anytime and anywhere . Because of its practicality, a hand sanitizer is very suitable for use in a Covid-19 pandemic like this. When the central government implemented the "New Normality" by opening schools during the Covid-19 pandemic, schools were obliged to maintain the health of all academicians, both teachers and employees., and students, as well as school guests. WHO (World Health Organization) recommends taking care of yourself in order to survive the corona virus which allows it to stick to hands. Therefore, an automatic hand sanitizer is needed that is practical and efficient in regulating the release of gel and hand sanitizer liquid that comes out of

the bottle.

Before entering the classroom, according to the protocol, the teacher and students wash their hands using soap provided by the school and a hand sanitizer in each class. The school does not provide a place to wash hands in every class, and it is felt that it will take a long time for students to queue to wash their hands. terms, an automatic hand sanitizer In practical makes it very easy for users to use the hand sanitizer and reduces touch. This Automatic Hand sanitizer uses the Arduino Leonardo Pro Micro as a microcontroller and an Ultrasonic sensor as a human hand detector.

## 2. METHODS

Hand sanitizer s need to be prepared in each classroom. Making an Automatic Hand sanitizer based on a Microcontroller is an automatic system that functions to increase the efficiency of using the hand sanitizer so that it is more effectively used and does not run out quickly in use. Automatic hand sanitizer is useful for making it easier for the hand sanitizer liquid to come out of the bottle, so that students don't have to press the bottle first. This Automatic Hand sanitizer uses the Arduino UNO as a microcontroller and an infrared sensor as a human hand detector. The pump motor gets power from a 9 volt battery and acts as an actuator that will press the bottle automatically. The mouth of thebottle is hand sanitizer connected using an elastic hose that leads to the part where the sanitizer

liquid comes out.hand sanitizer This automaticwas developed with the aim of improving strict health protocols, so that no Covid-clusters are found new19 in schools.

The research method used is the method of research and development (Research and Development or R&D). Research and Development (R&D) methods are research methods used to research a product to produce a new product and then test the effectiveness of the product so that it can function in the wider community. This research and development method was chosen because it is longitudinal andstill canbe developed in the future.

**2.1. Collecting Data and Information**

Collecting data and information in this study using observation techniques. The observation technique was carried out to determine the proper and efficient design of the automatic hand sanitizer. The tool was designed based on observations about the hand sanitizer that had been circulating in the community, then an automatic system was added to reduce touch so as to prevent and reduce transmission of Covid-19.

**2.2. Making Tool**

In designing an automatic hand sanitizer using a voltage source that comes from a 9 Volt battery.

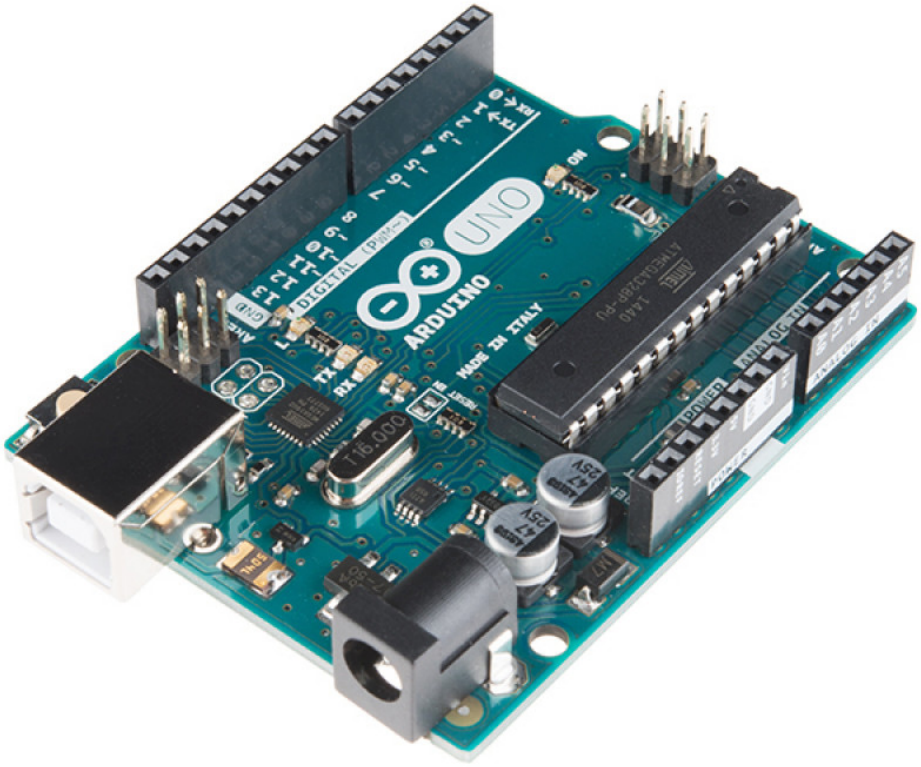
On the front of the automatic hand sanitizer, there is the HC-SR04 ultrasonic sensor. The ultrasonic sensor is used to detect hands with a distance of approximately 7 cm from the sensor. If a human hand has been detected, the sensor will send input to the Arduino nano as a microcontroller (central controller). The Arduino

