

“SANITIZER CONTROLLED DOOR”

**A Course Project report Submitted in partial fulfilment of the Academic requirements
for the award of the degree of Bachelor of Technology**

Submitted by

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UNDER THE COURSE

SOCIAL INNOVATION IN PRACTICE



CENTRE FOR ENGINEERING EDUCATION RESEARCH

**CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous)**

**(NAAC Accredited with ‘A’ Grade & NBA Accredited)
(Approved by AICTE, Permanently Affiliated to JNTU Hyderabad)
KANDLAKOYA, MEDCHAL ROAD, HYDERABAD-501401
2020-2021**

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CERTIFICATE

This is to certify that the course project report entitled

“SANITIZER CONTROLLED DOOR” is a bonafide work done by

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(Names of the project coordinators)

(Head CEER)

- 1. MR.SURESH RAM**
- 2. MRS.SUVARNA**

Mrs. Sowjanya

DECLARATION

We, the students of IIB.Tech IIISem of Centre for Engineering Education Research, CMR COLLEGE OF ENGINEERING & TECHNOLOGY, Kandlakoya, Hyderabad, hereby declare, that under the supervision of our guide course coordinators, we have independently Carried out the project titled “**SANITIZER CONTROLLED DOOR**” and submitted the report impartial fulfilment of the requirement for the award of Bachelor of Technology in by the Jawaharlal Nehru Technological University, Hyderabad (JNTUH) during the academic year 2020-2021.

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Finally we thank all our faculty members and Lab Assistants for their valid support.

We own all our success to our beloved parents, whose vision, love and inspiration has made us reach out for these glories.

ABSTRACT

COVID-19 is a serious pandemic at this moment. The corona virus is spreading quickly and easily between humans. There are ways to curb the spread of this virus and one way is to wash hands using soap for at least 20 seconds. Sometimes, if the person carelessly touches the faucet - which could be contaminated - after washing his/ her hands, he/she has a higher chance of contracting this corona virus disease. If you go out, it is safe to wash your hands before entering your premises. You do not have to touch the door handle because the door lock system is automated. In this project, a person will only be granted access once he/ she wash his/ her hands.

Our project is mainly focused on how to reduce the spreading of virus from one to another by taking some steps even in public places also.

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1. INTRODUCTION

The World Health Organisation (WHO) has declared the corona virus disease 2019 (COVID-19) a pandemic¹. A global coordinated effort is needed to stop the further spread of the virus. A pandemic is defined as “occurring over a wide geographic area and affecting an exceptionally high proportion of the population. The last pandemic reported in the world was the H1N1 flu pandemic in 2009.

On 31 December 2019, a cluster of cases of pneumonia of unknown cause, in the city of Wuhan, Hubei province in China, was reported to the World Health Organisation. In January 2020, a previously unknown new virus was identified, subsequently named the 2019 novel corona virus, and samples obtained from cases and analysis of the virus’ genetics indicated that this was the cause of the outbreak. This novel corona virus was named Corona virus Disease 2019 (COVID-19) by WHO in February 2020. The virus is referred to as SARS-CoV-2 and the associated disease is COVID-19.

Due to pandemic situation, the corona virus is spreading quickly and easily between humans. There are ways to curb the spread of this virus and one way is to wash hands using soap for at least 20 seconds. Sometimes, if the person carelessly touches the faucet - which could be contaminated - after washing his/ her hands, he/she has a higher chance of contracting this corona virus disease. If you go out, it is safe to wash your hands before entering your premises. You do not have to touch the door handle because the door lock system is automated. In my project, a person will only be granted access once he/ she wash his/ her hands.

The person could be wearing face masks when they go to public places but their hands may not be clean. Even if he/ she clean their hands, they could touch the surface which was touched by a virus carrier. The virus carrier's hands would be contaminated. Corona virus could last on a contaminated surface from several hours to days depending on the environmental conditions such as humidity and temperature. By washing your hands before entering the premises, this way of spreading corona virus could be prevented.

