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# DISINFECTANT HANDCLEANSING MACHINE USING FOG

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**Abstract**

Since the COVID pandemic began, it has been advised that we wash our hands frequently—at least several times each day. As a result, a significant amount of water is wasted. The problems brought on by water waste would be more problematic than the epidemic itself. We have created a method that provides hand washing while using over 95% less water to address this situation. Our device uses a fog-based mechanism to facilitate water conservation. A tank is built into the machine directly underneath it. Any safe herbal disinfection solution is added to the water in the tank before being sealed. A water fogging device automatically activates when the user places his or her hands within the apparatus, turning the water in the tank into fog.

**Keywords:** FOG, COVID<sup>1</sup>Associate Professor, <sup>2,3</sup>UG student, Sona College of Technology, Salem, Tamil Nadu**DOI:** 10.31838/ecb/2023.12.s1.049

## 1. INTRODUCTION

Many emerging societies have a common custom of eating with your hands. Therefore, it is impossible to stress the importance of cleaning your hands. The effective way to stop the transmission of infections is to wash hands frequently. Unwashed or inadequately cleansed hands can spread a variety of infections such as fever, colds, diarrhea, sore throats that are spread through contact with the hands. Hand hygiene was one of the most helpful strategies that helped us during COVID-19. With adequate hand washing, it is possible to prevent many gastrointestinal problems and respiratory illnesses, including the new coronavirus infection. The bacteria that could transmit diseases from one person to another will be eliminated by using hand sanitizers or washing your hands. This healthy habit will benefit those at risk for health issues, including youngsters, and it will combat COVID-19. In fact, this is a crucial technique for controlling the spread of the pandemic or for infection control.

As was previously said, regularly washing our hands with disinfectant is crucial in the fight against the epidemic. But washing your hands with soap and water consumes a lot of water. Additionally, a lot of individuals wind up giving their hands a thorough 15 to 20 second wash. Every millimeter of your hand is covered in disinfectant, which is sufficient to either help the virus glide out of your hand or kill it. When we open the faucet, only 10 to 30 percent of the water contacts our skin; the remainder simply pours on top of this first layer.

## 2. LITERATURE SURVEY

It is important to emphasize the importance of hand washing, especially in developing nations where using one's hands to eat is customary. There is frequently reluctance in certain developing nations to wash one's hands before eating, whereas in others it has become a generally accepted custom. Before anyone suddenly discovered that washing your hands was important, people have been wanting to eat with their hands for decades. So, people are educated to enhance hand washing along the route using technologies and hygiene precautions. The best strategy to stop the spread of infections is probably by washing your hands.

It is very common to spread infections due to unwashed or improperly cleaned hands. One of the best ways to reduce the spread of diseases and stop outbreaks, like the COVID-19 virus, is to practice good hand hygiene. Unwashed or inadequately cleansed hands can readily spread a variety of infections. One of the best ways to stop the transmission of diseases and outbreaks like the COVID-19 virus is done by Hand Hygiene. By incorporating good hand hygiene into their daily routines, community members can play a significant role in the fight against COVID-19. The simplest, least expensive, and most efficient way to reduce the spread of COVID 19 and many other infectious diseases is to encourage people to wash their hands with soap and water [1]. The practice of washing hands with soap and water is the easiest, least expensive, and most effective way to stop the spread of COVID 19 [2].

The COVID-19 outbreak has given the lack of preparation and its effects on health in developing nations [3]. Washing your hands under running water with soap is the most efficient technique to stop the spread of COVID-19 [4] [5] [6].

COVID-19 will be combated, and people at risk for health problems [7] and children's health [8] will be assisted. This is a crucial technique for restricting the spread of the pandemic [10] or controlling infection [9]. It has been demonstrated that better soap-washing percentages on significant public health cases are quite reliable [11]. The provision of hand washing stations is seen as a straightforward personal hygiene practice with positive externalities in terms of advantages to the general public's health. Its accessibility depends on availability of safe supply of enough water at fair prices.

According to research conducted by Jolan Bacay Sy and his colleagues, multi-station automatic hand-washing offers thorough hand washing activities with soap and water, which operates independently with one another and satisfy the World Health Organization hand washing standard as well as the World Health Organisation hand washing technique. [12] Several hand washing technologies have been developed as a result of the COVID-19 epidemic. A hand washing station was built for Bangladeshi locations with poor infrastructure.