nano microcontroller is the control main which has a program to access data from the input of the ultrasonic sensor. Arduino nano will send a signal and drive the motor, so that it will press the hand sanitizer liquid to the water pass . The hand sanitizer liquid will be released by hand sanitizer bottle in front of the appliance.

The main part of the automatic hand sanitizer working system is the Arduino UNO as the main control. In Arduino, there are programs that are used to access data from the input. The input consists of an ultrasonic sensor. The data from the sensor ultrasonic is then processed by the microcontroller to control the Arduino output in the form of motor drivers and lights indicator. The motor driver is used to start the motor when getting commands from the microcontroller . The motor driver is used because the microcontroller cannot directly turn on the motor.

## 3.COMPONENTS

1.AURDINO UNO BOARD.

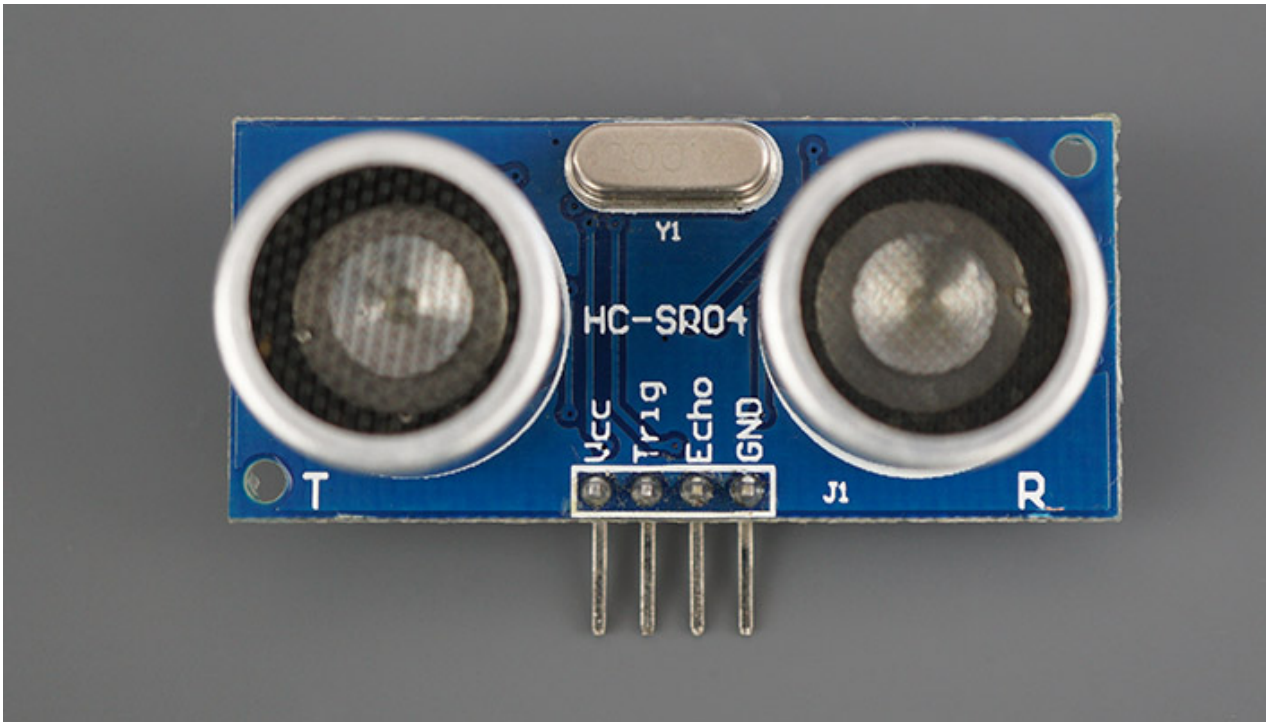



Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board.

Arduino was born at the Ivrea Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. As soon as it reached a wider community, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for IoT applications, wearable, 3D printing, and embedded environments.