2. LITERATURE REVIEW

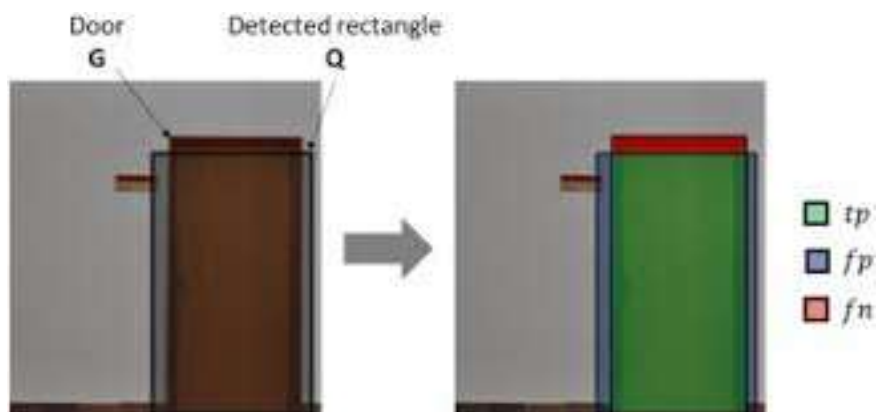
Existing Solutions:-

1. Sanitizer-integrated access control to provide extra care from COVID-19



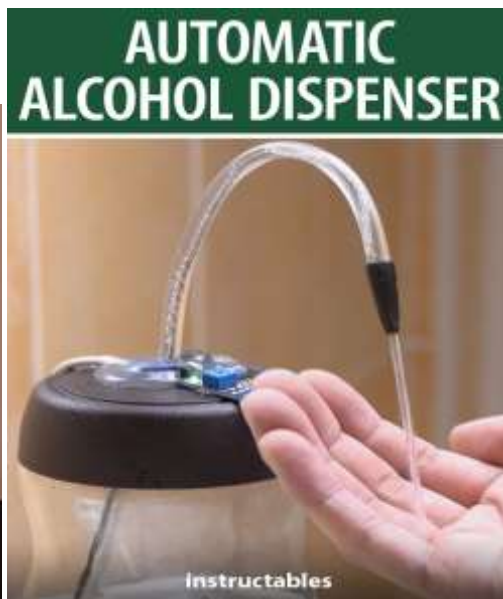
“It works as a relay device that sits in between the control panel and entry method and only passes on the unlock signal once both hands have been successfully coated with hand sanitizer”. Unlike standard automatic hand sanitizer dispenser, Steri Secure has four spray nozzles, two on top and two at the bottom, which ensure that a user’s hands are fully coated and speeds up the application time allowing up to 30 uses per minute.

2. Sensor Controlled Sanitizer Door Knob with Scan Technique



In this project a sanitizer is attached to the door handle and releases automatically when the person touches the door handle. But the drawback of this system is tissues get dried up and hence become of no use.

3. Automatic Hand Sanitizer Dispenser:-



Hand sanitizer is the best way to get rid of all the harmful germs and viruses in our hands. But there is a chance of spreading the virus by pressing the dispenser. To overcome this problem an automatic hand sanitizer dispenser which will help us to dispose of hand sanitizer without contact.

3. PROBLEM DEFINITION

3. Community interaction with the concerned project team:

On behalf of community visit, we came to know that the corona virus is spreading quickly and easily between humans. There are ways to curb the spread of this virus and one way is to wash hands using soap for at least 20 seconds. Sometimes, if the person carelessly touches the faucet - which could be contaminated - after washing his/ her hands, he/she has a higher chance of contracting this corona virus disease. To avoid this all problems, we decided to make prototype – “ Sanitizer controlled by Door ” .

3.1 PROBLEM STATEMENT:

The person could be wearing face masks when they go to public places but their hands may not be clean. Even if he/ she clean their hands, they could touch the surface which was touched by a virus carrier. The virus carrier's hands would be contaminated. Corona virus could last on a contaminated surface from several hours to days depending on the environmental conditions such as humidity and temperature. By washing hands before entering the premises, this way of spreading corona virus could be prevented.

AIM: Touch less Faucet with Door Control System prior to COVID

3.2 OBJECTIVE:

In this project, we have made a prototype to wash hands safely with automatic door control system. We have made touch less faucet so that do not have to touch the surface of the faucet and it is automatic. The prototype is cheap - only costs around 5K to build - and easy to make. This faucet is automatic and could also prevent wasting water when not in use.

- Less cost
- To minimize the human effort.
- Easy to make
- Automatic completely -To develop simple mechanism to perform the operation.
- Prevention of wastage of Sanitizer and water

3.3 REQUIREMENT ANALYSIS:

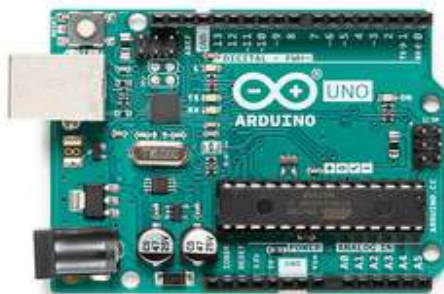
COMPONENTS:

The major components of Touchless Faucet with Door control system are:-

1. Aurdino Uno R3
2. USB Type A/B cable
3. Solder less Breadboard – Half
4. Ultrasonic sensor module (HC-SR04)
5. IR tracking sensor module
6. Towerpro Micro servo motor - SG90
7. Relay module - 5V single channel relay module
8. LCD display module - 16x2
9. Submersible water pump - 5V or solenoid water valve
10. Male-to-Male Jumper wires
11. Female-to-Male Jumper wires
12. HIW battery

1. Aurdino Uno R3:

The Arduino Uno R3 is a microcontroller board based on a removable, dual-inline-package (DIP) ATmega328 AVR microcontroller. It has 20 digital input/output pins (of which 6 can be used as PWM outputs and 6 can be used as analog inputs). Programs can be loaded on to it from the easy-to-use Arduino computer program. The Arduino has an extensive support community, which makes it a very easy way to get started working with embedded electronics. The R3 is the third, and latest, revision of the Arduino Uno.



