

Sensor Lab (Course Code: ITL603)

Automatic Body Sanitizer Dispenser

T. E. Information Technology

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CERTIFICATE

This is to certify that the project entitled **Automatic Body Sanitizer Dispenser** is a bonafide work of **Monik Kaole, Faustina Lazarus , Bennet Menezes , Dhruv Dave, roll no-09, roll no-10, roll no-11, roll no-12** submitted to the University of Mumbai towards completion of mini project work for the subject of **Sensor Lab (Course Code: ITL603)**.

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Date:

DECLARATION

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.



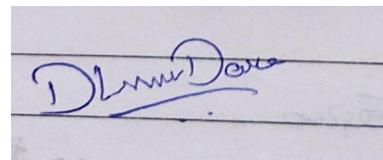
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ABSTRACT

Considering the current global pandemic WHO, an international organization regarding health, suggested that sanitizer is one of the best solutions to face this crisis and to avoid viruses from entering the body. Viruses spread through contact and by means of air, and eyes so it became important to sanitize our hands as we frequently touch the face with the hands. But after a few uses of regular sanitizer it came to know that there could be virus and bacteria collected on a number of sanitizer bottles touched by various people. To avoid this here it is the solution. When human enters in the tunnel or machine at that time sensors which are placed top center and side center senses human body and gives output to the circuit and circuit gets activated and whole system activates and all 7 sprayers gets activated and starting to spray towards center of the tunnel and all 7 sprayers sprays on the human body and it will automatically stops after 10-15 seconds. Because 10-15 seconds is enough for Sanitization. When Sprayer stops then humans can exit from the front side means exit side. So this machine can sanitize 4-5 humans in a minute and 250-300 humans in an hour. A sanitizer spray by machine allows you to spray the sanitizing liquid in a better way. It spreads the liquid evenly on the body.

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INTRODUCTION

1.1 Introduction to Domain/ Area and Motivation

In the year 2019, the COVID-19 virus developed in China due to the bad eating habits of Chinese people. In September or October of 2019, the virus COVID-19 started spreading in the Wuhan city of China. Near the start of 2020, this COVID-19 virus starts to rapidly spread throughout the whole World through China due to which most countries are suffering by COVID -19 disease. In October 2020, because of this nearly 4 crore COVID-19 cases were registered in the World and out of this nearly 75 lakhs cases were registered in India. So, it is necessary to take precautions which are helpful to fight against COVID-19 virus. As per suggestion given by a WHO doctors and various hospitals that uses of sanitizer, N-95 masks and social distancing plays a very important role in order to fight against COVID-19. For a protection most of the people in various country followed the steps like maintaining social distance, hand wash by using sanitizer or soap, wearing of N-95 masks to protect the body from COVID-19 virus due to which importance and demand of masks and sanitizer is still increased in this COVID-19 pandemic season. Due to the coronavirus pandemic, sanitizers have become a necessary requirement.

Sanitization can be done in many ways including UV Sanitization, Soap Sanitization, Non- Alcohol Sanitization, Bleach Sanitizing and so on. Of the above methods, Non-alcohol was found to be more useful for human beings since it is harmless on skin surface, vaporizes easily and kills most of the viruses, bacteria, and also removes dirt in our hands. Sanitizers are also provided with antiseptic disinfectants like Chlorhexidine Gluconate. Minimum concentration of alcohol in hand sanitizers must be greater than 70% for effectiveness against viruses. But, repeatedly touching the sanitizer containers to get a drop of sanitizer again initiates contact with persons, which may be risky. Hence there is a need for a non contact based body sanitizer dispenser. In crowded areas, there is a chance of the COVID-19 virus easily. In this area, if we contact the person who has a COVID-19 related symptom in his body, it is very harmful to us and others who we were in contact with. In this condition, the most effective way to remove viruses from your body is to sanitize not only our hands but also our whole body. In most of the organization such as hospitals, hotels, etc. the body

sanitization machine is used but, in this machine, there is a manual contact is required for start the sanitization process, that's why this machine gives more time for body sanitization and also there is a continuously spreading of sanitizer due to which there happened is that loss of some amount of sanitizer used for the sanitization process. In order to save the time required for sanitization and loss of sanitizer, we will develop an automatic sanitizer machine Which works automatically and the methods used for sanitization. Our project focuses on the sanitization of the whole body. It will help in the fight against pandemic by reducing virus transmission.Sanitization means cleaning or sterilizing an object or body part like hands or whole body.

