Automatic Sanitizer Dispenser

Project Exhibition - 1

Submitted in partial fulfillment for the award of the degree of

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In

ELECTRICAL AND ELECTRONICS ENGINEERING

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Submitted by

Sakshi Pathak (19BEE10004)
Shailesh Digari (19BEE10014)
Kritik Kumar Saini (19BEE10016)
Sanjyot Sanjay Khardekar (19BEE10021)

Under the Supervision

of

Dr. Jitendra kumar Tandekar

SCHOOL OF ELECTRICAL & ELECTRONICS ENGG
VIT BHOPAL UNIVERSITY

BHOPAL (M.P.)-466114

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VIT BHOPAL UNIVERSITY BHOPAL (M.P.) 466114

SCHOOL OF ELECTRICAL & ELECTRONICS ENGG.

CANDIDATE'S DECLARATION

I hereby declare that the Dissertation entitled "**Automatic Sanitizer Dispenser**" is my own work conducted under the supervision of Dr. Jitendra kumar Tandekar, Assistant Professor, School of Electrical and Electronics Engineering at VIT University, Bhopal.

I further declare that to the best of my knowledge this report does not contain any part of work that has been submitted for the award of any degree either in this university or in other university / Deemed University without proper citation.

Sakshi Pathak (19BEE10004)
Shailesh Digari (19BEE10014)
Kritik Kumar Saini (19BEE10016)
Sanjyot Sanjay Khardekar (19BEE10021)

This is to certify that the above statement made by the candidate is correct to the best of my knowledge.

Date:08-05-2021

Dr. Jitendra Kumar Tandekar

Assistant Professor

VIT UNIVERSITY BHOPAL (M.P.) – 466114

SCHOOL OF ELECTRICAL & ELECTRONICS ENGG.

CERTIFICATE

This is to certify that the work embodied in this Project Exhibition -1 report entitled **"Automatic Sanitizer Dispenser"** has been satisfactorily completed by **Ms. Sakshi Pathak (19BEE10004), Mr. Shailesh Digari (19BEE10014), Mr. Kritik Kumar Saini (19BEE10016), Ms. Sanjyot Sanjay Khardekar (19BEE10021)** in the School of Electrical & Electronics Engineering of Electrical at VIT University, Bhopal. This work is a bonafide piece of work, carried out under my/our guidance in the School of Electrical & Electronics Engineering for the partial fulfilment of the degree of Bachelor of Technology.

Dr. Jitendra Kumar Tandekar

Assistant Professor

Forwarded by

Dr. Pallabi Sarkar

Program Chair

Approved by

Dr. R Maheshwar

Professor & Dean

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I feel thankful to the college staff for giving me such a big opportunity. I believe I will enroll in more such events in the coming future. I ensure that this project was done by me and is not copied.

Sakshi Pathak (19BEE10004)
Shailesh Digari (19BEE10014)
Kritik Kumar Saini (19BEE10016)
Sanjyot Sanjay Khardekar (19BEE10021)

Executive Summary

We have designed an automatic hand sanitizer dispenser that is compatible with various containers. When one moves one’s hand close to the device sensor, the hand sanitizer container is pumped once.The automatic hand sanitizer device proposed in this project is ultimately expected to contribute to contactless hand disinfection in public places and virus infection prevention. Additionally, it is economical and eco-friendly by decreasing waste emissions.

List of Figures

List of Symbols &Abbreviations

A	**Ampere**
ARM	**Association Rule Mining**
DIC	**Dynamic Item-Set Counting**
DM	**Data Mining**
DHP	**Direct Hashing and Pruning**

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CHAPTER 1

INTRODUCTION

The Automatic Sanitizer Dispenser is an infrared motion sensor-based dispenser. It used to dispense any alcohol-based sanitizer. It has a touch-less operation, which makes people fearless and more confident about the sanitization process. It is also known as a touch-less or contact-less sanitizer dispenser.

Demand for hand sanitizers has surged as the coronavirus broke out and spread around the world . Alcohol gel hand sanitizers are usually applied by squirting the sanitizer liquid when one presses a pump with one's hand . This causes many people to come into contact with the pump handle, which increases the risk of viral transmission. Pressing the pump handle is bothersome, and many pass by without disinfecting their hands. Moreover, each person presses the pump handle differently, making it difficult to predict the amount of use and to manage refills and replacements. For this reason, the actual use of hand sanitizers is reduced, which does not help prevent spread of the virus .