All Arduino boards are completely open-source, empowering users to build them independently and eventually adapt them to their particular needs. The software?, too, is open-source, and it is growing through the contributions of users worldwide.

2. ULTRASONIC SENSOR HC-SR04.



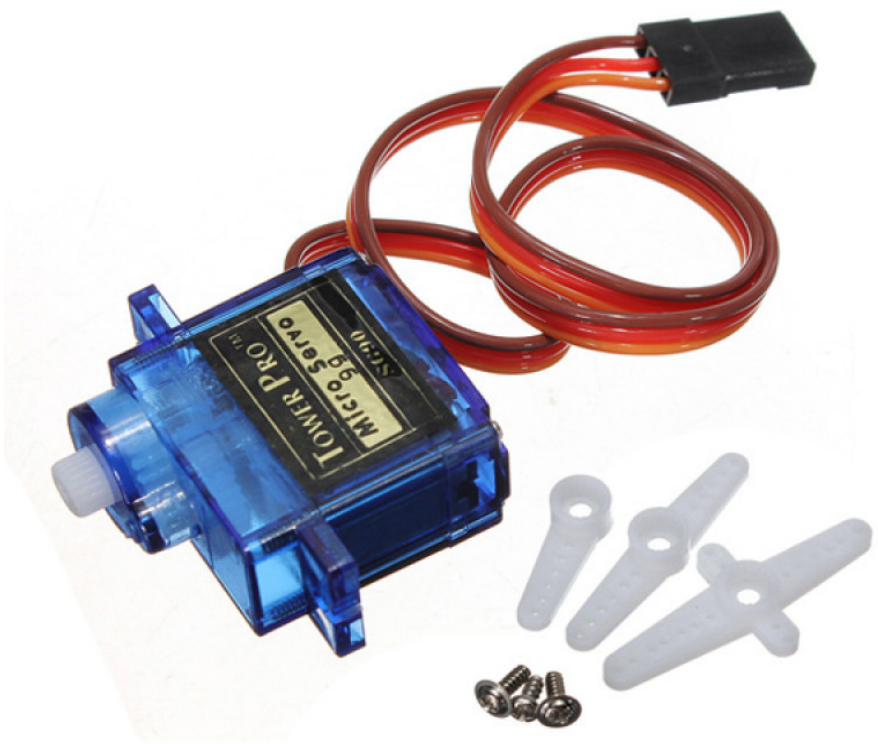

The HC-SR04 Ultrasonic Distance Sensor is a sensor used for detecting the distance to an object using sonar. It's ideal for any robotics projects your have which require you to avoid objects, by detecting how close they are you can steer away from them!
The HC-SR04 uses non-contact ultrasound sonar to measure the distance to an object, and consists of two ultrasonic transmitters (basically speakers), a receiver, and a control circuit. The transmitters emit a high frequency ultrasonic sound, which bounce off any nearby solid objects, and the reciever listens for any return echo. That echo is then processed by the control circuit to calculate the time difference between the signal

being transmitted and received. This time can subsequently be used, along with some clever math, to calculate the distance between the sensor and the reflecting object!