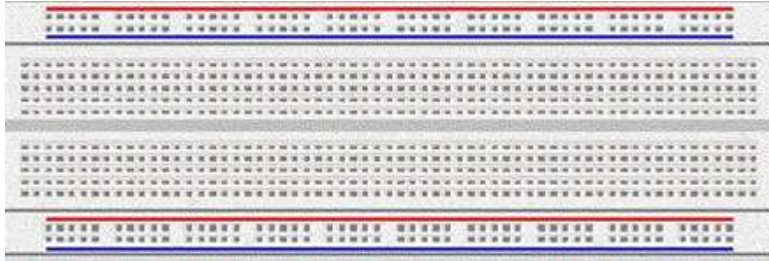
2.USB Cable:

The term **USB** stands for "Universal Serial Bus". **USB cable** assemblies are some of the most popular **cable** types available, **used** mostly to connect computers to peripheral devices such as cameras, camcorders, printers, scanners, and more.

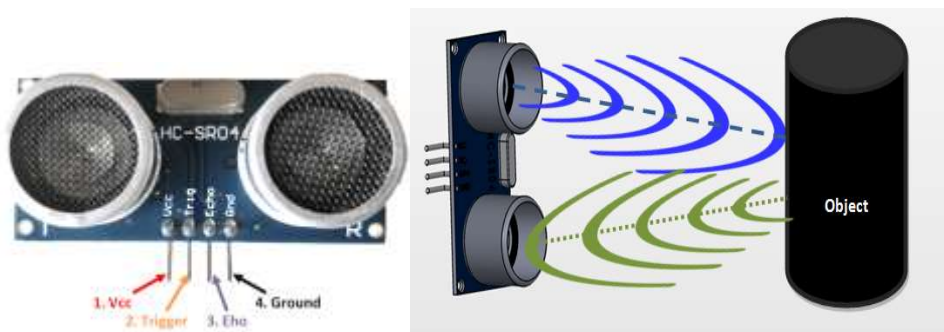


3. Solder less Breadboard:

A breadboard is used to build and test circuits quickly before finalizing any circuit design. The breadboard has many holes into which circuit components like ICs and resistors can be inserted. The holes are most commonly spaced 0.1" apart to accommodate standard DIP components. A typical breadboard that includes top and bottom power distribution rails is shown below.



4. Ultrasonic sensor module (HC-SR04):



As shown above the **HC-SR04 Ultrasonic (US) sensor** is a 4 pin module, whose pin names are Vcc, Trigger, Echo and Ground respectively. This sensor is a very popular sensor used in many applications where measuring distance or sensing objects are required. The module has two eyes like projects in the front which forms the Ultrasonic transmitter and Receiver.

5. IR tracking sensor module:

The TCRT5000 sensor (or infrared photoelectric sensor) is used. The blue LED of TRT5000 is the emission tube and after electrified it emits infrared light invisible to human eye. The black part of the sensor is for receiving; the resistance of the resistor inside changes with the infrared light received.

The IR emission tube of TCRT5000 sensor constantly emits infrared light. Since the black absorbs light, when the IR emission tube shines on a black surface, the reflected light is less and so less IR rays are received by the receiving tube. It indicates the resistance is large; then the comparator outputs high and the indicator LED goes out. Similarly, when it shines on a white surface, the reflected light becomes more. So the resistance of the receiving tube is lower; thus, the comparator outputs low and the indicator LED lights up.



6. Tower pro Micro servo motor - SG90:



The Tower Pro SG90 mini servo is lightweight, high-quality and lightning-fast. The servo is designed to work with almost all the radio control systems. It is with excellent performance brings you to another horizon of flight. The SG90 mini servo with accessories is perfect for R/C helicopter, plane, car, boat and truck use.

7. Relay module - 5V single channel relay module:



This is 1 Channel 5V Relay Board Module for Arduino PIC AVR DSP ARM. A wide range of microcontrollers such as Arduino, AVR, PIC, ARM and so on can control it. Each one needs 15mA - 20mA driver current and Equipped with high current relay: DC 5V / 10A, AC 250V / 10A. Standard interface that can be compatible with microcontroller.

8. LCD display module (16x2):

LCD modules are very commonly used in most embedded projects, the reason being its cheap price, availability and programmer friendly. Most of us would have come across these displays in our day to day life, either at PCO's or calculators. The appearance and the pinouts have already been visualized above now let us get a bit technical. **16x2 LCD** is named so because; it has 16 Columns and 2 Rows. There are a lot of combinations available like, 8x1, 8x2, 10x2, 16x1, etc. but the most used one is the 16x2 LCD. So, it will have (16x2=32) 32 characters in total and each character will be made of 5x8 Pixel Dots.



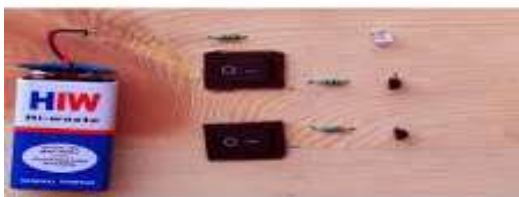
9. Submersible water pump (5V):



A solenoid valve is an electrically controlled valve. It is made of a magnetic plunger that rests on the orifice, blocking the flow, when it's in its off position. When the electric signal is passed, the current flows through a coil creating a magnetic field and attracting the plunger away from the orifice, thus opening it.