1.2 Problem Statement

- Demand for body sanitizers has surged as the coronavirus broke out and spread around the world. But the equipments which are used for this purpose, have some technical flaws as mentioned below.
- Each person presses the pump handle differently, making it difficult to predict the amount of use and to manage refills and replacements. It causes the actual use of hand sanitizers to be reduced, which does not help prevent spread of the virus because of insufficient amounts. Some hand sanitizers on the market are automatically pumped.
- However, because sanitizer containers and pump devices are designed to be compatible only between products produced by the same manufacturer, consumers must also repurchase the container for the liquid if they replace the hand sanitizer. It is not economical and it has a negative impact on the environment by increasing waste emissions.

1.2 Objectives

- This dispenser is contactless and will spray sanitizer for the whole body while entering into the buildings like Hospitals, Office complexes, shopping Malls, auditoriums , public places, apartments, schools, colleges, places of worship, other public places etc.
- It saves the time required for sanitization.
- The machine will detect the motion of the person and will spray the sanitizer thus reducing the wastage of sanitizer.
- Expected to contribute to contactless body disinfection in public places and virus infection prevention.

1.3 Proposed Solution



Fig 1.1 System Layout

Sensors:

Arduino: The Arduino is a brain of the system which controls the input and output device, it reads the data from IR temperature sensor and IR proximity data, and activates the blowers and pump on its own control signal.

Relays: Relay is a mechanical electromagnetic switch. For use to operate ON/OFF Blower and PUMP.

Ultrasonic: Ultrasonic devices are used to detect objects and measure distances.

Bluetooth Module: HC-05 Bluetooth Module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Its communication is done via serial communication which makes an easy way to interface with a controller or PC. HC-05 Bluetooth module provides switching mode between master and slave mode which means it able to use neither receiving nor transmitting data.

Other materials:

Nozzle: A nozzle is a device designed to control the direction or characteristics of a fluid flow (especially to increase velocity) as it exits (or enters) an enclosed chamber or pipe. A nozzle is often a pipe or tube of varying cross sectional area, and it can be used to direct or modify the flow of a fluid.

The Goal is to replace standard sinks, hand dryers, and soap dispensers in public bathrooms with our hand washing device. The best sanitation method for the design is with the use of traditional soap. Soap gives the ability to clean off grime and is the safest. Soap compares just as well to hand, body sanitizers and is still the gold standard today.

Working of the proposed solution:

The sensor senses the proximity of hands when placed under the machine. It works on ultrasonic waves reflection principle. Ultrasonic ranging module HC-SR04 provides 2cm - 400cm non-contact measurement function, the ranging accuracy can reach up to 3mm. As the controller receives High signal from the sensor module it triggers the pump to pull water from the storage area and send it to the nozzle in mist form. The program runs the pump for seconds. It has been seen during testing that 3 seconds are sufficient to sanitize the hand's fifth mist spray. Even can change the time as per user needs through the program.

Arduino is used as a microcontroller for calculating the distance between the sensor and the hand placed below it. If it is less than 7cm, then the pump runs for 100ms through a relay and pumps out a few mL of liquid alcohol based hand sanitizer and also senses the distance for every 1000ms. Components like pump, relay, Arduino were tested.

1.4 Organization of the Report

The material presented in the report is organized into six chapters.

Chapter 1 describes the introduction of the project which includes introducing to the domain i.e why we need to build this project, then problem statement and then the objectives and proposed solution.

Chapter 2 describes the literature review of other research papers for the same topic about how they built, what are the advantages and disadvantages of those projects including the research gaps identified by us.

