Mini Project Report

on

"AUTOMATED HAND SANITIZATION MONITORING"

Submitted in partial fulfillment of the requirements for the award of the degree of

BACHELOR OF TECHNOLOGY

in

ELECTRONICS AND COMMUNICATION ENGINEERING

By

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Accredited by NBA and NAAC with A Grade

Bachupally, Hyderabad – 500090

2023-24

DECLARATION

We hereby declare that the work described in this report, entitled **"AUTOMATED HAND SANITIZATION MONITORING"** which is being submitted by us in partial fulfillment for the award of the degree of **Bachelor of Technology** in the department of **Electronics and Communication Engineering** at **BVRIT HYDERABAD College of Engineering for Women,** affiliated to **Jawaharlal Nehru Technological University Hyderabad**, Kukatpally, Hyderabad – 500085 is the result of original work carried out by us under the guidance of **Dr. T. Thammi Reddy, Professor.**

This work has not been submitted for any Degree/Diploma of this or any other institute/university to the best of our knowledge and belief.

Place: Hyderabad

Date:

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Certificate

This is to certify that the major/mini project report, entitled **"AUTOMATED HAND SANITIZATION MONITORING"** is a record of bonafide work carried out by **G. Sneha Priya (20WH1A0481), K. Venkata Praditha (20WH1A0482), P. Harsha Sri (20WH1A0491), V. Neethika Reddy (20WH1A0492)** in partial fulfillment for the award of the degree of **Bachelor of Technology** in the department of **Electronics and Communication Engineering** at **BVRIT HYDERABAD College of Engineering for Women,** affiliated to **Jawaharlal Nehru Technological University Hyderabad**, Kukatpally, Hyderabad – 500085.

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ABSTRACT

Sanitizer is one of the basic necessities in the world of COVID-19.School and colleges have installed sanitization systems while entering into the places. Hence it is very necessary to sanitize our hands every time. Without sanitization, it becomes a sheer risk to all other persons.

Through this prototype, we would like to design a smart sanitization detector alarm circuit using Linear and Digital Integrated Circuits so that the one's who doesn't get sanitized and enter into the place will be restricted by an Alarm and people get notified of it.

In this prototype, we are going to design a system which detects the person who enters into a room without getting sanitized and alerts using the alarm.

The **"AUTOMATED HAND SANITIZATION MONITORING"** is a technology-driven project aimed at promoting hygiene and ensuring effective sanitization practices in various environments.

The motivation behind this project stems from the importance of maintaining cleanliness and preventing the spread of infections, especially in public spaces. This project serves as a valuable tool to encourage and monitor proper sanitization practices ,contributing to public health and safety.

The project employs a range of hardware components to realize its functionality. These include a IC's, IR sensors, LED, and a buzzer alarm. The use of IR sensors is to detect the motion of a person. The IR sensors send the data to a control unit which is having IC's and memory element such as flipflops to store the current and updated states as required.

According to the input the feedback will be provided to the people , whether sanitized or not, if sanitized it doesn't give any indication as accepted and if not sanitized it gives an buzzer alarm with an light indication as they are not allowed.

By combining sensors, control unit, and user feedback mechanisms, the system offers a reliable and immediate method of verifying successful sanitization. This project has potential to be implemented in one way entrances in public restrooms and transportation hubs.

The successful development of this system not only showcases the integration of technology for a social cause but also emphasizes the importance of responsible hygiene practices for the well-being of individuals and communities.

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CHAPTER-1

INTRODUCTION

1.1 INTRODUCTION TO THE SYSTEM

In the era of COVID-19, the significance of maintaining rigorous sanitization practices has become paramount for public health and safety. Institutions such as schools and colleges have recognized the critical need for sanitization, evident in the installation of dedicated systems at entry points. However, ensuring compliance remains a challenge. To address this, we propose the "Automated hand sanitization Monitoring," a technology-driven project aimed at promoting hygiene and monitoring sanitization practices in various environments, especially in public spaces.

The prototype incorporates a sophisticated system utilizing a combination of hardware components, including Integrated Circuits (ICs), Infrared (IR) sensors, LEDs, and a buzzer alarm. IR sensors are employed to detect the motion of individuals entering a room. The collected data is then transmitted to a control unit equipped with ICs and memory elements, such as flip-flops, enabling the storage of current and updated sanitization states as needed.

1.2 PROBLEM STATEMENT

In the wake of the COVID-19 pandemic, maintaining proper sanitization practices has become a critical aspect of public health. However, ensuring that individuals entering public spaces adhere to sanitization protocols poses a significant challenge. The lack of an efficient monitoring system results in a potential risk of infections spreading in crowded areas, such as schools, colleges, and other public spaces. There is a need for a reliable and technologically-driven solution to enforce and verify sanitization practices at entry points.

1.3 MOTIVATION

The "Automated hand sanitization Monitoring" is motivated by a commitment to public health and safety, specifically targeting infectious disease prevention, notably during the COVID-19 era. Addressing challenges in crowded spaces like schools, and transport hubs, the system enforces hygiene compliance, fostering a safer environment.

Rooted in technological integration for social good, it showcases the positive impact of technology on societal well-being, instilling a sense of responsibility in public spaces. Amid the ongoing pandemic, the urgency to mitigate health risks propels the project to provide an immediate, effective solution for enhanced sanitization practices. Particularly relevant in educational and healthcare settings, the system prioritizes the safety of students, patients, and staff.