10. HIW battery :

The **nine-volt battery**, or **9-volt battery**, is a common size of battery that was introduced for the early transistor radios. It has a rectangular prism shape with rounded edges and a polarized snap connector at the top. This type is commonly used in walkie-talkies, clocks and smoke detectors.



11. Jumper wires:



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. In fact, it doesn't get much more basic than jumper wires.

COMPONENT ANALYSIS :-

S.No.	Components	Quantity	Prize
1.	Aurdino uno	1	340
2.	USB Cable	1	40
3.	LCD display	1	120
4.	Relay Module	1	65
5.	Micro Servo motor	1	110
6.	Water pump	1	110
7.	IR Sensor	1	45
8.	Ultrasonic Sensor	1	85
9.	Breadboard	1	70
10.	Jumper wires(M-M)	2	120
11.	Jumper wires(M-F)	2	120

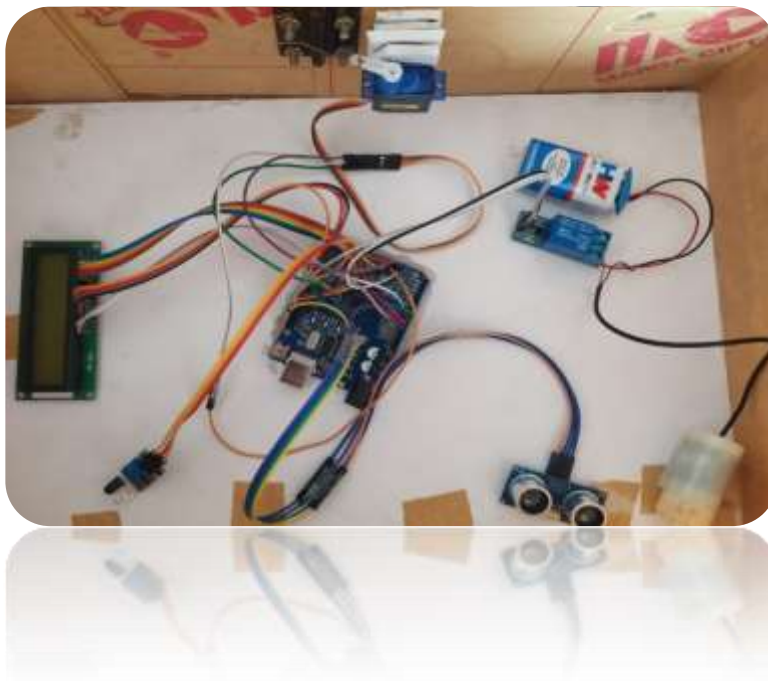
Price estimation of components:- 1500/-

Total Amount Spent:- 1225/-

3.4 METHODOLOGY :

The LCD display shows message, “Sanitize the hands, before entering “. To sanitize the hands, place the hands within 15 cm from the Ultrasonic sensor. According to Arduino program, this will switch on the Relay module. The Submersible water pump is connected to the relay module and an external power supply. The external power supply can be adjusted to provide the appropriate voltage. The submersible pump is switched on and the sanitizer is pumped from the container to our hands through a tube, which is modelled as the faucet in this prototype. The message will show on LCD display, “You are safe, U can enter “.

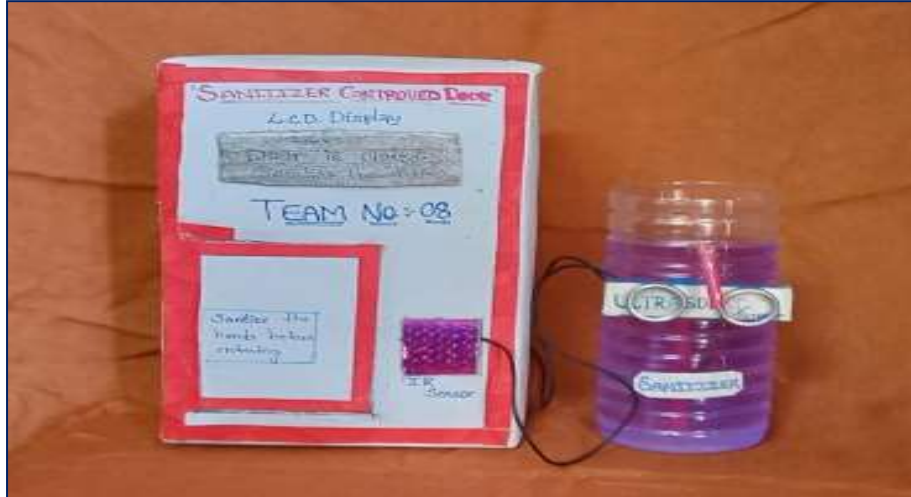
After washing hands, place hand in front of the IR tracking sensor. The IR sensor sends a LOW signal when an object is detected within 2cm. The LOW signal makes the Servo motor to rotate 90° and open the door (in this model). The door will automatically close after 10 seconds. If we place our hand in front of the IR tracking sensor without washing your hands, the door will not open and the LCD display module will show a message asking to wash hands.



