

Automatic Hand Sanitizer Dispenser

YOGESH A. PATLE, DEVENDRA B. MADAVI AND ANJU N. NANDESHWAR
Ms. SEEMA BIRANWAR (Under the guidance)

Department of Electronics and Telecommunications Engineering
Madhukarrao Pandav College Of Engineering , Bhandara - 441904

Abstract - In this covid-19 pandemic period which is a global outbreak, hand hygiene is the core preventive measure in the spread of the disease as advised by WHO (World Health Organization) which includes washing hands with water and soap regularly, hand sanitizing using hand sanitizers, etc. Hygiene refers to the practices conducive to maintaining health and preventing disease especially through cleanliness such as washing hands, coughing in the elbow etc. Hand washing helps to prevent any diseases that spread through contact. In order to eliminate most of the germs on the hands, one needs to apply a good hand washing practice. In most healthcare settings, alcohol-based hand sanitizers are preferable to hand washing with soap and water because it can be easily tolerated and it is also more effective at reducing bacteria. Hand sanitizer is a liquid, gel, or foam generally used to decrease infectious agents on the hands. A sanitizer is designed to kill germs on skin, objects and surfaces. This research paper aim to design and implement a low cost smart hand sanitizer dispenser with door controller based on ATMEGA328P (Microcontroller), electromagnetic lock and Ultrasonic sensor that can help to solve the challenges faced by security guards at different stations such as bank doors, school gates, hospital gates etc. in enforcing this hand sanitizing action before letting people in to where ever they intend to enter as some people are not willing to collaborate, some look at it as a wastage of their time and also sometimes these security guards can let some people in without sanitizing just because they are their friends or family relatives which is very risky. Therefore, the smart hand sanitizer is stationed at the entrance door and it is connected to the door in such a way that it controls it.

Keyword : Hygiene, Hand sanitizer, Microcontroller, Ultrasonic sensor, Servo motor, LCD, Electromagnetic Lock.

1.INTRODUCTION

Hands are considered to be the primary mode of infectious diseases, especially for those living in close proximity such as college residence halls, shopping malls, bank halls, market areas etc. Because of the frequent contact with hands and

multiple surfaces, the incidence of cross-contamination is significantly increased. Hand hygiene is a major requirement for human health and many infectious diseases can be emerged if proper hand hygiene procedures are not implemented. Hand washing is the simplest, important and cost effective way to improve hand hygiene in health care and support the prevention of infectious disease. Over recent years, there has been increasing availability and usage of hand sanitizing products. The main advantage of these products seems to be that they are more trusted, quicker and easier to use. They may also provide another way to clean the hands when water and soap are not available. Using hand sanitizers is usually considered to be an effective hand hygiene regime for hospital, health-care settings and others. As we all know, the COVID-19 outbreak hit the world and changed our lifestyle.

2. Objectives :

The main objective of this research paper is to design and implement a low cost touch free smart hand sanitizer dispenser with door controller that includes features such as ultrasonic sensor, LCD display and servo motor, based on Microcontroller.

1. To design a touch less hand sanitizer dispenser.
2. To design and implement a low power consumption system

3.System Description :

In this research paper, we are using the ultrasonic sensor (HC-SR04) to detect the presence of a hand. When it detects presence of hand below 10cm, it will trigger the first servo motor to move from 0 degrees to 180 degrees in order to pour the liquid on the hand. It will delay for two (2) seconds before returning back to 0 degrees. After returning to 0 degrees, the electromagnetic lock will de-energize and a green LED will light up immediately, a word "The Entrance Door is Open" will appear on the LCD display then the second servo motor will open the entrance door. We added a delay of six (6) seconds to energize the electromagnetic lock and a

delay of two seconds to reset the system. In this system, microcontroller is used to control all the attached devices across the external electronics equipment which are: ultrasonic sensor, servo motor, electromagnetic lock, LCD display and LEDs. The power supply provides the voltage and current required for effective performance of the system. The electromagnetic lock taps directly from the 12V DC power source and then Microcontroller and servo motor are fed with regulated DC power supply, which is 5V and 9V respectively.

This system consists of two parts, Hardware and Software.

[1] The Hardware parts include :

1. ATMEGA328P
2. Ultrasonic sensor
3. Electromagnetic lock
4. 12V DC Power Supply, 9V and 5V DC Regulator
5. LCD display
6. Relay
7. Servo motor
8. Saleae Logic 16 (Logic Analyzer)
9. LEDs
10. Resistors, Capacitors and Diodes.

