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Dry Hand Sanitizer Dispensing Machine

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Abstract – *In the covid-19 pandemic situation, the wastage of water for hand wash is at a peak. To help and resolve this water wastage problem we designed a system. The proposed automated sanitizing system, mainly deals with COVID-19 care precautionary measures and the purpose is to prevent the wastage of water. Yet, in public places, people are facing many issues. Sanitizing is one of the important factors in COVID-19 care measures in public places. And people waste a lot of water in traditional tap-based hand wash systems. This paper aims to provide an easily compatible facility at an economically feasible rate. Hence, by adopting this, we will be able to implement precautionary measures and facilitate people to use these effectively.*

Keywords – *Automated sanitizing system, Contactless Hand washing, Fog-based technology, covid-19.*

I. INTRODUCTION

The positive effects of good hand hygiene can reduce infection transmission [2]. It's been known since Ignaz Semmelweis faced opposition for introducing hand-washing regimes in the 1840s [14]. The Overuse and misuse of our arsenal of antibiotics have led to pandemics of hospital-acquired infections (HAIs) and more recently widespread community-associated infections with multidrug-resistant (MDR) organisms [7].

In this covid-19 pandemic, hand hygiene is the most important measure to prevent the spread of covid-19 as advised by WHO (World Health Organization) which includes washing hands with some extent of alcohol or something which can disinfect our hands from germs and bacteria, in which hand sanitization using hand sanitizers, etc. [3]. Hygiene prevents disease, especially through washing hands, coughing in the elbow, etc. Hand washing helps to prevent any diseases that spread through contact [2]. Hand wash is used to kill germs on skin, objects, and surfaces. In most healthcare departments, tap-based handwashing with soap and water is the most preferable way to disinfect hands because they can be easily tolerated and more effectively reduce bacteria.[8] But the amount of water that gets wasted in disinfecting hands is huge, especially in public places such as college residence halls, shopping malls, bank halls, market areas, etc. [4]. And according to "NITI AAYOG" latest report India's 20 cities going to face the worst water crisis in the upcoming years [9]. And the table shown below shows the quantity of water a person will waste by using a traditional tap-based hand washing system [12].

TABLE 1.1 WATER BEING WASTED IN HANDWASH

As shown in the above table, if one person washes his hands 10 times a day using a tap-based handwashing system, he will be using at least 20 liters of water per day. And if there are at least 5 members in each family so the total amount of water going to be used there are 100 liters [8]. And if we multiply this by 10 crores to the family of 5 members which is going to be 38.5% population of India at present then we will end up using 1 lakh crores liters of water. To help and resolve this problem we have designed a system [6]. The purpose of the Dry Hand Sanitizer Dispensing Machine is to remove germs from hands. While consuming 95% less water [5].

II. METHODOLOGY

The system turns on automatically and operates in a touchless mode until the disinfection cycle is completed [2]. The system is touchless and automatic if the sensor detects hands inside the disinfection box it will disinfect hands until the disinfection cycle is completed [4]. This eliminates the possibility of human error. Fogging system will decrease labor costs. This system automatically detects the hands using an ultrasonic sensor and turns on the fog mist maker and UV lamp based on the selected time. In this way, a dry handwashing machine requires less than 95% water compared to the traditional tap-based hand washing. Fog sanitizer helps to kill the ham full virus [13]. An Infrared sensor is used to detect hands. When IR Sensor provides 5V Single to relay to turn it on [14].

2.1 UV lamp

- Ultraviolet lamps are used to disinfect surfaces in the home or the same places.
- UV radiation is a known disinfecting of air, water, and nonporous surfaces [14]. UV radiation has been effectively used for decades to reduce the spread of bacteria, such as tuberculosis treatment. And this is the reason UV lamps are also called "germicidal" lamps.

2.2 ULTRASONIC sensor

- Ultrasonic sensors are known for emitting short, high-frequency sound pulses at regular intervals [10]. These propagate in the air at the velocity of sound. If they strike an object, they are reflected as echo signals to the sensor, which computes the distance to the target based on the period between emitting the signal and receiving the echo [7]. As the distance to an object is determined by measuring the time of flight and not by the intensity of the sound, ultrasonic sensors are excellent at suppressing background interference [6].

2.3 Regulated power supply

- A power supply is a supply of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a Power supply unit or PSU [1]. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others.

- Conversion of one form of electrical power to another desired form and voltage, It involves the conversion of AC line voltage to a well-regulated lower-voltage DC for electronic devices.