1.4 OBJECTIVES

The "Automated hand sanitization Monitoring" project is driven by a commitment to actively contribute to public health and safety in the context of the COVID-19 pandemic. The primary objective is to develop a robust "Automated hand sanitization Monitoring" that ensures proper sanitization practices in diverse environments, focusing on high-traffic public spaces like schools, and transportation hubs.

This innovative system employs infrared (IR) sensors for real-time detection of individuals entering a room, providing instantaneous data on their sanitization status. The integrated alarm system, featuring a buzzer and LED indication, serves as both a deterrent and immediate notification to individuals entering without proper sanitization.

A sophisticated control unit, equipped with integrated circuits (ICs) and memory elements such as flip-flops, processes and stores sanitization status data efficiently. The user feedback mechanism is designed to provide clear indications: if sanitized, no signal is given, signifying acceptance; if not sanitized, the buzzer alarm and LED indication activate, signaling entry restrictions until proper sanitization is completed.

The adaptability of the system for one-way entrances enhances its applicability in public restrooms and transportation hubs. Emphasizing responsible hygiene practices, the project aims to positively influence individuals and communities, encouraging a proactive approach to public health.

With a focus on potential widespread implementation, particularly in educational and healthcare settings, the system prioritizes the safety of students, patients, and staff. Ensuring privacy and regulatory compliance, the project showcases the successful integration of technology for social good, emphasizing its role in promoting responsible hygiene practices during and beyond the ongoing pandemic.

CHAPTER-2

LITERATURE SURVEY

A number of studies have shown that Automated hand sanitization Monitorings can be effective in increasing hand hygiene compliance rates. For example, one study found that the use of an automated hand hygiene monitoring system increased hand washing compliance from 44% to 95% among healthcare workers. Another study found that the use of a hand sanitizer dispenser with an integrated sensor increased hand hygiene compliance from 67% to 90% among elementary school students (Saniwaves).

2.1 EXISTING SYSTEM:

The existing systems are the one which detects the presence of hand and dispenses the sanitizer. The system does not detect whether the person entered into the place by sanitizing or not.

2.2 PROPOSED SYSTEM:

The proposed Automated hand sanitization Monitoring is an automated system that aims to promote hand hygiene and dispensing sanitizer when necessary. The system has

Infrared (IR) sensors: These sensors detect the presence of hands ,trigger the sanitizer dispensing mechanism and detects the person.

Power supply: The power supply provides power to the system.

Hand washing monitoring: The system can be equipped with additional sensors and provide feedback to users, encouraging proper hand hygiene practices.

2.3 SCOPE OF THE PROJECT

Identify the specific needs and requirements of the target users and environments where the system will be deployed. Analyze the existing sanitization practices and hand hygiene compliance rates in the target settings.

Define the functional and non-functional requirements of the system, including performance, reliability, and usability. Select the appropriate hardware components, such as IR sensors, sanitizer dispenser and power supply.

CHAPTER-3

COMPONENTS

3.1 ICs USED:

- 74LS32
- 74LS08
- 74LS76
- 74LS04
- NE555

3.2 HARDWARE USED:

- ICs Listed
- Capacitors
- Resistors
- Switches
- IR Sensors
- Jumper wires
- Breadboard
- LED

CHAPTER-4
WORKING AND DESCRIPTION

The implementation is purely based on logic and is represented as state diagram. From the state diagram we deduce the logical expressions and realize the circuit using J-K Flipflops.

4.1 STATE DIAGRAM

A state diagram is a graphical representation of a system's states and the transitions between those states. Each state represents a condition of the system, and transitions indicate how the system moves from one state to another based on certain conditions.