**The HC-SR04 Ultrasonic Range Sensor Features:**

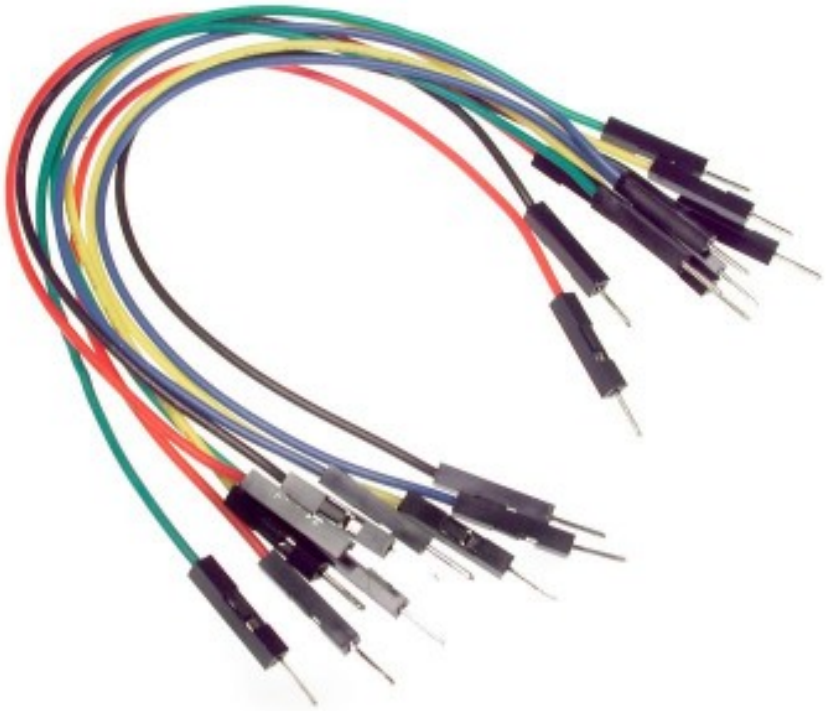
- Input Voltage: 5V
- Current Draw: 20mA (Max)
- Digital Output: 5V
- Digital Output: 0V (Low)
- Working Temperature:  -15°C to 70°C
- Sensing Angle: 30° Cone
- Angle of Effect: 15° Cone
- Ultrasonic Frequency: 40kHz
- Range: 2cm - 400cm
- Dimensions
    - Length: 43mm
    - Width: 20mm
    - Height (with transmitters): 15mm
    - Centre screw hole distance: 40mm x 15mm
    - Screw hole diameter: 1mm (M1)
    - Transmitter diameter: 8mm

3.SERVO MOTOR SG-90




Micro Servo Motor SG90 is a tiny and lightweight server motor with high output power. Servo can rotate approximately 180 degrees (90 in each direction), and works just like the standard kinds but smaller. You can use any servo code, hardware or library to control these servos. Good for beginners who want to make stuff move without building a motor controller with feedback & gear box, especially since it will fit in small places. It comes with a 3 horns (arms) and hardware.

4.JUMPER WIRES(male to female,male to male).



Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. Jumper wires are typically used with breadboards and other prototyping tools in order to make it easy to change a circuit as needed. Fairly simple. In fact, it doesn't get much more basic than jumper wires.

5. 9Volt BATTERY.


6.9V Battery Snap with DC Jack.