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. In addition, some users may think that it is a hassle to buy a hand sanitizer-containing device-compatible again, so they pour other hand sanitizers into previously used containers and reuse them. However, sanitizers that come directly into contact with the human body are classified as medicines or non-medical products, and they are safest to use in original containers .

CHAPTER 2

Literature Survey

John M. Boyce, M.D.and Didier Pittet, M.D [1] talked about the significance of hand washing with individual cleanliness. For ages, hand washing with cleanser and water has been viewed as a proportion of individual cleanliness. The idea of purging hands with a germicide specialist most likely rose in the mid nineteenth century. As ahead of schedule as 1822, a French drug specialist exhibited that arrangements containing chlorides of lime or soft drink could destroy the foul smells related with human bodies and that such arrangements could be utilized as disinfectants and sterilizers. In a paper distributed in 1825, this drug specialist expressed that doctors and different people going to patients with infectious illnesses would profit by soaking their hands with a fluid chloride arrangement.

R. Monina Klevens, et al.,[2] used a multi-step approach and three data sources. The main source of data was the National Nosocomial Infections Surveillance (NNIS) system, data from 19902002, conducted by the Centers for Disease Control and Prevention. Information from the National Hospital Discharge Survey (for 2002) and the American Hospital Association

Survey (for 2000) were utilized to enhance NNIS information. The level of patients with a HAI whose passing was resolved to be caused or connected with the HAI from NNIS information was utilized to gauge the quantity of passing.

The work mainly says about the hospital grasped infections, which is about 2 Million Patients per year and also says that it is 8th leading cause for deaths annually in USA. It also says that handwashing is important and also effective with proper hand washing steps, but washing with soap and water is time consuming for peak hours in hospitals.This paper also showed the effectiveness of the alcohol based hand sanitizers, which reduced infection rates by whopping 30%. They used hand sanitizers with 60 to 70 percent ethanol or isopropanol for reducing significant number of pathogens. The patients were also given about 4.25 ounce containers of hand sanitizer alongside their beds.

For 10 month period of using hand sanitizers showed a result of 36.1% infection reduction. In [2], the paper says about the infection caused by drug resistant micro-organisms which causes increase in death rate and also complications, the multidrug resistant bacteria includes Methicillin Resistant Staphylococcus aureus(MRSA), Extended Spectrum Beta-lactamase (ESBL) producing bacteria, Multidrug Resistant Pseudomonas aeruginosa(MDRP), which are very common worldwide. Several antibiotics have increasing multidrug bacteria isolation rate, even personal protection equipment(PPE) can't be effective in isolation rate of MSRA. Hence they emphasize about the use of alcohol based hand sanitizers since the alcohol based hand sanitizers had negative association with MRSA isolation rate, which means that hand hygiene is very important in hospitals. In [3], the paper says about emergence of the novel Coronavirus(SARS-CoV-2), which has caused unexpected challenges to health of the people of this world, the paper also aims at reducing the transmission rate of the disease. The paper explains about the virus structure and how is it different from that of the bacterial structure, which means that virus has single stranded or double stranded RNA or DNA encapsulated in 'capsid' and virus can replicate only in presence of a host and described as 'living entities'. Bacteria also has almost the same structure including DNA or RNA along with 'Cell Membrane' and can replicate without a host. The paper also gives a complete comparison between hand sanitizers and soap, foam vs gel, and it says that high concentration of ethanol can reduce the amount of virus particle present in the hand and hence proves the effectiveness of alcohol based hand sanitizer.

CHAPTER 3

PROBLEM FORMULATION

& PROPOSED METHODOLOGY

3.1 Methodology

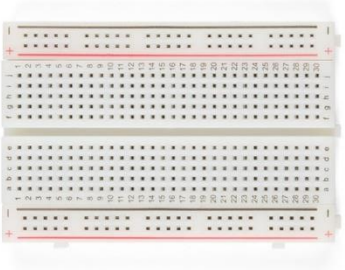
Several steps were carried out in this research to test the Automatic hand sanitizer container has shown in Figure.1. Due to the spread of Covid disease, first we analyse the importance of environment needed for automatic hand sanitizer. The second step we make the literature study about the related article. We design the hardware, examine the product and report the result.