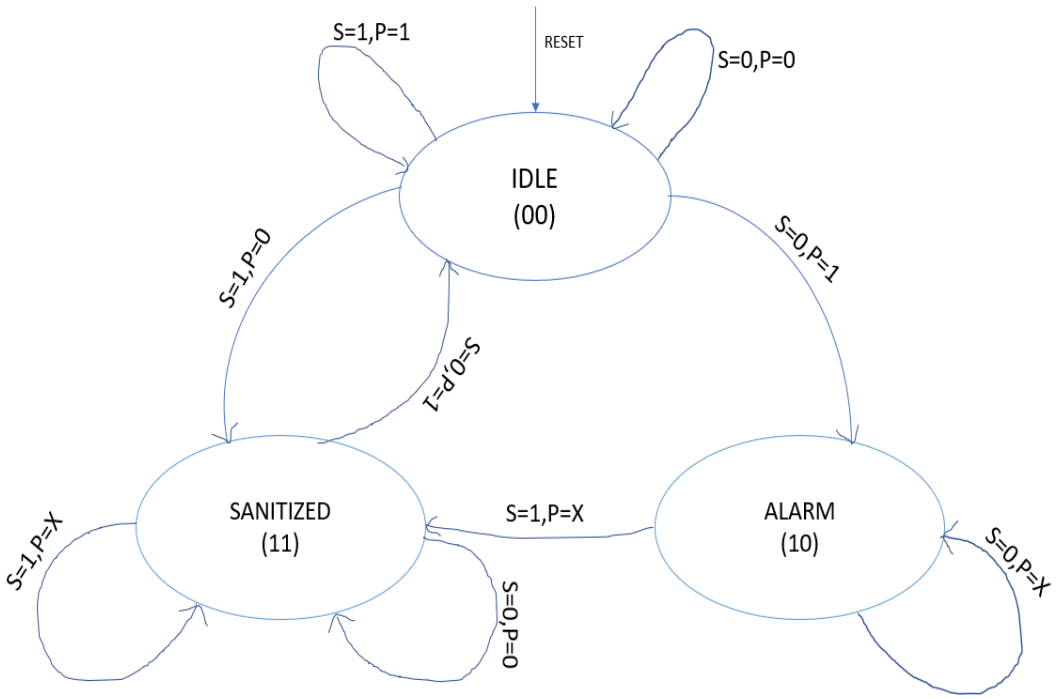


Fig-1 State Diagram

4.2 DESCRIPTION:

The states are as shown above in the state diagram.
There are 3 states named:
• IDLE STATE
• SANITIZED STATE
• ALARM STATE (Not Sanitized)

1. **IDLE STATE:**
    - This is simply the reset state.
    - The "reset state" is the condition before sanitization.
    - This is the state where the person not entered the room and the person is not getting sanitized.

2. **SANITIZED STATE:**
    - Sanitized state is when the person is entering room which is detected by the IR sensor then we make P=1 and person entered getting sanitized at sanitizer and that is detected by the IR sensor present at sanitizer. This state is sanitized state.
    - When the sensor detects the hand, then it's state gets pulled down and by that edge detection, we make S=1.

3. **ALARM STATE:**
    - In Alarm State the person enters the room it is detected by IR Sensor and make P=1.
    - But the entered person is not sanitized and that make S=0.
    - In this case the system gives a alarm to notify that the person entered the room and not sanitized. This state is Alarm State.
    - This state is also known as Not Sanitized State.

4.3 STATE TABLE

Table-1

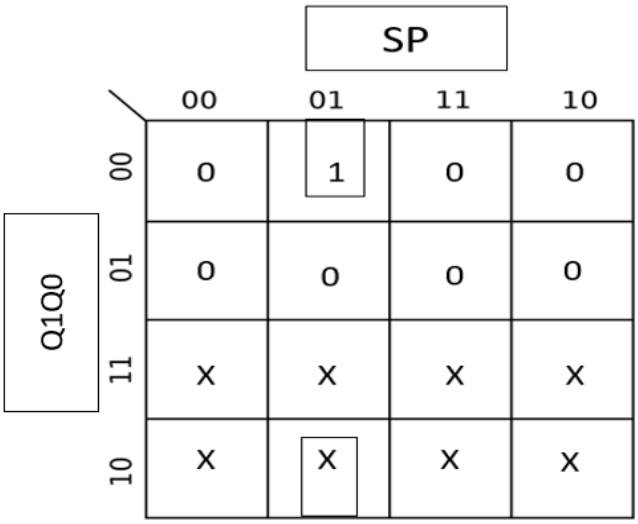
Present state		S	P	Next State		J2	K2	J1	K1	Output
0	0	0	0	0	0	0	X	0	X	0
0	0	0	1	1	0	1	X	0	X	0
0	0	1	0	0	1	0	X	1	X	0
0	0	1	1	0	0	0	X	0	X	0
0	1	0	0	0	1	0	X	X	0	0
0	1	0	1	0	0	0	X	X	1	0
0	1	1	0	0	1	0	X	X	0	0
0	1	1	1	0	1	0	X	X	0	0
1	0	0	0	1	0	X	0	0	X	1
1	0	0	1	1	0	X	0	0	X	1
1	0	1	0	0	1	X	1	1	X	1
1	0	1	1	0	1	X	1	1	X	1
1	1	0	0	X	X	X	X	X	X	X
1	1	0	1	X	X	X	X	X	X	X
1	1	1	0	X	X	X	X	X	X	X
1	1	1	1	X	X	X	X	X	X	X

From the state diagram, we have drawn the state table.

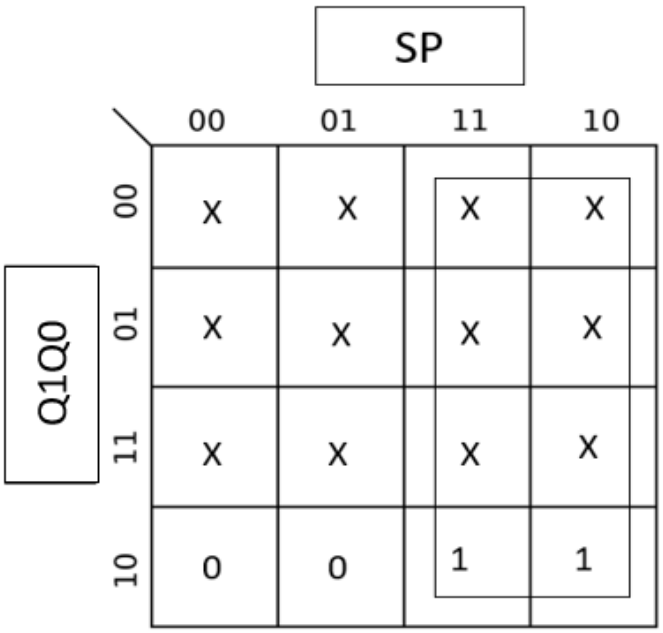
• Now, from the present state and next state, we can now realize the expressions for J and K of every flipflop.