## 4. How it's work ?

Here, we use an Ultrasonic distance sensor, Servo motor and Arduino board. here I am using Arduino Uno. You can also use any other microcontroller. When we place our hand in front of the distance sensor, it will help to the Arduino to measure the distance from the sensor to object (here the hand). if the object in the desired range, Arduino will write the servo to 180. Servo motor is mounded on the hand sanitizer bottle. And the trigger of bottle is connected to servo by a thread. When servo motor rotate, the trigger will press.

## 5. Test Results

Testing of automatic hand sanitizer tools is carried out by testing the performance of automatic hand sanitizer s. Testing of the automatic hand sanitizer tool is in the form of testing the success rate of the tool. The component that detects hands is an ultrasonic sensor. Testing is done by testing the ultrasonic sensor by placing your hands at a certain distance, namely 5 cm, 7 cm, and 10 cm. The test was carried out on 10 people with 10 detections for each person and the distance between the hands and the sensor.

The automatic hand sanitizer sensor will work properly when the hand is at a distance of 7 cm.The successful discharge rate of hand sanitizer reaches 100%. The success rate of automatic hand sanitizer with a hand distance of 5 cm from the sensor reaches 90%.

While the success rate of automatic hand sanitizer with a hand distance of 10 cm from the sensor reaches 10 cm. This is because the program is set at 7 cm to match the hand sanitizer fluid discharge .

The program distance can be adjusted via the Arduino program.

# 6.CODING AND CIRCUIT DIAGRAM

```
#include <Servo.h>

const int trigPin = 9;

const int echoPin = 8;

long duration;

int distance;

Servo myServo;

void setup()

{

myServo.attach(7);

pinMode(trigPin, OUTPUT); // Sets the trigPin as an Output

pinMode(echoPin, INPUT); // Sets the echoPin as an Input

Serial.begin(9600);

}

void loop() {

distance = calculateDistance();

myServo.write(0);

if ( distance < 5)
```