- **Ultrasonic Distance Sensor** : It is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear).

- **Arduino**: It 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.

- **Servomotor:** It is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors.

- **Breadboard:** It is a solderless device for temporary prototype with electronics and test circuit designs. Most electronic components in electronic circuits can be interconnected by inserting their leads or terminals into the holes and then making connections through wires where appropriate.



3.2 Software Tool: Tinker cad

3.3 Block diagram

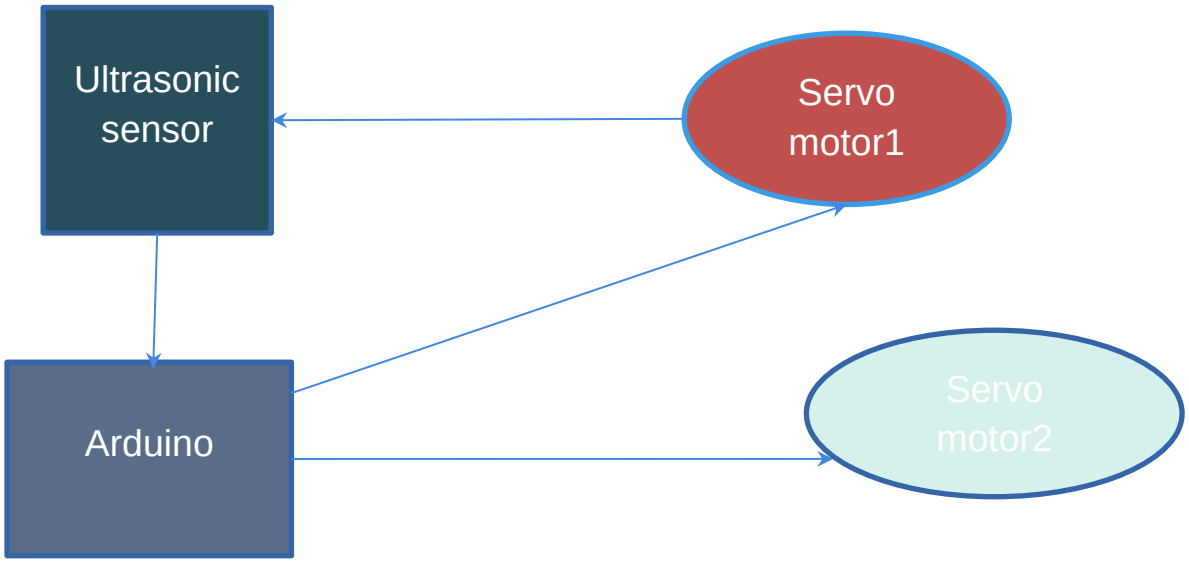


Fig. 3.1: Block diagram of Automatic Sanitizer Dispenser

3.4 Circuit Diagram

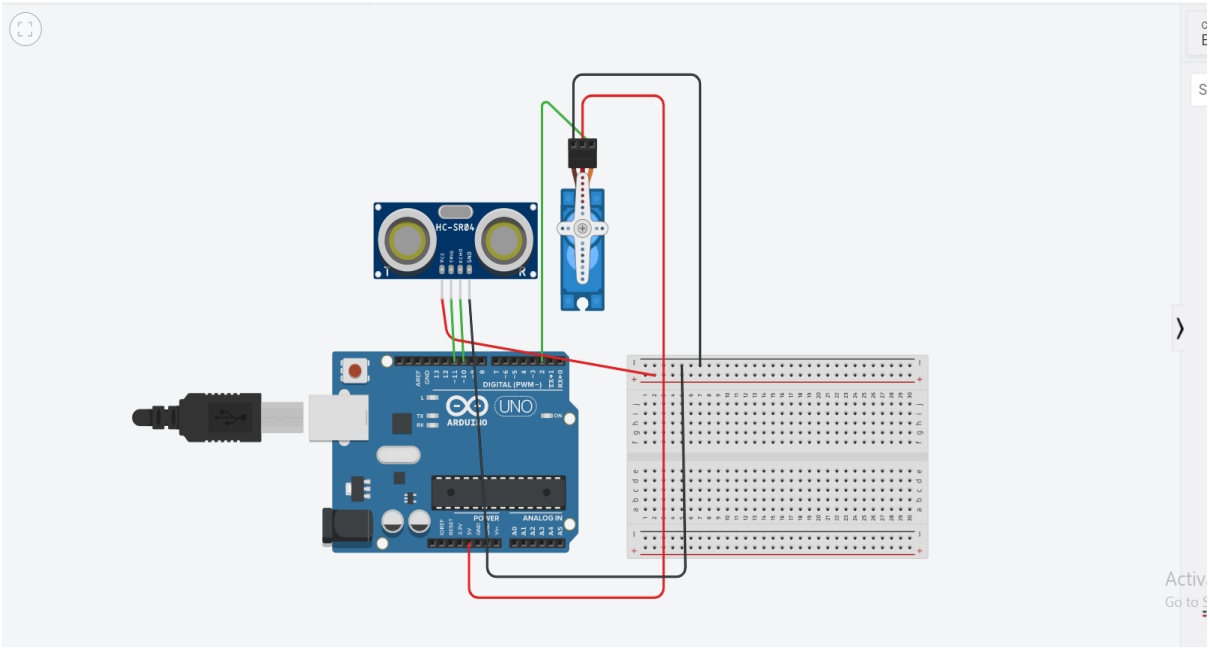


Fig. 3.2: Circuit diagram of Automatic Sanitizer Dispenser

3.5 Working

When washing hands, the users place their hands under the nozzle and in front of the sensor. Then the activated sensor will activate a pump dispensing a pre measured amount of fluid from the nozzle.

3.5.1 Radar-based sensor*.*

This product sends out bursts of microwave or ultrasound energy and waits for the reflection of energy. In a slack situation, the energy will bounce back in a normal pattern. When our hands are placed in the basin, the energy emitted from the sensor will bounce back irregularly. From there, they trigger the dispensation of sanitizer. Modern sensors which are used in electronic faucets, electronic flush valves and electronic dispensers use Infrared light with wavelength in the range of 850 nm. The sensor employs an emitter and a collector. While the collector positioned to face in the same direction as the emitter "sits" waiting to sense the emitted pulses, the emitter emits pulses of infrared light. When no hands are present in front of the device, there will be no reflection of light. Since then, no pulse is sensed.

When hands are present in the path of the emitted light, portions of the emitted infrared light is bounced back in the direction of the collector. The collector then will become excited by the light (in the case that a photodiode is used) and generate voltage to turn the pump on. If a photo transistor is utilized, then the photo transistor will simply switch the pump on when sensing the infrared pulse