• The circuit realization can be done by the K-Maps.

4.4 K-MAPS

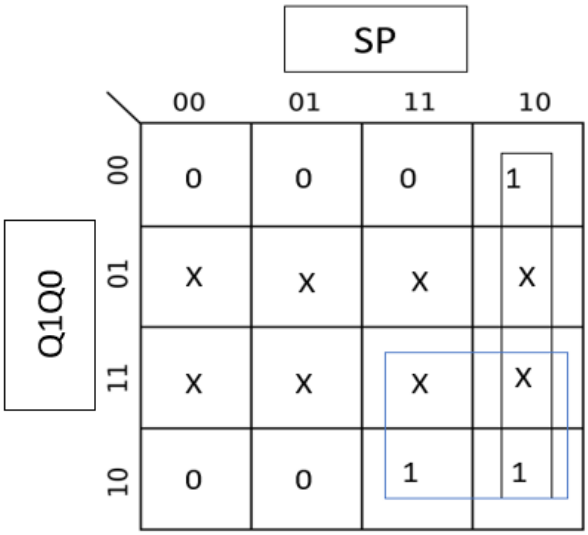


$J2=\overline{Q0}\ S\ P$

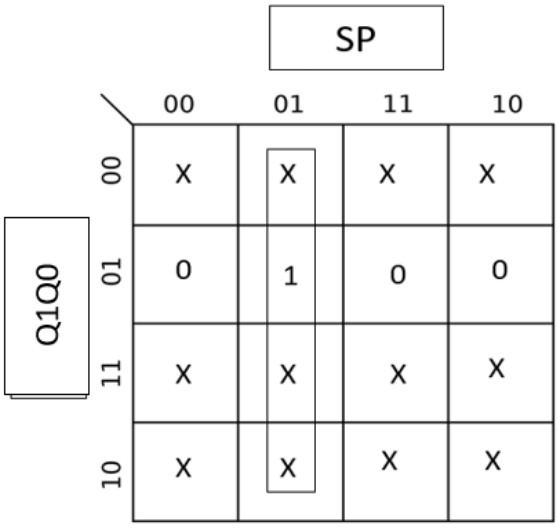


$K2=S$

Fig-2



$$J1=Q1\ S + S\ \overline{P}$$



$$K1 = \overline{S}\ P$$

Fig-3

From the K-Maps we realized the expressions for J and K of every flipflop.

- Since there are 3 states, So only 2 flipflops are required.
- The circuit is as shown below.

CHAPTER-5

CIRCUIT DESIGN

5.1 CIRCUIT DIAGRAM

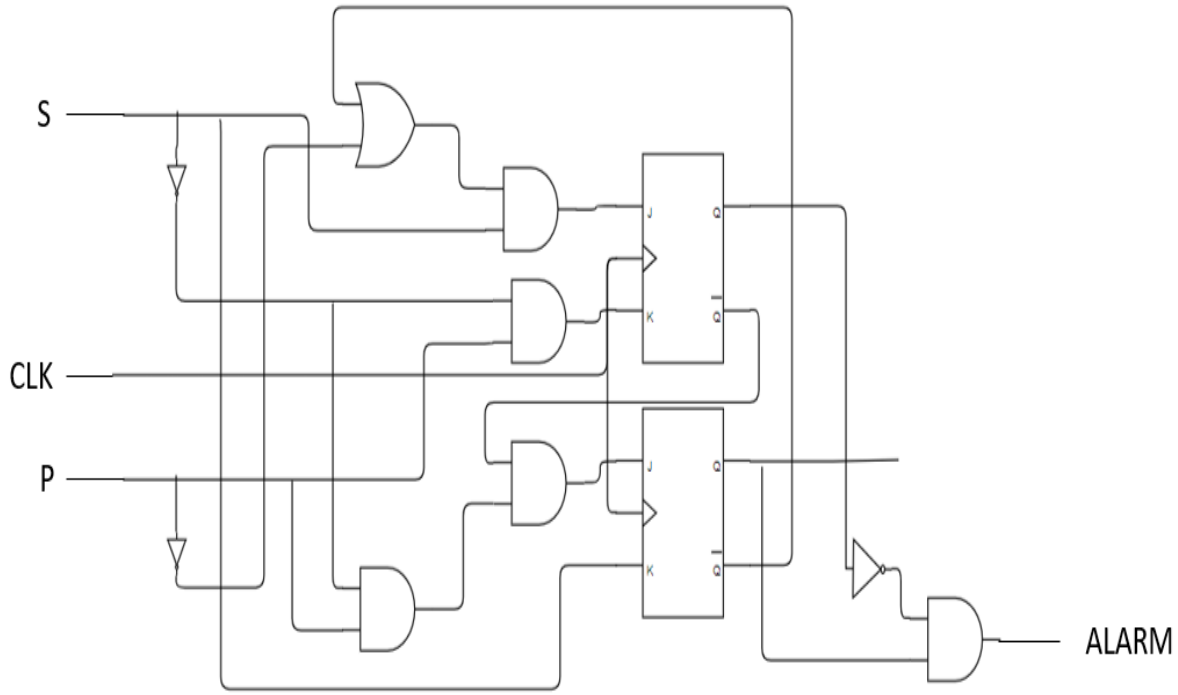


Fig-4

5.2 ICs USED IN THIS PROJECT:

- 555 timer in astable mode is used to generate the CLK pulse.