4.SYSTEM MODEL

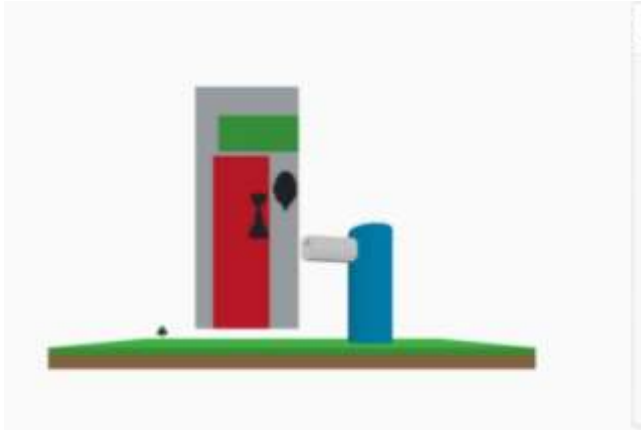
4.1 CONCEPTUAL DESIGN:

To analyse the prototype paper models are been prepared:- (Finalized paper model)

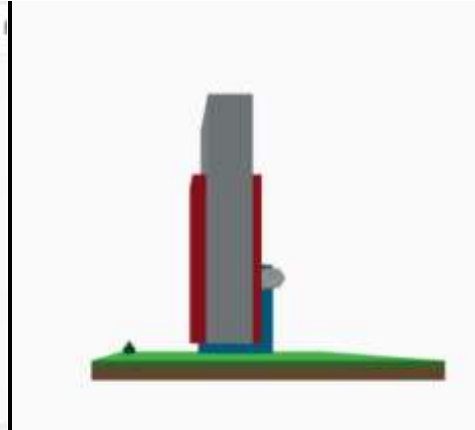


THREE DIMENSIONAL DESIGN:

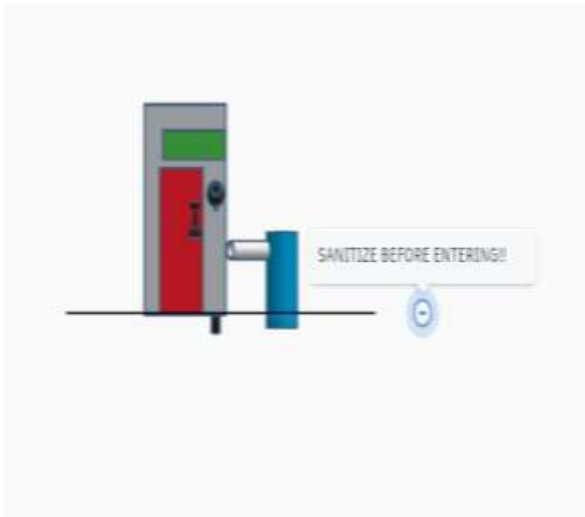
PLANAR VIEW



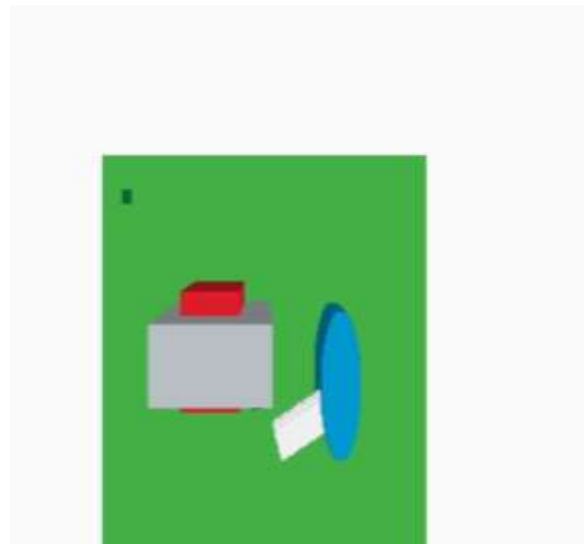
SIDE VIEW



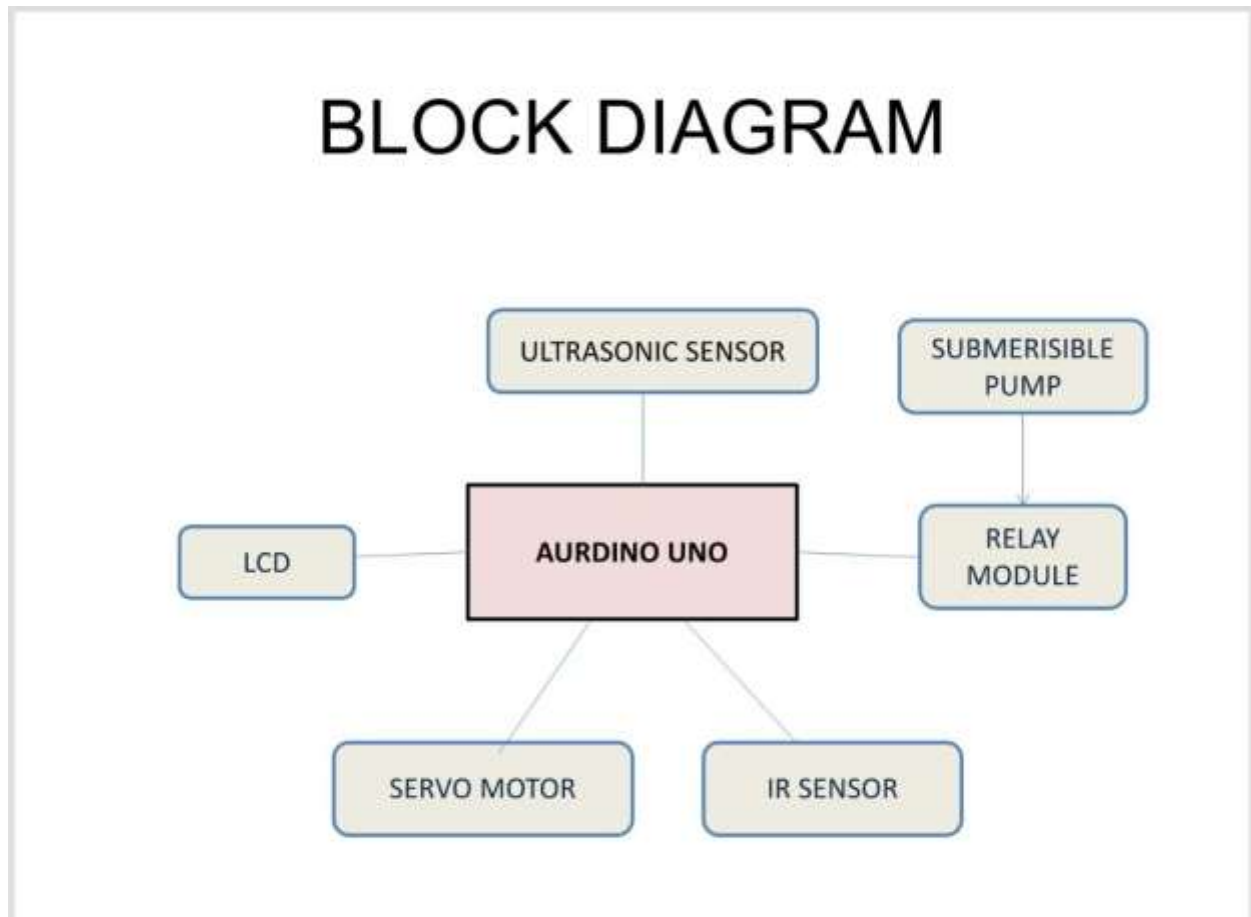
FRONT VIEW



TOP VIEW

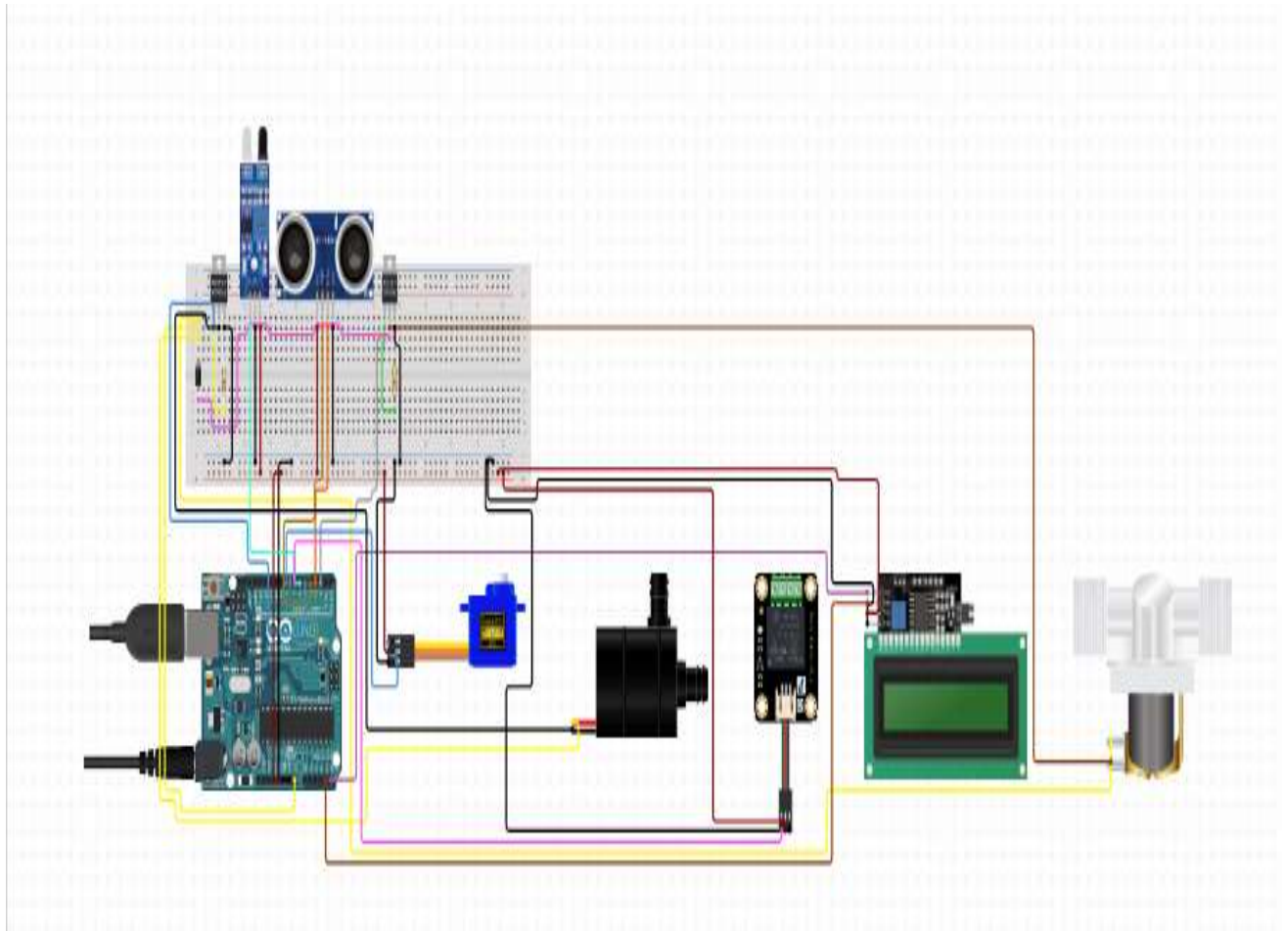


4.2 BLOCK DIAGRAM:



- Relay module connected to Aurdino UNO
- Submersible pump connected to relay module
- LCD is connected to Aurdino using breadboard
- Ultrasonic and IR sensors are connected to Aurdino using breadboard
- Servo motor is connected to Aurdino using breadboard

CIRCUIT DIAGRAM :



<https://www.circuito.io/app?components=9442,10456,11021,13959,417986,487601,811437,987654,2345678>

Connections:

Ultrasonic sensor module (HC- SR04):

VCC - 5V

Trig - D5

Echo - D4

GND – Ground

IR tracking sensor module

S - D3

(+) - 5V

Sanitizer controlled Door

(-) – Ground

Relay module

S - D6

(+) - 5V

(-) – Ground

Servo motor (SG-90)

S (Yellow/ Orange wire) - D9

(+) (Red wire) - 5V

(-) (Black/ Brown wire) - Ground

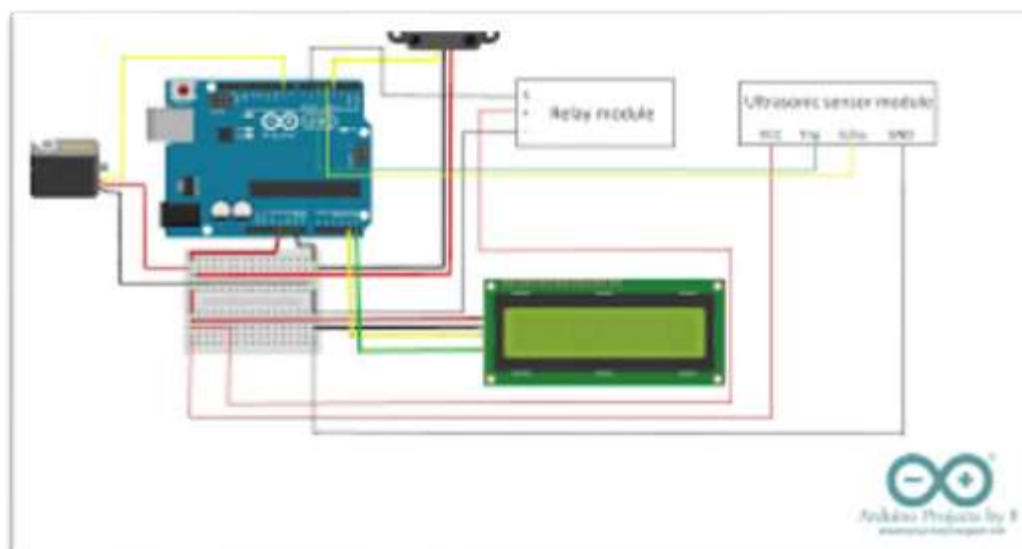
LCD display module (16x2 with I2C interface)

VCC - 5V

GND – Ground

SDA - A4

SCL - A5



4.3 DESIGN DESCRIPTION:

In model, consists of two systems - one is automatic door system and other is automatic sanitizer dispenser. Sanitizer dispenser is made up of bottle. Ultrasonic sensor is placed on bottle and connected to submersible pump. This submersible pump is connected to relay module. Pipe is attached to submersible pump is used to pump out. Coming to door, IR sensor and LCD is attached to wall. Servo motor is attached inside and attached to door.

If you want to wash your hands, place your hands within 15 cm from the ultrasonic sensor. According to the Arduino program, this will switch on the relay module. The submersible water pump is connected to the relay module and an external power supply. The external power supply can be adjusted to provide the appropriate voltage. The water pump is switched on and the water is pumped from the container to our hands through a tube, which is modelled as the faucet in this prototype. After washing your hands, place your hand in front of the IR tracking sensor. The IR sensor sends a LOW signal when an object is detected within 2cm. The LOW signal makes the servo motor to rotate 90° and open the door (in this model). The door will automatically close after 10 seconds. If you place your hand in front of the IR tracking sensor without washing your hands, the door will not open and the LCD display module will show a message asking you to wash your hands.