Chapter 3 describes the system design of our project along with the explanation including the circuit diagram, the system requirements and applications of this project.

Chapter 4 describes the implementation of our project along with phase wise codes and snapshots regarding the same.

Chapter 5 summarizes the project we built which includes how this project will help us in achieving our objectives.

Finally, chapter 6, includes the references of other research papers in IEEE format.

LITERATURE REVIEW

Sr No	Methodology	Advantages	Future Scope
1.	Automatic Body Sanitizer Tunnel using Arduino and IR Sensor and Temperature detection.	Fast, accurate temperature readings. It gives an almost instantaneous reading, and there is a built-in-fever alarm to indicate if a temperature is very high.	Infrared pulse oximeters can be added to this project.
2.	Door Operated Automatic Sanitizing Machine with Temperature Sensor	Here, they are using microcontrollers which are cost effective. They take less time to perform the operation. They perform all the tasks effectively.	Mask detection can be added using Xovis 3D sensors.
3.	Autonomous Advanced Disinfection Tunnel	An advanced level of disinfection system using two chambers: UV light disinfection and Sanitization. LEDs indicating chamber's occupancy.	Can be extended to mobile disinfection tunnels for vehicles/two-wheeler s and for lightweight chambers.

Table 2.1: Literature review

Research Gaps:

1. Multiple sensors can be used for system efficiency.
2. Can add a feature where if the tank is low or empty can send alert messages to the admin.
3. Adding an alteration for the nozzle to control the force of sanitizer liquid coming out of the nozzle.

SYSTEM DESIGN

Hardware and software requirements:

Component	Quantity	Price
Ultrasonic	1	114/-
Pump	1	50/-
Arduino	2	500/-each
Bluetooth	2	300/- each
Relay Switch	1	50/-
Total	8	1814/-

Table 3.1 Components

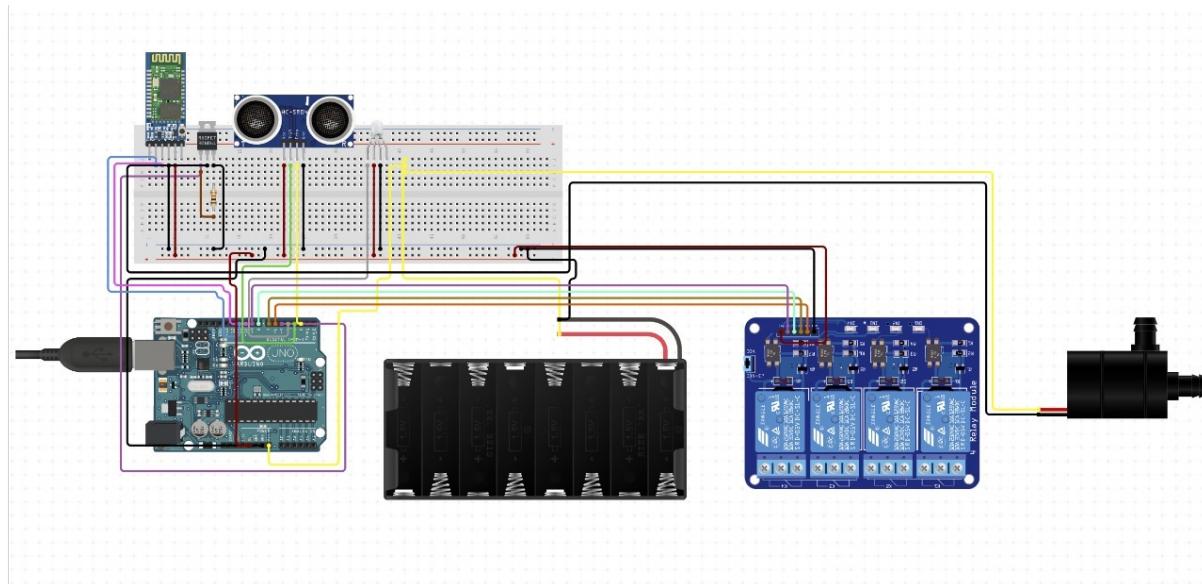


Fig 3.1 Block Diagram of connections

Here, we have done basic connections of the Ultrasonic sensor with Arduino Uno. We are using an Ultrasonic sensor to detect the distance between the sensor and the object/person. Using the Bluetooth Module, the signal will be sent to the mobile which will show the live distance. Then as the object moves closer i.e $\geq 5\text{cm}$ then the relay will trigger the pump to pump sanitizer out of the pipe.