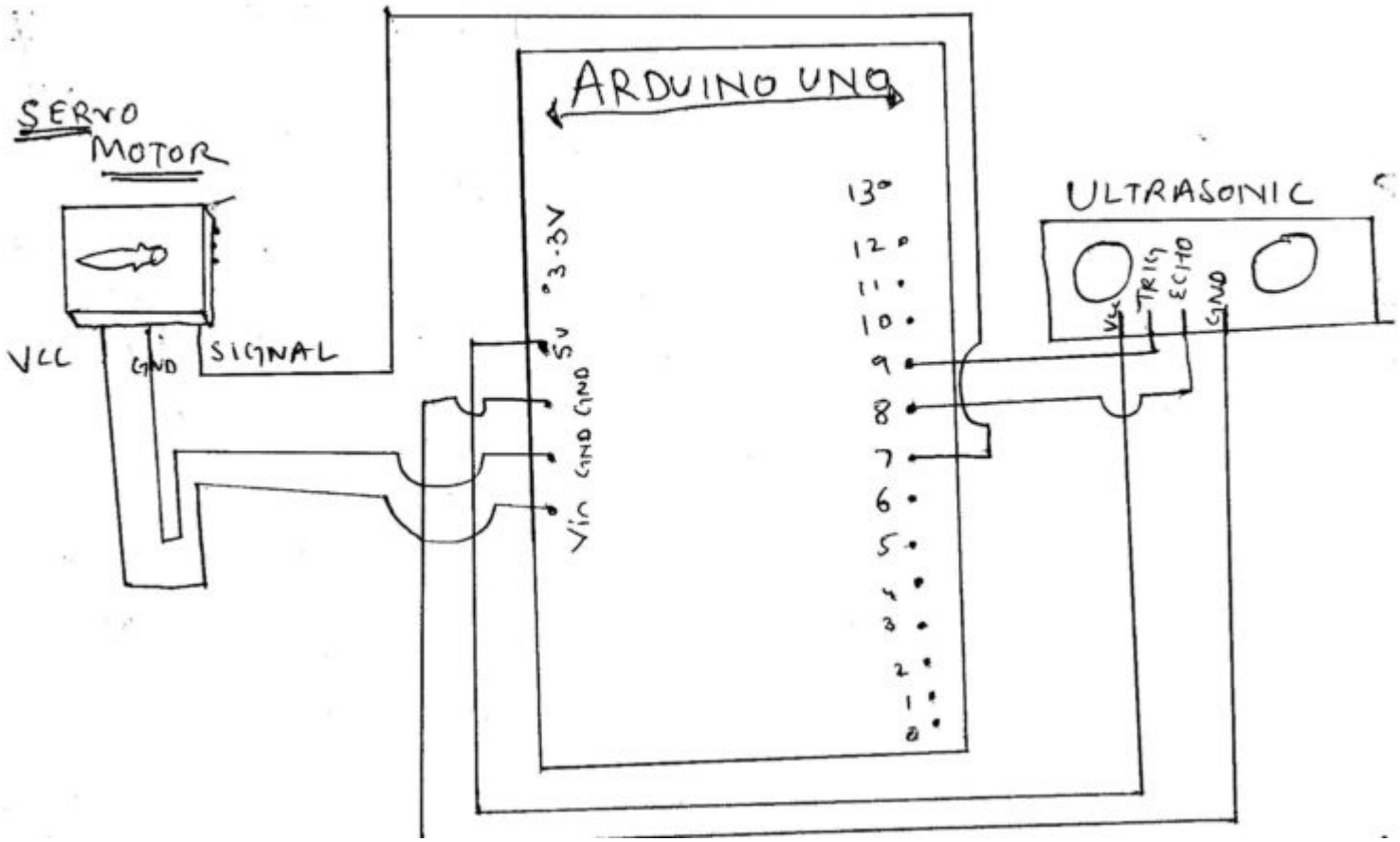
```
{ myServo.attach(7);
myServo.write(160);
delay(500);
myServo.write(0);
delay(1000);
}
else{
myServo.detach();
}
Serial.println(distance);
}
int calculateDistance(){
digitalWrite(trigPin, LOW);
delayMicroseconds(5);
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin, LOW);
duration = pulseIn(echoPin, HIGH);
```

```
distance= duration*0.034/2;

return distance;

}
```

CIRCUIT DIAGRAM:

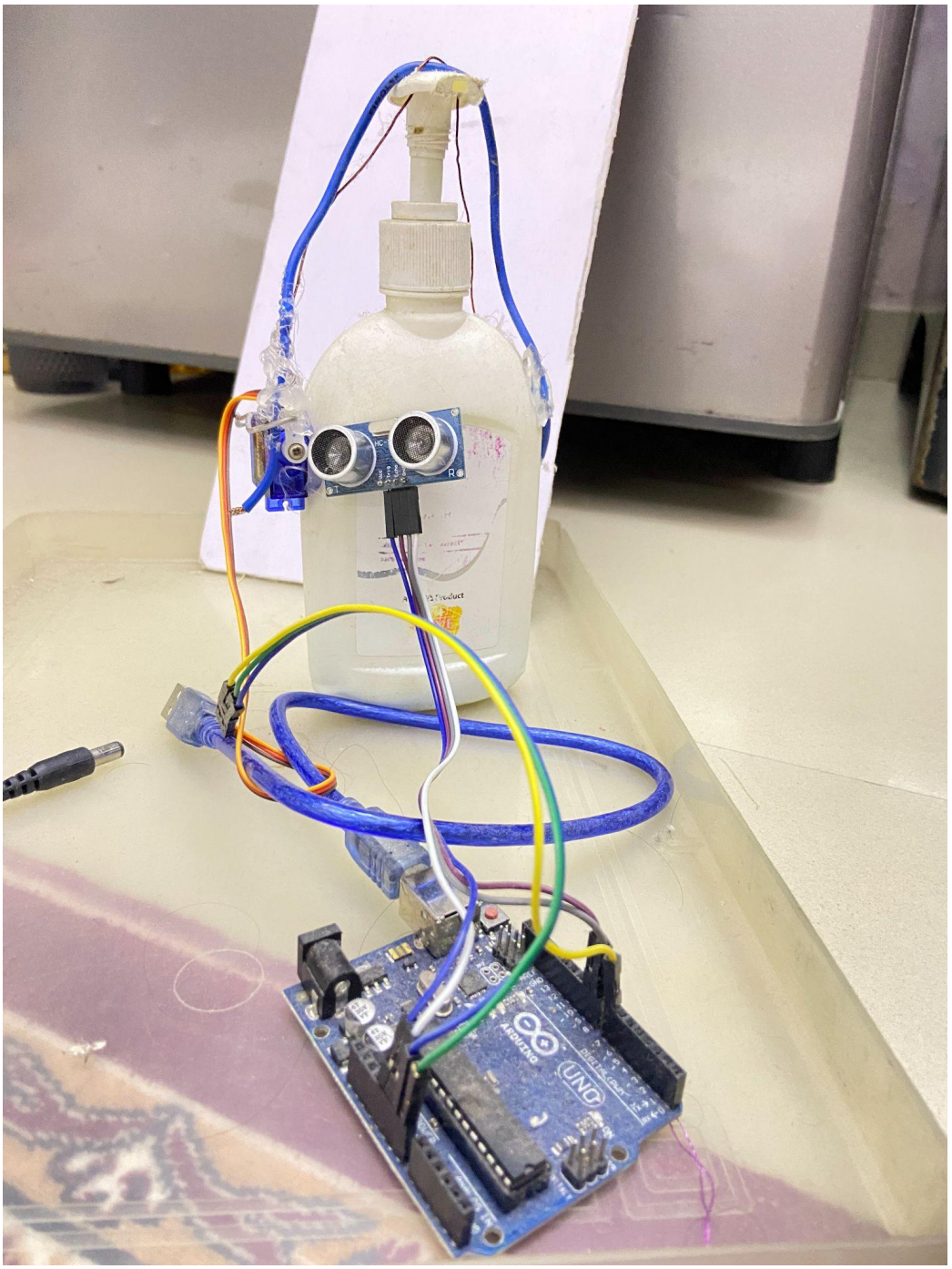


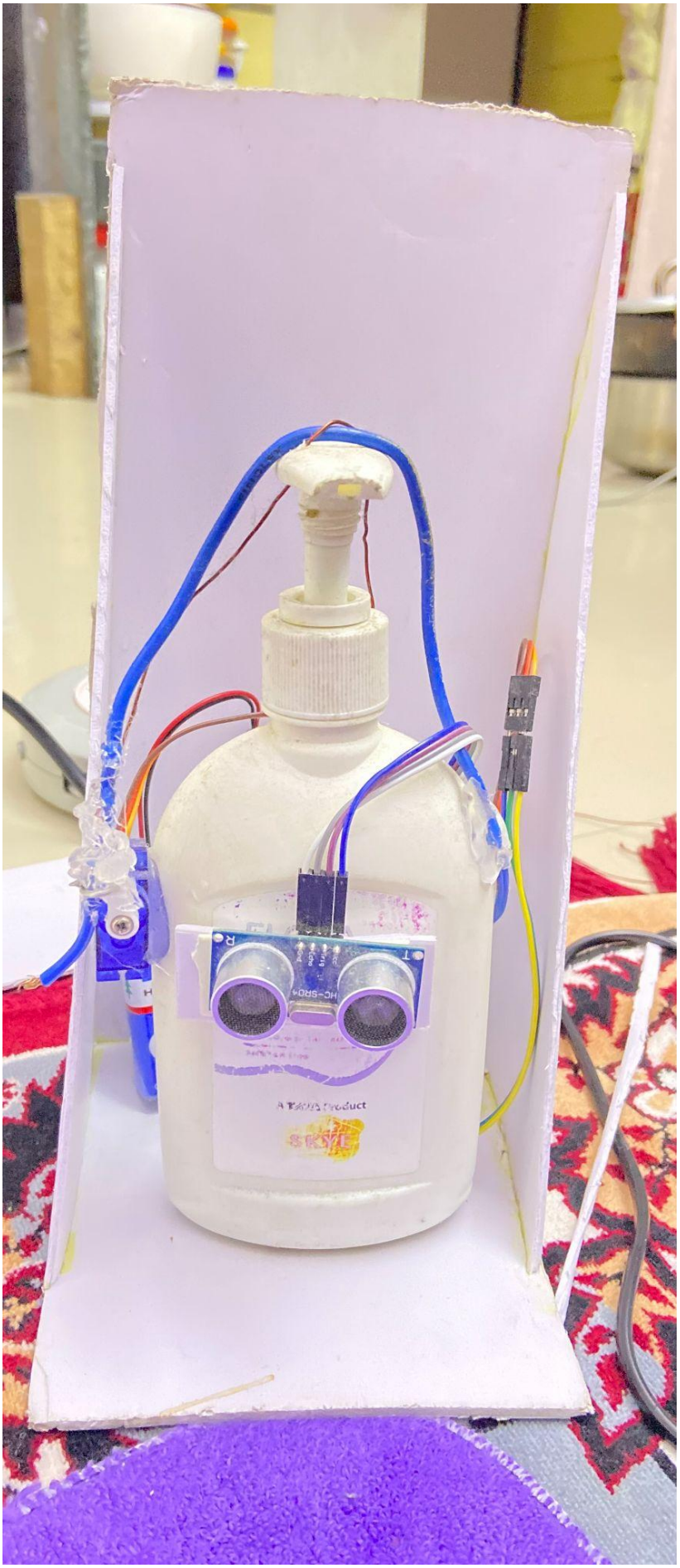
## 7.ADDITIONAL INFORMATION

The use of a touchless automated hand sanitizer dispenser may play a key role to reduce contagious diseases. The key problem of the conventional ultrasonic and infra-red-based dispensers is their malfunctioning due to the interference of sunlight, vehicle sound, etc. when deployed in busy public places. To overcome such limitations, this study introduced a laser-based sensing device to dispense sanitizer in an automated touchless process. Method: The dispensing system is based on an Arduino circuit breadboard where an ATmega328p microcontroller was pre-installed. To sense the proximity, a light-dependent resistor (LDR) is used where the laser light is to be blocked after the placement of human hands, hence produced a sharp decrease in the LDR sensor value. Once the LDR sensor value exceeds the lower threshold, the pump is actuated by the microcontroller, and the sanitizer dispenses through the nozzle. Results and discussion: A novel design and subsequent fabrication of a low-cost, touchless, automated sanitizer dispenser to be used in public places, was demonstrated. The overall performance of the manufactured device was analyzed based on the cost and power consumption, and environmental factors by deploying it in busy public places as well as in indoor environment in major cities in Bangladesh, and found to be more efficient and cost-effective compared to other dispensers available in the market. A comprehensive discussion on this unique design compared to the conventional ultrasonic and infra-red based dispensers, is presented to show its suitability over the commercial ones. The guidelines of the World Health Organization are followed for the preparation of sanitizer liquid. A clear demonstration of the circuitry connections is presented herein, which facilitates the interested individual to manufacture a cost-effective dispenser device in a relatively short

time and use it accordingly.

## 8.PICS OF PROJECT




HC-SR04

## 9. CONCLUSION

Based on the results of the research on the design of the automatic hand sanitizer that the researchers did, it can be concluded that the hand sanitizer can work well when the hands are at a distance of 7 cm. According to the researchers, 7 cm is considered ideal because it has been adjusted to the discharge pipe for the hand sanitizer . The hand sanitizer can be active for approximately 20 hours and one time filling of the hand sanitizer liquid can be used up to 400 times.