[2] Software parts include:

1. Arduino IDE
2. Saleae Logic 1.2.18

3.1 Flow Chart :

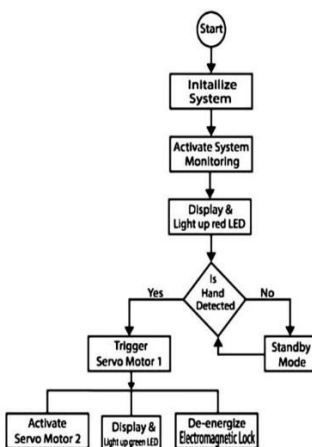


Fig1. The flow chart of the system

3.2 Block Diagram :

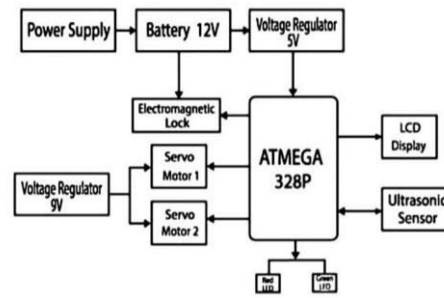


Fig2. The block diagram of the syste

3.3 Circuit Diagram :

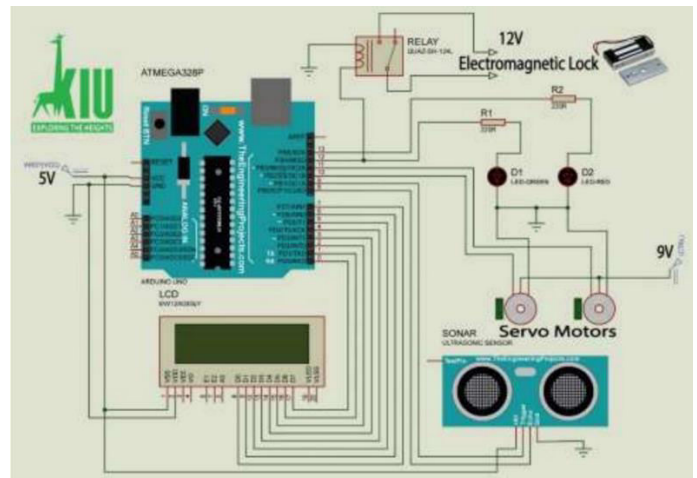


Fig3. The circuit diagram of the system

4. LIST OF COMPONENTS

1. Adaptor 12v 1amp
2. IC 7805
3. IC ATmega 328p
4. Diode 1N4007
5. Capacitor 10uf,100uf,22pf,0.1uf
6. Resistors 1k, 10k, 4700hm ,560hm
7. Crystal oscillator
8. Resistors 1k, 10k, 4700hm ,560hm
9. Transistor BD139
10. IR Sensor
11. Diaphragm DC Motor
12. Buzzer
13. light-emitting diode (LED)

5. CONSTRUCTION :

The schematic is very simple and easy to understand. IR proximity sensor detects the presence of a hand and makes the OUT pin LOW. Normally OUT pin keeps HIGH. When it goes low it turns on the PNP transistor and the pump becomes on. I used the BD139 power transistor for the circuit. A 1K resistor is connected between sensor OUT and

the base of the transistor. It protects the transistor from burning out.

Turn the potentiometer of the sensor from the lowest sensitivity level, and slightly increase it to achieve your desired detection range. Do NOT make it too sensitive because the pump might act spontaneously without any trigger! For powering the circuit and the motor through 12V 1A Adaptor which is used for powering the circuit. For the sanitizer container, you can select any similar glass or plastic container, such as a plastic coffee storage container. My selected one is a Acrylic container. An enclosure for the circuit is designed according to the cap size and the file is attached.

6. Advantage :

1. Automatic

The first and foremost advantage of an automatic sanitizer dispenser is that it provides a truly touchless experience. There is no hassle of pressing a button or a handle (as in the case of foot-operated ones). These dispensers have ultrasonic sensors that release the sanitizer once you keep your hands below the nozzle. It's fast, safe, and simply more efficient.

2. Easy to use

For every appliance, the ease of use is what determines its feasibility. While choosing a sanitizer dispenser, you will want something that will be easy to use, unlike the manual ones.

Automatic hand sanitizer dispensers are better than the traditional ones as they dispense the sanitizer automatically. You don't have to apply physical pressure on the dispenser; just place your hands under the nozzle, and it provides the right amount.

3. Delivers a standard dose

One of the biggest advantages of an automatic hand sanitizer dispenser machine is that it offers a standard amount that is enough to clean both hands.

These standardized doses are usually sprayed on the hands, which causes minimum to no wastage, unlike manual ones, which releases extra sanitizer at times.

4. Eliminates a contact point

Manual hand sanitizers require pushing the pump to release sanitizer. Touching the pump can spread a lot of germs, as people with dirty hands also use it.

With touchless hand sanitizer dispensers, there is no common contact point, which means less or no germs will be transferred from one person to another.

5. Modern appearance

Contactless hand sanitizer dispensers usually have a sleek and stylish design. They also add a modern appeal to places they are installed in. If you install a contactless hand sanitizer dispenser at your workplace, then you are indeed giving a high-end vibe to your environment.

7. Applications :

This system can be applied in hospital, banks, offices, home, shopping malls etc.

8. Conclusion :

The system surely help in implementing the hand hygiene without any challenges as it is a must to sanitizer if you are to access any entry point. It is much safer and more recommended due to its touch less property which zeros down any chances for cross- contamination. This is a low cost user friendly system that anyone can make use of. All the devices communicate well. It can be concluded here that the system has been successfully implemented and the aim is achieved without any deviations. The results achieved in this project are genuine and are a product of sincerity and hard work.

9. References

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