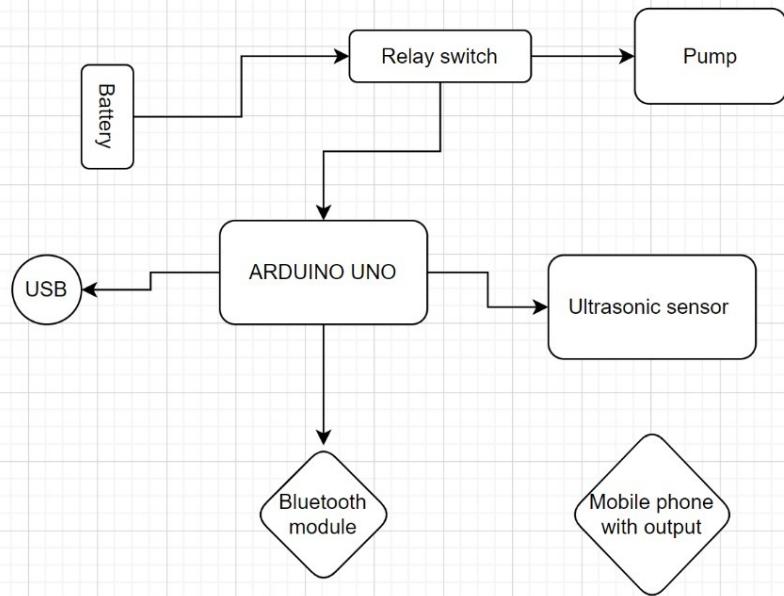


Fig 3.2 System Diagram

IMPLEMENTATION and RESULTS