Their programmed the use of behavioral models for water, sanitation, and hygiene interventions [13]. Using video and an approach known as observable Mark choice, Hoey et al. [14] created automatic hand washing that helps persons with dementia as well as typical people. Another invention made by Li et al. is the wristwatch. An inertial calculating unit and a Hidden Markov Model analysis tool are included in this wrist-worn detecting interface to automatically assess hand washing procedures [15]. The relationship between assistive hand washing and emotional intelligence was another discovery from Lin's thesis [16].

Hospitals also monitored the hand washing of medical staff members to prevent the spread of sickness. So, using an audit vision system, Naim et al. created stain detection in automatic hand washing [17].

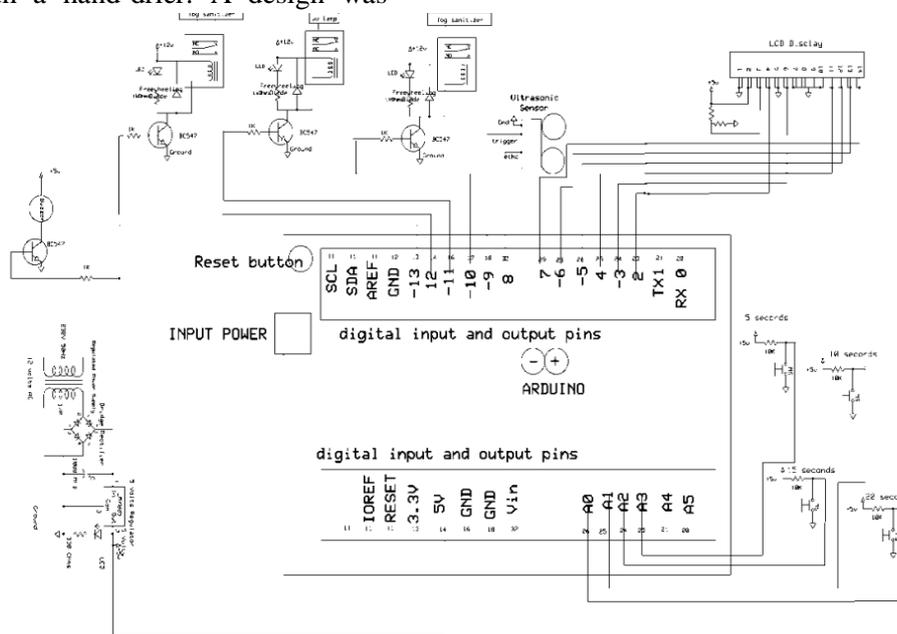
Numerous advantages of automatic hand washing include improved cleanliness, lower expenses, and less waste production [18]. Through all the documents that were examined, the paper envisioned a project that will wash hands automatically and is integrated with a hand-drier. A design was

developed by the researchers that will lessen the possibility of the disease transmission and address the difficulties associated with washing and drying hands. Additionally, this will raise people's awareness of similar designs and their degree of personal hygiene. In the conversation that followed, the techniques employed were described.

### 3.EXISTING METHODOLOGY

The technology currently in use in the article "Dry Handwash utilizing Fog to conserve Water" in the journal "International Journal of Creative Research Thoughts (IJRCT)" gives us the notion of washing our hands using a fog system. The system described in that work is transportable, inexpensive, and appropriate for general usage. It has two sensors that release soap and water separately, giving the user enough time to follow the recommended hand washing techniques. It also has UV light to destroy dangerous viruses. To reduce water, use by 95%, a fog-based system has been developed.

The block diagram for the above existing method is as follows



**Figure 1 Block diagram of Dry Handwash using fog**

The Arduino board, reset buttons, relays, LCD display, Sensors, UV lamp, and Buzzers are all shown in the block diagram above. This system's primary methodology is to use a buzzer and an LED light to signal how long the cleaning will last. The chosen sensor

performs better since it is less sensitive to environmental factors including temperature, light, and pressure. Additionally, to remind consumers how long the washing will take, an electronic buzzer is set off, giving the user a way to participate in the washing process.