2.4 Relay Driver

- The current needed to operate the relay coil is more than can be supplied by most chips (op. amps etc), so a transistor is usually needed, as shown in the diagram below [3].
- Use BC109C or similar. A resistor of about 47k will probably be alright. The diode is needed to short circuit the high voltage "back emf" induced when the current flowing through the coil is suddenly switched off [2].

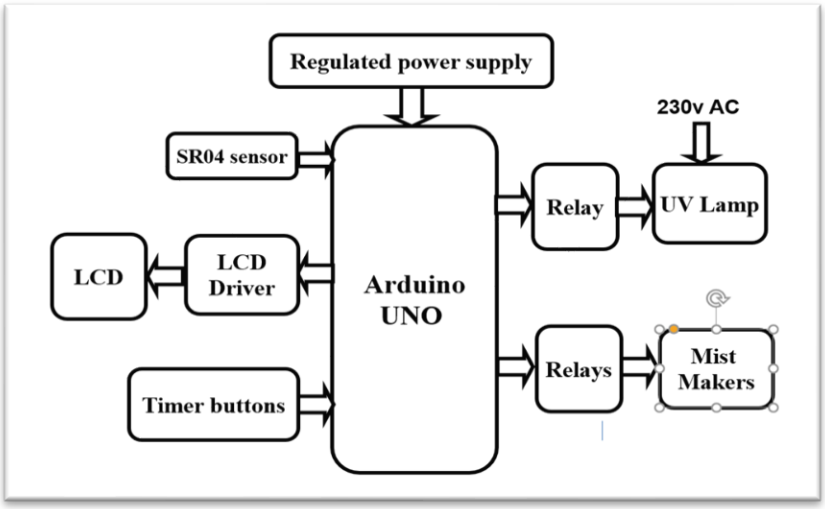

FIGURE 3.2 BLOCK DIAGRAM

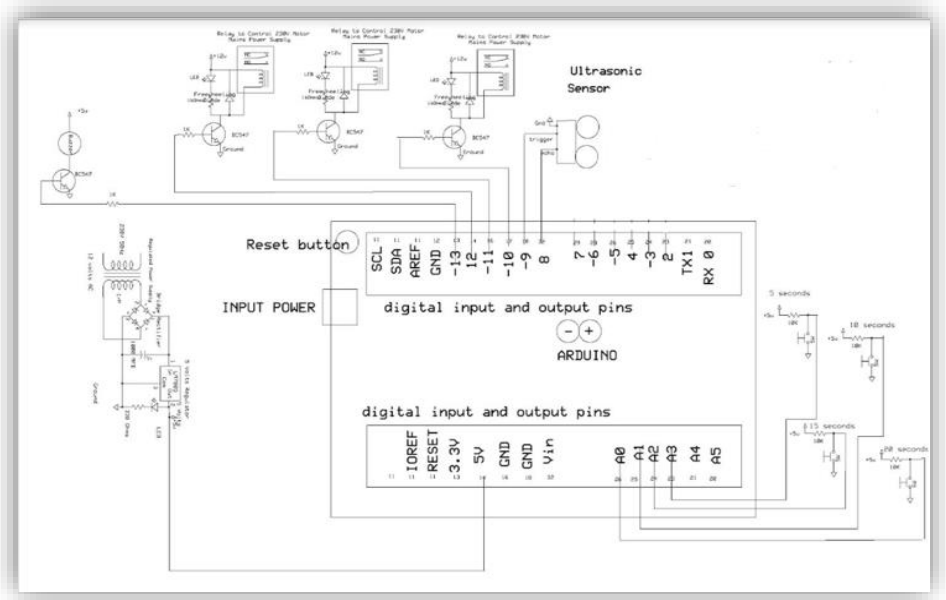

FIGURE 3.3 CIRCUIT DIAGRAM

IV. RESULT

This paper presents the idea of using AFDU (AUTOMATIC FOGGING DISINFECTION UNIT). The spray generates fog with equal particle size. So that the molecules of water can spread all the corners and can save up to 95% water. This dispensing machine is touchless. Which prevents the spread of infection And UV lamp helps to kill germs and bacteria.