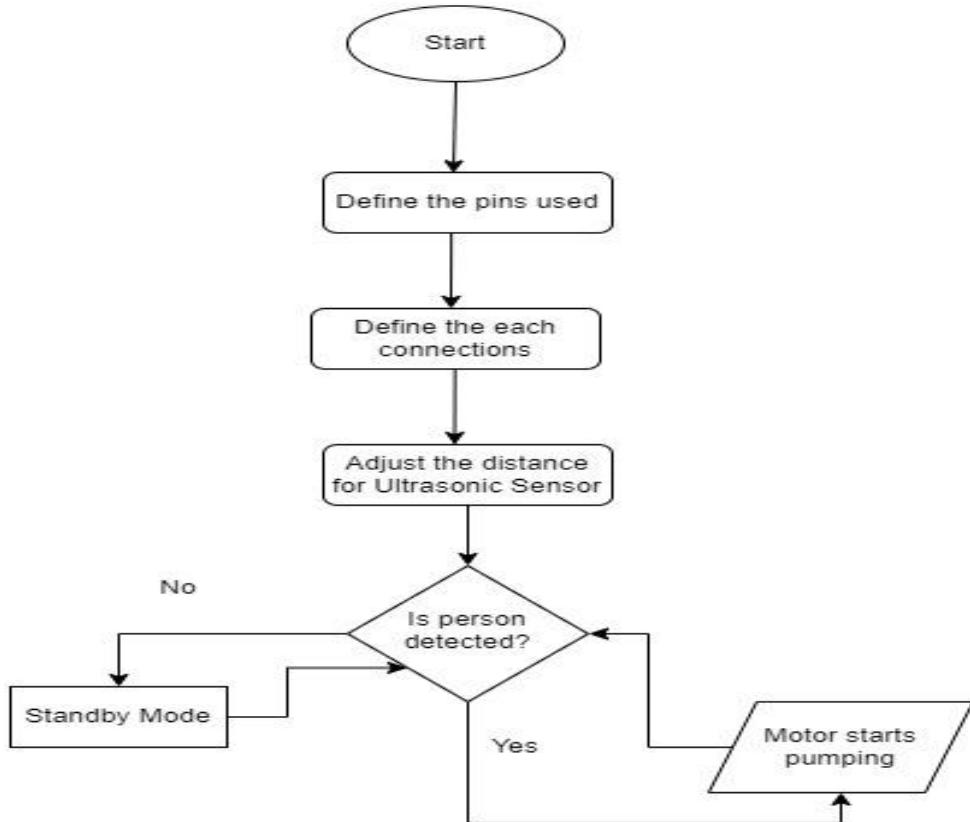
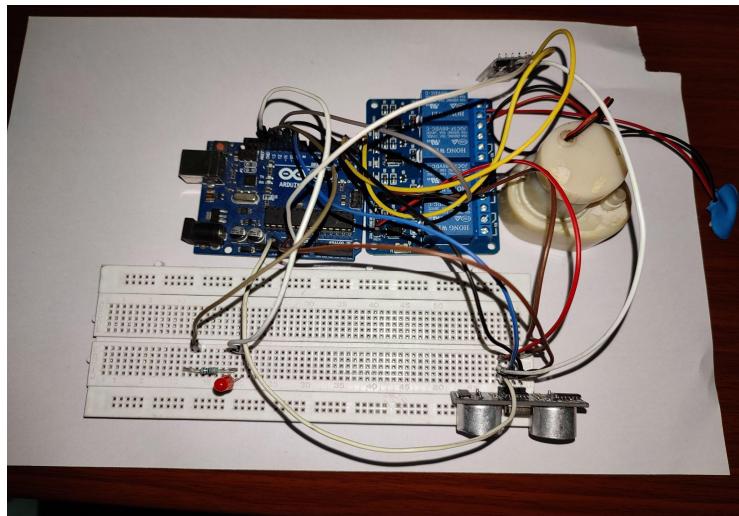
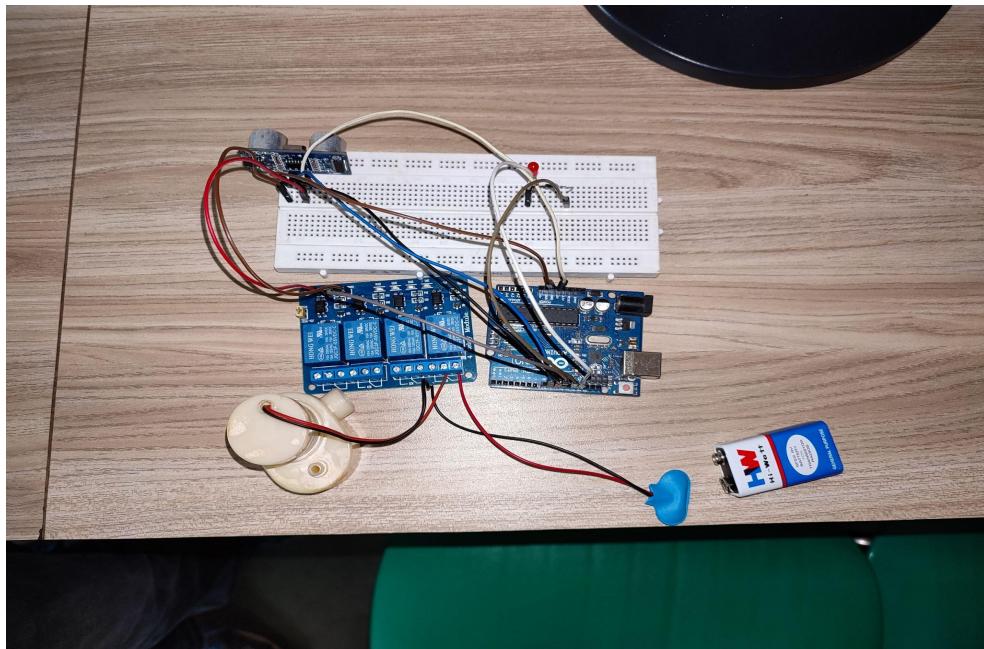