Realizing J and K requires “AND” and “OR” gates. We use digital IC’s to realize them.

The IC we used to realize the main circuit are:-

- 74LS32:- Dual i/p OR gate
- 74LS08:- Dual i/p AND gate
- 74LS04:- NOT gate IC
- 74LS76:- Master slave JK_FF (Negative edge triggered)
- 555:- 555 Timer IC is used to generate the master CLK pulse in our system.

These are the IC used in realization of the circuit.

- Practically, for S and P inputs we use sensors which are generally pulled up and when it detects (for ‘S’ when it detects person pressing sanitize button and for ‘P’ when the IR sensor detects the person) the outputs of sensors goes low. But, again the become high after (1-2 seconds).
- So, our system interprets: (High to Low transition of S or P) as ->HIGH, (No change in S or P) as ->LOW.

6.3 UML DIAGRAMS:

Unified Modelling Language The Unified Modelling Language (UML) is a standard language for specifying, visualizing, constructing, and documenting the artefacts of software systems, as well as for business modelling and other non software systems. The UML represents a collection of best engineering practices that have proven to be successful in the modelling of large and complex systems. The UML is a language for :

- Visualizing
- Specifying
- Constructing
- Documenting the artifacts of a software system.

UML is a language which provides vocabulary and the rules for combining words in that vocabulary for the purpose of communication. A modelling language is a language whose vocabulary and the rules focus on the conceptual and physical representation of a system. Modelling yields an understanding of a system.

USE CASE DIAGRAM:

- Use case Diagram consists of use case and actors.
- The main purpose is to show the interaction between the use cases and the actor.
- It intends to represent the system requirements from user’s perspective.
- The use cases are the functions that are to be performed in the module.