FINAL DESIGN - (OUR PROTOTYPE):-

“SANITIZER CONTROL DOOR “

1.Before Sanitize : LCD shows sanitize your hands, before u enter.



Door is closed

2.After Sanitize: LCD shows u are safe now, u may enter



Door is opened

5. IMPLEMENTATION

5.1 RESULT AND DISCUSSIONS:

In areas such as hospitals or labs, the spread of germs and contagions is a serious health concern. For this reason, many such facilities post visual signs which are intended to remind a person to sanitize their hands before entry or exit, but such signs can be easily ignored, and thus stronger warning systems are required if such spread of disease is to be checked or inhibited, with a view to reducing the spread of germs and contagions, stronger warning means that the visual alerts should be used in certain public facilities to provide these reminders, such as for employees of a restaurant, hospitals, food processing or research facilities.

“The sanitizer controlled door” reminds and forces a person to sanitize or disinfect their hands before permitting an entry or exit, thereby reducing the spread of germs and contagions.

5.2 CONCLUSION:

Our prototype “**SANITIZER CONTROLLED DOOR**” enables to sanitize the hands automatically before entering the premises. As our prototype is touchless faucet, we need not to touch the surface of the faucet and is automatic. This device is cheap when it is compared to existing models present in market and it is sustainable too.

6.1 APPENDIX:

<https://www.asmag.com/showpost/31495.aspx>

<https://www.digikey.in/en/maker/blogs/2020/make-an-automatic-hand-sanitizer-dispenser-using-arduino>

<https://patents.google.com/patent/CA2776280A1/en>

https://www.researchgate.net/publication/270339029_Sensor_Controlled_Sanitizer_Door_Knob_with_Scan_Technique

<https://hackaday.io/project/171789-automated-door-handle-sanitizer>

<https://rootsaid.com/automatic-hand-sanitizer-dispenser-using-arduino/>

6.2 REFERENCES:

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<https://hackaday.io/project/171789-automated-door-handle-sanitizer>

<https://rootsaid.com/automatic-hand-sanitizer-dispenser-using-arduino/>

6.3 Source code:-

//Sanitizer controlled door

//Sec_A _Team no. 08

```
#include <Servo.h>

#include <LiquidCrystal.h>

int Contrast=75;

LiquidCrystal lcd(12, 11, 9, 4, 3, 2);

int angle = 0;

#define trig 7

#define echo 8

Servo servo;

const int sensor = 10;

const int Relay = 13;

int state;

int value;

long duration;

int distance;

void setup()

{

  Serial.begin(9600);

  analogWrite(6,Contrast);

  lcd.begin(16,2);

  lcd.print("before you enter please sanitize");

  servo.attach(5);

  servo.write(0)
```

Sanitizer controlled Door

```
pinMode(trig, OUTPUT);  
pinMode(echo, INPUT);  
pinMode(sensor, INPUT);  
pinMode(Relay, OUTPUT);  
  
}  
  
void loop()  
{  
    digitalWrite(trig, LOW);  
    delayMicroseconds(5);  
    digitalWrite(trig, HIGH);  
    delayMicroseconds(10);  
    digitalWrite(trig, LOW);  
    value = digitalRead(sensor);  
    duration = pulseIn(echo, HIGH);  
    distance= duration*0.034/2;  
    delay(1000);  
    if (distance > 1 && distance < 15)  
    {  
        lcd.clear();  
        lcd.setCursor(1, 0);  
        lcd.print("Hands detected");  
        lcd.setCursor(0, 1);  
        lcd.print("wash hands - 20s");  
        digitalWrite(Relay, HIGH);  
        state = 1;  
        delay(2000);  
        lcd.clear();  
    }
```

```
    lcd.print("You are safe now");  
}  
else  
{  
    digitalWrite(Relay, LOW);  
}  
if ((state == 1) && (value == LOW))  
{  
    lcd.clear();  
    lcd.setCursor(1, 0);  
    lcd.print("you may go in");  
    state = 1;  
    delay(1000);  
    lcd.clear();  
    lcd.print("you are safe now");  
}  
else  
{  
    digitalWrite(Relay, LOW);  
}  
if ((state == 1) && (value == LOW))  
{  
  
    lcd.clear();  
    lcd.setCursor(1, 0);  
    lcd.print("you may go in");  
    lcd.setCursor(1, 1);
```

```
lcd.print("10 seconds left");  
  
servo.write(180);  
  
delay(10000);  
  
servo.write(0);  
  
lcd.clear();  
  
lcd.print("wash your hands");  
  
lcd.setCursor(0, 1);  
  
lcd.print("before you enter");  
  
state = 0;  
  
}  
  
else if ((state == 0) && (value == 0))  
{  
  
    lcd.clear();  
  
    lcd.print("wash your hands");  
  
    lcd.setCursor(0, 1);  
  
    lcd.print("to grant access");  
  
}  
  
}
```

THE END