Fig 4.1 Flowchart of the code

Application Areas of this Project:

1. Indoor areas including office spaces
2. Outdoor areas
3. Schools, Colleges
4. Hospitals
5. Homes
6. Residential Buildings
7. Shopping Malls



Distance measuring using Ultrasonic Sensor

```
// defines pins numbers
const int trigPin = 9;
const int echoPin = 10;
const int pump = 11;
const int ledPin = 13;

// defines variables
long duration;
int distance;
int safetyDistance;

void setup() {
pinMode(trigPin, OUTPUT); // Sets the trigPin as an Output
pinMode(echoPin, INPUT); // Sets the echoPin as an Input
pinMode(buzzer, OUTPUT);
```

```
pinMode(ledPin, OUTPUT);
Serial.begin(9600); // Starts the serial communication
}

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

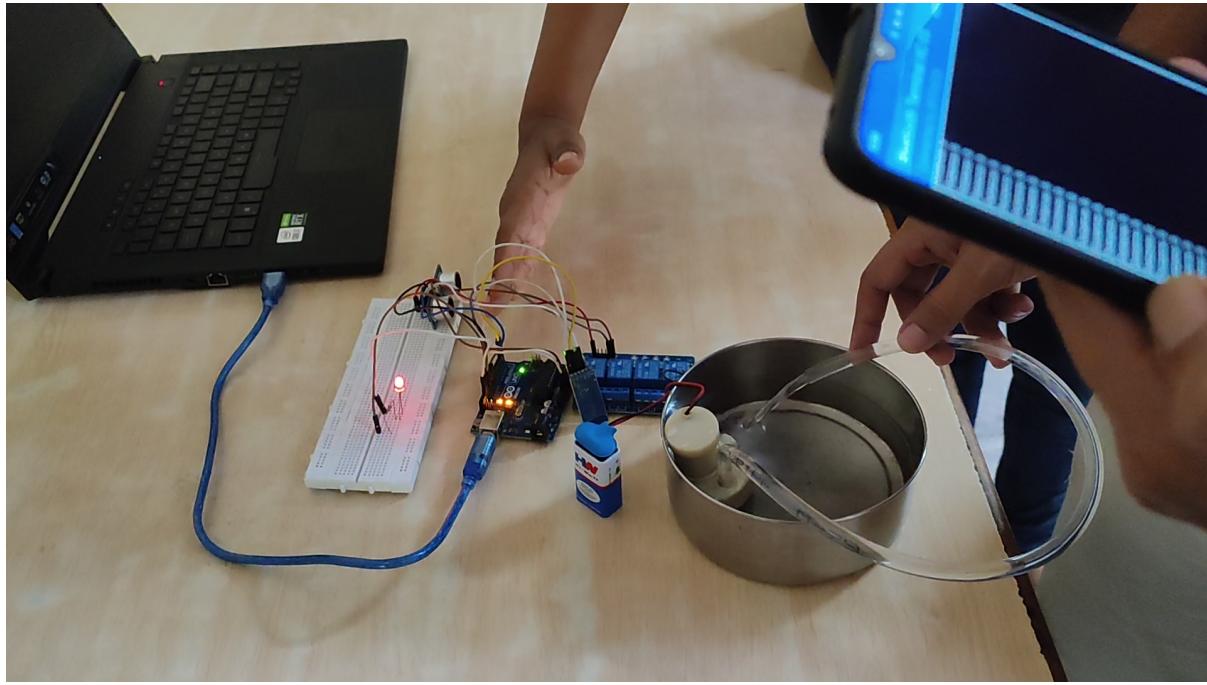
// Sets the trigPin on HIGH state for 10 micro seconds
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin, LOW);

// Reads the echoPin, returns the sound wave travel time in microseconds
duration = pulseIn(echoPin, HIGH);

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

safetyDistance = distance;
if (safetyDistance <= 5){
  digitalWrite(buzzer, HIGH);
  digitalWrite(ledPin, HIGH);
}
else{
  digitalWrite(buzzer, LOW);
  digitalWrite(ledPin, LOW);
}

// Prints the distance on the Serial Monitor
Serial.print("Distance: ");
Serial.println(distance);
}
```



```
int triggerPin = 7; //triggering on pin 7
int echoPin = 8; //echo on pin 8
int LED = 13; //led pin
int info = 0;//variable for the information coming from the bluetooth module
int state = 0;//simple variable for displaying the state

void setup() { //we will be combining both setups from the codes

    Serial.begin(9600); //we'll start serial communication, so we can see the distance on the
    serial monitor

    pinMode(triggerPin, OUTPUT); //defining pins
    pinMode(echoPin, INPUT);
    pinMode(LED, OUTPUT); //defining LED pin
    digitalWrite(LED, LOW); //once the program starts, it's going to turn off the led, as it can
    be misleading.

}

void loop() { //here we combine both codes to work in the loop
    bluetooth();
    sensor();
}

void bluetooth() { //loop from the bluetooth code is renamed to "bluetooth"
    void
    if(Serial.available() > 0){ //if there is any information comming from the serial lines...
        info = Serial.read();
        state = 0; //...than store it into the "info" variable
    }
    if(info == '1'){ //if it gets the number 1(stored in the info variable...