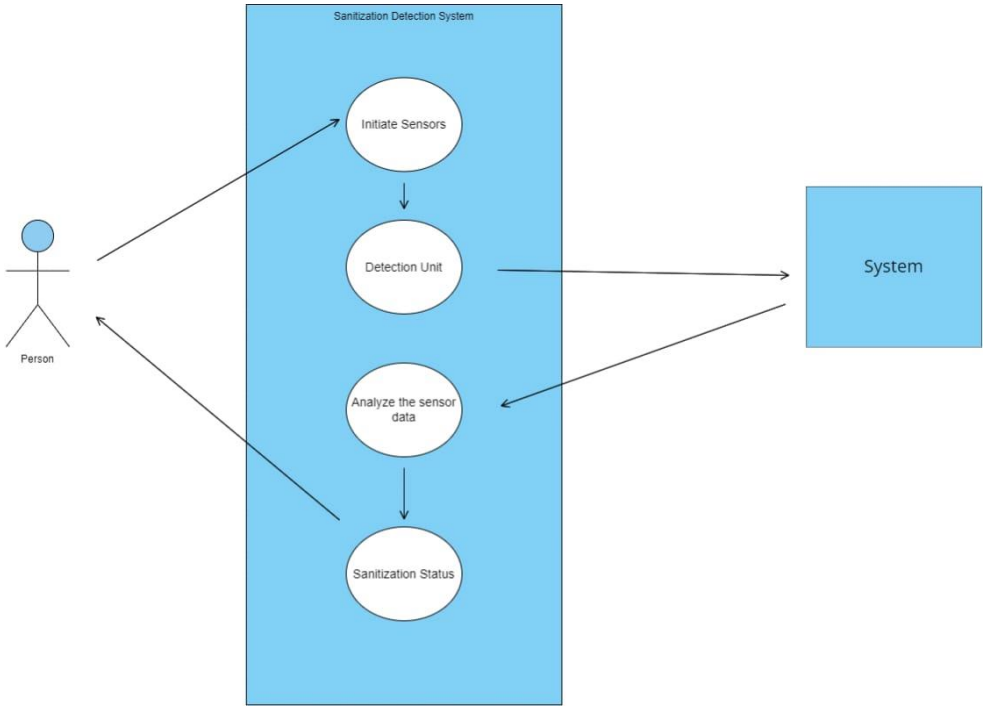


Fig-5

SEQUENCE DIAGRAM

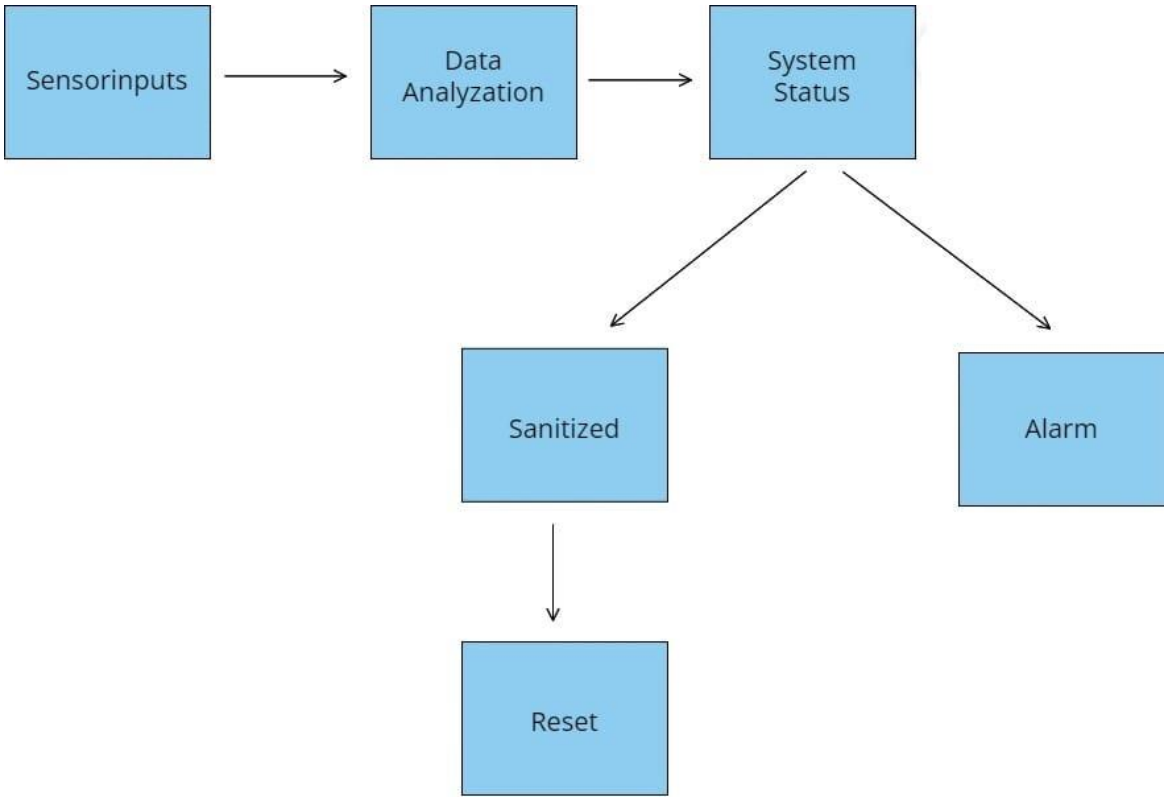


Fig -6

CHAPTER-6

CIRCUIT OUTPUTS

Case 1: P=0 and S=0

This is IDLE State in which the person is not entered the room i.e; P=0 and not sanitized i.e; S=0.

This state is 00 state.

So the output of the circuit is 00 (IDLE State) as shown below.

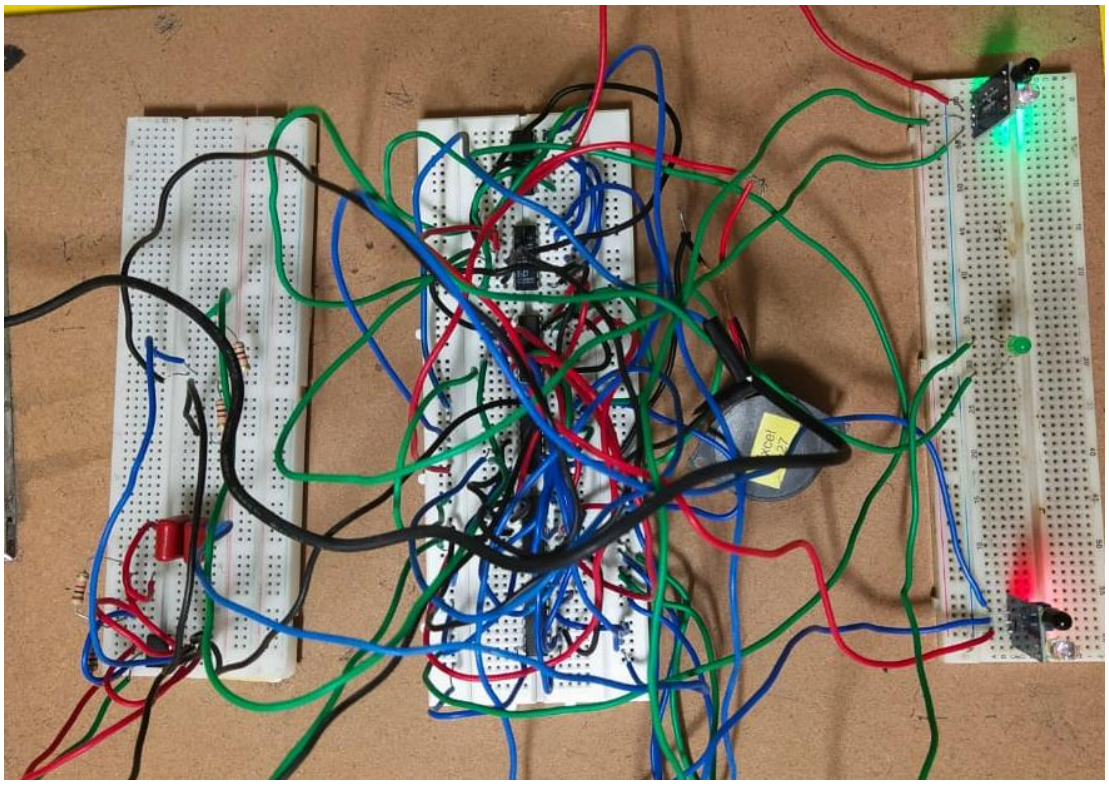


Fig-7

Case 2: P=1 and S=0

This is Alarm State in which the person entered the room i.e; P=1 and not sanitized i.e; S=0.