3.5.2. Photo sensor*.*

This mechanism has two parts which are a source of focused light and a light sensor. When the users place their hands in line of the beam of light, the pump mechanism is activated by the disruption sensed by the light sensor.

3.5.3. Passive infrared sensor*.*

Infrared sensors detect infrared energy that is emitted by a person’s body heat. When they place their hands in the proximity of the sensor, the infrared energy quickly fluctuates. After that, it will trigger the pump to activate and dispense the specified amount of sanitizer.

3.6 Code for Arduino Automatic Sanitizer Dispenser

```
int servo=2;
int trigpin=11;
int echopin=10;
long duration;
int distance;
#include<Servo.h>
Servo myservo;
int pos=0;
void setup()
{
  pinMode(trigpin, INPUT);
  pinMode(echopin, OUTPUT);
  myservo.attach(servo);
  myservo.write(0);
  Serial.begin(9600);
}
void loop()
{
  digitalWrite(trigpin,LOW);
  delayMicroseconds(2);
  digitalWrite(trigpin,HIGH);
  delayMicroseconds(10);
  digitalWrite(trigpin,LOW);
  duration=pulseIn(echopin,HIGH);
  distance=duration*0.034/2;
  Serial.print("distance");
  Serial.println(distance);
  if(distance<10){
  myservo.write(45);
  delay(100);
  myservo.write(90);
  delay(100);
  myservo.write(135);
  delay(100);
  myservo.write(180);
  delay(1000);
  myservo.write(0);
  delay(3000);
}
}
```

3.7 Advantages

3.7.1 Touch-free.

Furthermore, a more sterile environment is created by the improvement of the automatic sanitizer dispenser. By using the pump, we will leave behind a variety of bacterial colonies. Then they will interbreed and lead to a more resistant strain of bacteria which can re-contaminate different hands and would not be completely eliminated by the anti-bacterial soap or sanitizer. Wider spectra or higher levels of resistance in the present colonies are due to interaction and/or complementation between the resistance genes. Bacterial transmission will be eliminated once we stop using and touching the pump.