```

```

digitalWrite(LED, HIGH); //it's gonna turn the led on(the on board one)
if(state == 0){ //if the flag is 0, than display that the LED is on and than set that
value to 1
    Serial.println("LED ON"); //^^that will prevent the arduino sending words LED ON all
the time, only when you change the state
    state = 1;
}
}
else if(info == '0'){
    digitalWrite(LED, LOW); //else, it's going to turn it off
    if(state == 0){
        Serial.println("LED OFF");//display that the LED is off
        state = 1;
    }
}
}

void sensor() { //loop from the sensor code is renamed to the "sensor" void

int duration, distance; //Adding duration and distance

digitalWrite(triggerPin, HIGH); //triggering the wave(like blinking an LED)
delay(10);
digitalWrite(triggerPin, LOW);

duration = pulseIn(echoPin, HIGH); //a special function for listening and waiting for the
wave
distance = (duration/2) / 29.1; //transforming the number to cm(if you want inches, you
have to change the 29.1 with a suitable number

Serial.print(distance); //printing the numbers
Serial.print("cm"); //and the unit
Serial.println(" "); //just printing to a new line

//adding for measuring distance where the led will turn off, even if we tell it to turn off
when we chose so in the app

if(distance <= 15){ //if we get too close, the LED will turn off, that's the method with my
RC car, if it gets too close, it turns off, but that will be in the next instructable :)
    digitalWrite(LED, LOW);
    Serial.println("TOO CLOSE!!!!");
    delay(2000); //so the stopping is visible
}
}

```

CONCLUSION

1. Due to COVID-19 situation in most of the organization, the hand sanitizer machine is used to remove the viruses from hand, but when our body contact with the other body if a person whose having a COVID-19 symptoms then, it is necessary to sanitized not only hand but also a whole body. So, an automatic sanitizer machine will be developed for the purpose of body sanitization.
2. Nowadays in various organizations, a body sanitizer machine is used but the main problem in this machine is that it takes more time for the sanitization process and also there is a loss of some amount of sanitizer due to continuously spraying of sanitizer in the body for sanitization.
3. So, when we use an automatic sanitizer machine, we save the time or sanitizer required for the sanitization process of the body by working automatically.
4. This machine will be more effective than soaps and also contactless, easy to use thus reducing the risk of virus transmission.
5. Also when we use an automatic sanitizer machine, we save the time or sanitizer required for the sanitization process.

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