This state is 10 state.

So the output of the circuit is 10 (Alarm State) as shown below.

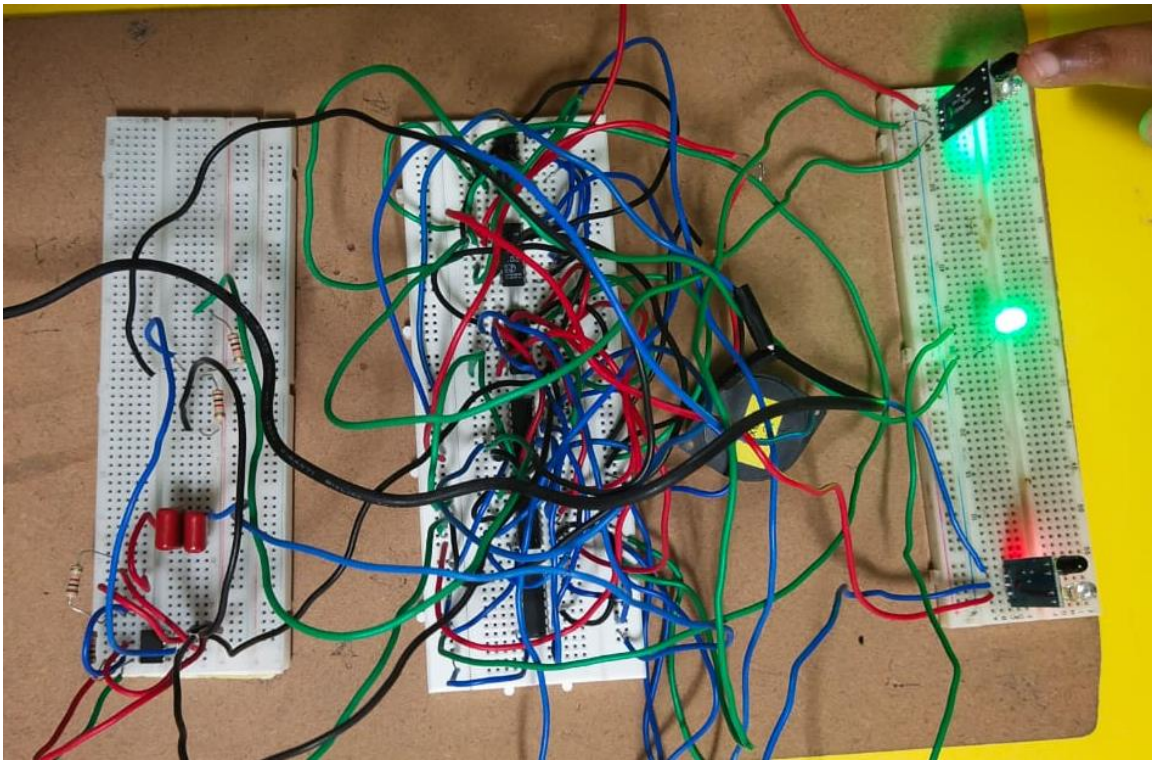


Fig-8

Case 3: P=1 and S=1

This is Sanitized State in which the person entered the room i.e; P=1 and sanitized i.e; S=1.

This state is 11 state.

So the output of the circuit is 11 (Sanitized State) as shown below.