3.7.2 Preset increments.

These devices will only distribute a set amount per motion activation. A specified amount to be dispensed can be set to a highly efficient quantity in which waste will be minimal.

3.7.3 Flexibility.

Besides hand sanitizer, dispenser's structure also works for other liquids: soap, lotion, laundry detergent etc. The wide range of possibilities widens the use of the dispenser to various other locations other than the bathroom.

3.8 Applications

The execution of automatic washroom supplies has increased significantly. An increasing number of
public locations and private institutions have been incorporating touchless technology into their washrooms.

3.8.1 Public places.

Public washrooms were permeated by automatic technology. Journalist Michael Sasso once gave it a name, “Hygienic Company Brings Space Age to Bathroom”. In reference of the Tampa International Airport, he wrote that the first automatic urinal was implemented in 1987 and in 16 years, “the airport had 143 automatic urinals, 390 automatic-flush commodes and 276 automatic faucets”. Touch-free technology has become a formal part of modern washroom facilities.

3.8.2 Hospital setting.

A research was carried out in the accession area of the clinical microbiology laboratory and the outpatient dentistry department of the University of Virginia Medical Center. Researches were executed in order to evaluate the particular antiseptic solution and the automatic dispensers in a hospital surroundings. It was executed for two months. At the conclusion, the effectiveness of the solution and dispenser was surveyed. Although the particular alcohol antiseptic was disliked due to the skin-drying effect that the alcohol solution had caused, the hand sanitizer dispenser was advised for greater use throughout the healthcare facilities.

The filth, poverty and disease impregnating nineteenth century’s society was absolutely reduced by revolutionary sanitation movements throughout the twentieth century. Although several other advances can be causally and temporally relevant to some of these diseases, the causal evidence is conformable with the theory that personal hygiene is another factor helping to determine the decline. The advances of hygiene such as that automatic sanitizer dispenser can be considered as one of the more silent victories of public health and continues to be an important disease prevention strategy, even in this “modern” era when the “gospel of germs” has waned in popularity.

CHAPTER 4

RESULTS AND DISCUSSION

We have designed an automatic hand sanitizer system that is compatible with various containers. When one moves one's hand close to the device sensor, the hand sanitizer container is pumped once.

In the above work, Arduino is used as a microcontroller for calculating the distance between the sensor and the hand placed below it. If it is less than 30cm, then pump runs through a relay and pumps out few mL of liquid alcohol based hand sanitizer. Components like pump, relay, Arduino microcontroller were tested. The Hand Sanitizer used was liquid type with Isopropanol and Chlorohexidine Gluconate (0.3%). This can also be used for gel type hand sanitizer also.

CHAPTER 5

CONCLUSION AND FUTURE SCOPE

The automatic hand sanitizer device proposed in this work is ultimately expected to contribute to contactless hand disinfection in public places and virus infection prevention. Additionally, it is economical and eco-friendly by decreasing waste emissions.

Hand sanitizers usually operate by squirting sanitizer liquid when one presses a pump with one's hand. Some hand sanitizers on the market are automatically pumped. However, sanitizer containers and pump devices are designed to be compatible only between products produced by the same manufacturer.

To address this problem, we have designed an automatic hand sanitizer system that is compatible with various containers. With the proposed device, it is possible to avoid many people coming into contact with the pump handle, thus preventing fomite viral transmission and making the use of hand sanitizer much more convenient. Moreover, the system squirts a certain amount of hand sanitizer at all times, making it easy to manage refills and replacement. Furthermore, it can operate compatibly with various designs of sanitizer containers, so consumers do not need repurchase a container for the liquid if they replace the hand sanitizer. Thus, it is economical and eco-friendly by decreasing waste emissions. The automatic hand sanitizer device proposed by this paper is ultimately expected to contribute to contactless hand disinfection in public places and virus infection prevention.

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