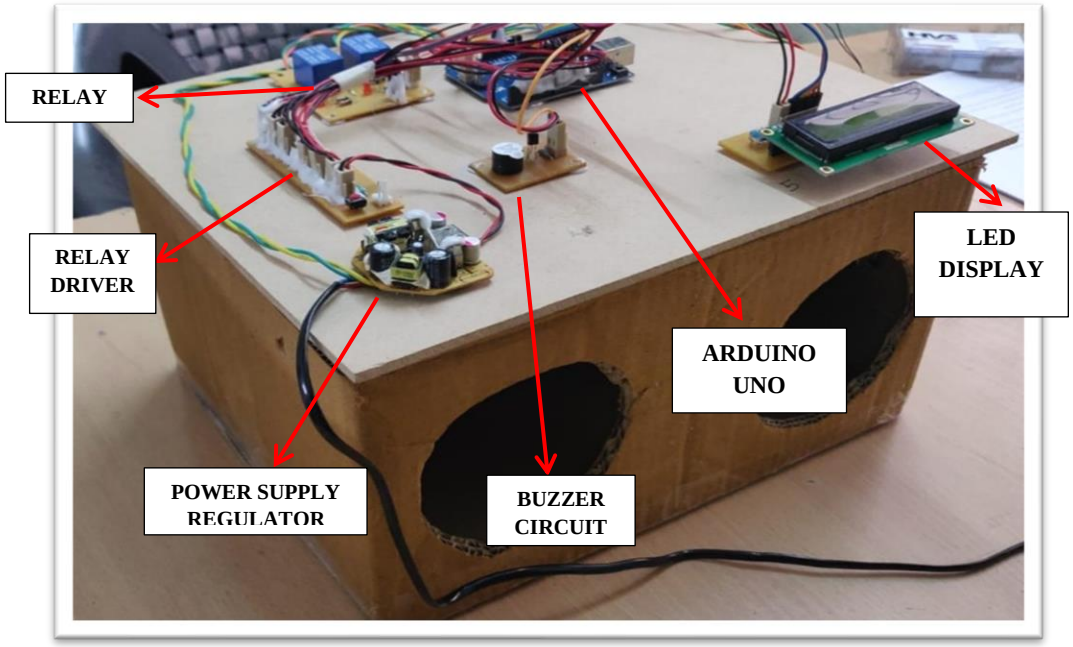

FIGURE 4.1 TOP VIEW

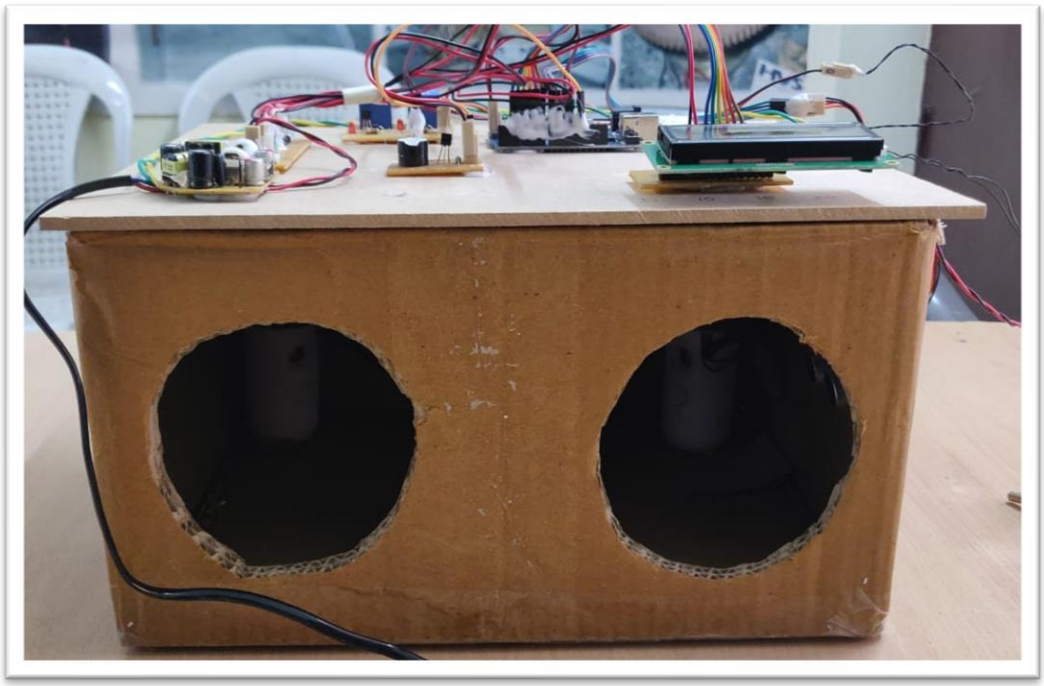

FIGURE 4.2 FRONT VIEW

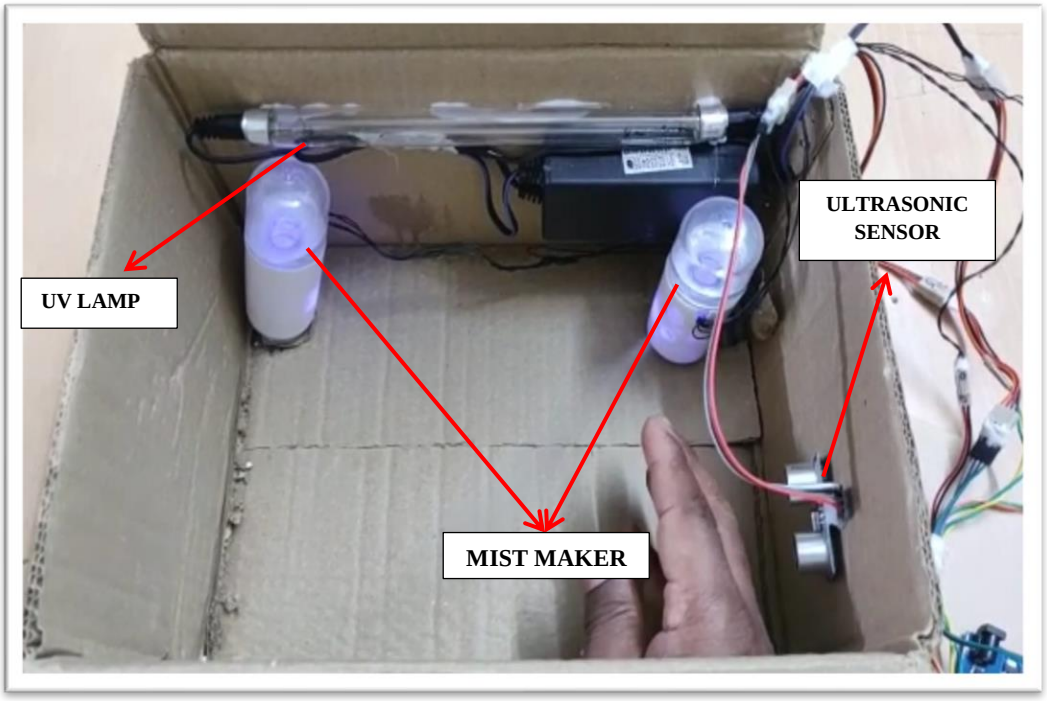

FIGURE 4.2 INSIDE VIEW

Below table shows the swats analysis of this product as it is visible the four key points that are strength, weaknesses, opportunities, and threats. If we look at the strength it requires fewer efforts and there are very fewer competitors in the market. In the weakness section, it has low productivity and requires maintenance. And the system can be improved by adding new technologies and features in it and similar products are available in the market at a very high cost.

TABLE 4.1 SWAT ANALYSIS

Strengths: • Less user effort • Fewer competitors in the market.	Weaknesses: • Low Productivity • Need maintenance
Opportunities: • New-Technology is available to improve production. • Similar products are expensive in the market.	Threats: • Failure of System/Product. • Number of Users

➢ Advantages

(i) It is Non contactable.

(ii) Protect from COVID-19.

(iii) Infrared sensor technology.

(iv) Design is compact.

(v) Easy wall-mounted installation.

(vi) Available in different sizes.

(vii) User friendly.

(viii) Maintenance is low.

- **Disadvantages**

(i) Dry skin.

(ii) Fire hazards.

- **Applications**

(i) It can be used in hospitals.

(ii) Used in public locations.

(iii) Also used in schools & colleges.

(iv) Use in Airports.

(v) Used in hotels and restaurants.

(vi) Shopping malls.

(vii) Banks.

V. CONCLUSION

As a suitable interface, Arduino aims to provide an easily compatible facility at an economically feasible rate. Hence, by adopting this methodology, we will be able to implement precautionary measures and facilitate people to use these effectively.

Future Scope

- We can extend this project by adding mask detection, door control, and social distance measurement to this project.
- A pulse oximeter sensor can also be added for the measurement of heart rate and oxygen levels.
- Cameras can be installed to capture users' images for record-keeping and tracking.

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