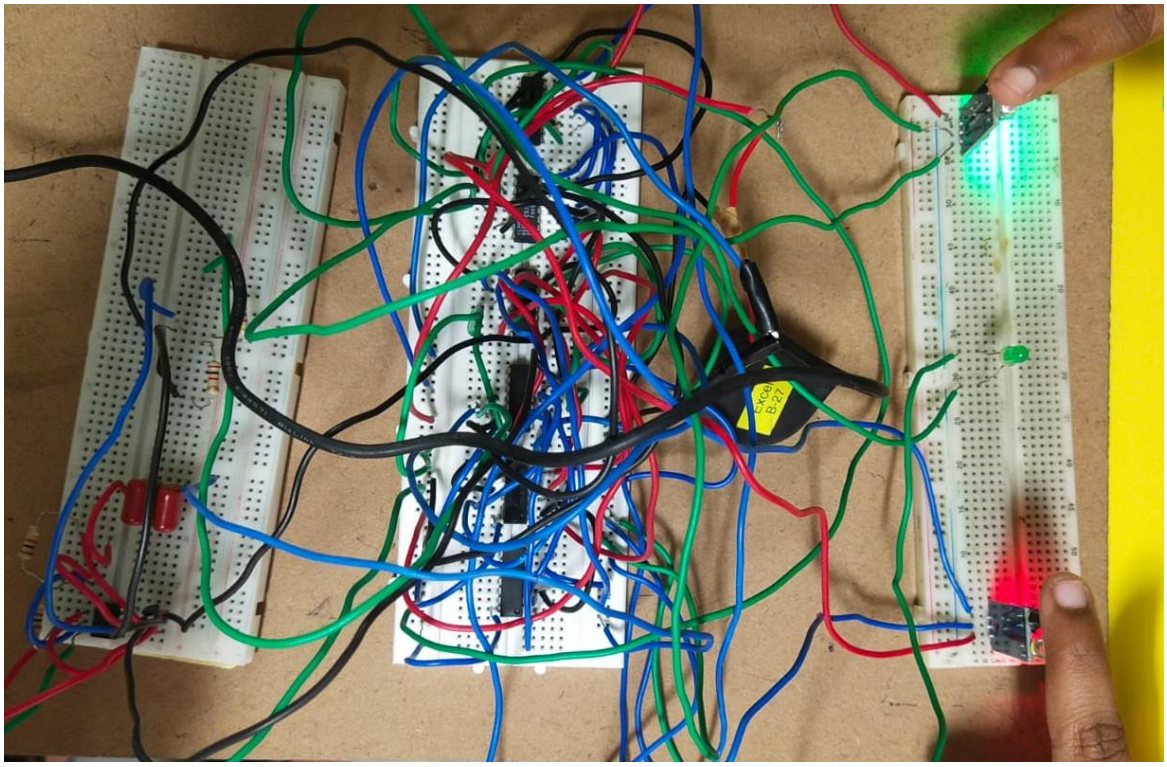


Fig-9

FUTURESCOPE OF THE SYSTEM AND CONCLUSION

As technology evolves and societal needs change, the future scope for the sanitization system can encompass several innovative features and improvements. Anticipating emerging trends and addressing potential challenges will help ensure the system remains effective and adaptable in the long run.

1. **User-Centric Customization:** In the future, the system could incorporate user-centric customization features. This might include personalized sanitizer preferences, allowing users to choose the type of sanitizer (foam, gel, or liquid) or fragrance.
2. **Integration with Health Monitoring:** Leveraging advancements in health monitoring technology, the sanitization system could integrate with wearables or smart devices to provide additional health-related insights.
3. **AI-Powered Predictive Maintenance:** Introducing artificial intelligence (AI) for predictive maintenance can enhance the reliability of the system. By analyzing sensor data and usage patterns, the system can predict when components might require maintenance or replacement, ensuring minimal downtime and maximizing overall system efficiency.
4. **Data Analytics for Continuous Improvement:** Implementing robust data analytics capabilities can enable continuous improvement of the system. By collecting and analyzing usage patterns, the system can identify high-traffic periods, popular locations, and areas with lower compliance rates. This data-driven approach can inform strategic adjustments and optimize the system's performance.

Automated hand sanitization Monitorings are an effective tool for promoting hand hygiene. These systems can be used in a variety of settings, including schools, and workplaces. They are typically equipped with sensors that detect when a person's hands are present and then automatically dispense sanitizer. Systems ensure that users wash their hands and feedback mechanisms to let users know if they have washed their hands or not.

Studies have shown that Automated hand sanitization Monitorings can increase hand hygiene compliance rates by up to 80%. They can also reduce the incidence of infectious diseases by up to 50%. Automated hand sanitization Monitorings are a cost-effective way to improve hand hygiene. They are a valuable tool for promoting public health.

REFERENCES

- "Automated Sanitization and Monitoring System" by Anukriti Pudmja, Kartik Tripathi, Shivam Saini, and Abhishek Singh (2021). This paper describes an automated sanitization and monitoring system that uses motion sensors, thermal detection, and a hand sanitizer dispenser to promote hand hygiene and reduce the spread of germs.
- "Automatic Mask and Temperature Detection System using Deep Learning and Bus sanitization module for Covid-19" (2021). This paper describes an automatic mask and temperature detection system using deep learning and a bus sanitization module for COVID-19. The system uses a deep learning model to detect whether or not a person is wearing a mask and to measure their temperature. The bus sanitization module automatically sprays disinfectant when passengers enter and exit the bus.
- "Non-Contactable Detection and Sanitization of COVID-19, Automable Attendance System" (2021). This paper describes a non-contactable detection and sanitization system for COVID-19 that uses a proximity sensor, infrared radiation, object detection, and an infrared thermometer sensor to detect the presence of people and measure their temperature. The system also includes an automable attendance system that records the attendance of people who enter and exit the building.
- "Automated Sanitizing Machine for Recording Thermal Detection and Hygiene Application" by Z. H. Zaidan, M. A. Hussain, M. H. Ibraheem, N. H. A. Rashid, and M. H. Zubaidi (2022). This paper describes an automated sanitizing machine for recording thermal detection and hygiene application. The machine uses a motion detection sensor to detect the presence of people and then automatically dispenses hand sanitizer and takes their temperature. The machine also records the temperature readings and alerts users if their temperature is elevated.
- "Automatic Room Sanitization Using UV-C Tubes" by S. Sivakumar, S. B. Patil, J. K. Patra, and S. K. Panda (2022). This paper describes an automatic room sanitization system using UV-C tubes. The system uses motion sensors

to detect the presence of people and then automatically turns on UV-C tubes to sanitize the room. The system also includes a timer to ensure that the UV-C tubes are on for the appropriate amount of time.

- "Smart Hand Sanitizer Dispenser with Temperature Monitoring" by A. Patel, R. Shah, P. Sharma, and S. Patel (2020):This paper presents a smart hand sanitizer dispenser integrated with temperature monitoring. The system employs IR sensors for hand detection, a dispenser for touchless sanitizer application, and an infrared thermometer for temperature measurement. The real-time temperature data is monitored, promoting a comprehensive approach to health safety.