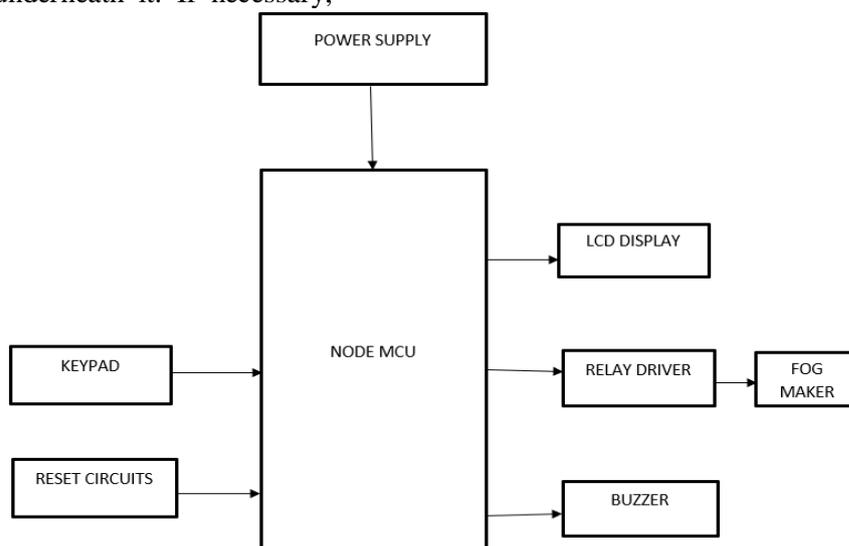
The project “Dry Hand washing Machine by Fog Disinfection to Save Water” was done with an Arduino UNO. The main controlling device of the project is ARDUINO microcontroller. SR04 ultrasonic sensor, timer buttons, LCD display, fog sanitizer and UV lamp is interfaced to the microcontroller. User need to set the time through buttons and then user inserts his/her hands inside the machine then the system automatically detects the hands using ultrasonic sensor and based on the selective time the machine switches on the sanitizer and UV lamp automatically. When the people remove the hands from working machine it will activate the buzzer for alert. The status of the project will display on LCD. To performance this intelligent task microcontroller loaded embedded c language.

#### 4. PROPOSED METHODOLOGY

Using a fog-based method, our machine advances to a new level to provide even greater water savings. A tank is built into the machine directly underneath it. If necessary,

the tank is filled with water and any suitable herbal disinfection solvent. A water fogging system that turns water in the tank into fog and drives it in the hand wash chamber automatically activates when the user spreads soap on his or her hands and inserts them into the apparatus.

Now Due to its gaseous form, fog can cover the entire hand in less than 5 seconds (water vapor). The soap on the user's hand is washed away with the fog five to fifteen seconds after exposure to water fog. Compared to conventional hand washing methods that use water from the faucet, this uses less than 95% of that amount. The device has a fan to introduce the air necessary to introduce the fog into the hand wash chamber. A PIC-based controller system that supports manual settings powers the hand washer. The duration during which the machine must drive the fog for each user is one of these settings. As a result, the machine we suggest permits hand washing for disinfection.



**Figure 2 Block Diagram of disinfectant hand cleansing machine using fog**

The machine is integrated with a tank below it. The tank is filled with water along with any disinfectant liquid. The disinfectant liquid can be of any choice. The machine consists of a timer of 5 seconds, 7 seconds, and 10 seconds respectively. If the user clicks 5 seconds and inserts their hand into the machine, the water with disinfectant liquid from the tank is now converted into fog using a fog converter. The fog now reaches each corner of the hand within 5 seconds as per the user's time

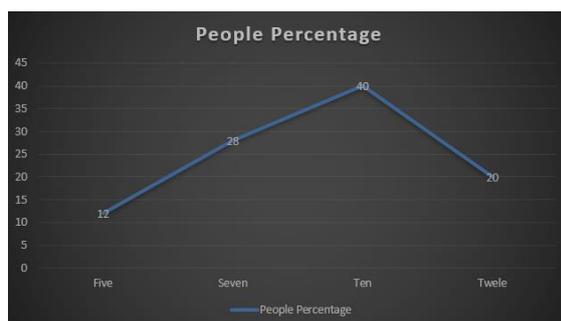
requirement as it is in gaseous state (water vapor). The hand wash machine is driven by a PIC based controller system for setting timers.

Relay circuits and switches are used to give control to timers. Pipelines are used to give connection for the tank and the machine. Keypads are for setting timers and Buzzers indicate us to remove our hands from the machine when the time is over. The LCD display gives the user the welcome message and thankyou message. Overall, the machine

completely works with the help of power supply. Enclosure Cave is set up, so that the fog does not go out of the machine and to provide a neat representation.

## 5.RESULTS AND DISCUSSION

According to the study, employing a "Disinfectant Hand Cleaning Machine utilizing Fog" results in an increase in daily water usage of 4.5 L per person. The results convey that each person washes their hands seven to eight times a day for seven to ten seconds each time. The city's current domestic water consumption has increased as a result. If one practices "Disinfectant Hand Cleaning using Fog" for 7-8 times a day, the consumption of water is reduced to 3-5 liters of clean water per person for a day. The average hand washing tap uses 2-3 liters per minute, which suggests a total water requirement of 8-10 liters of clean water per person for a day.

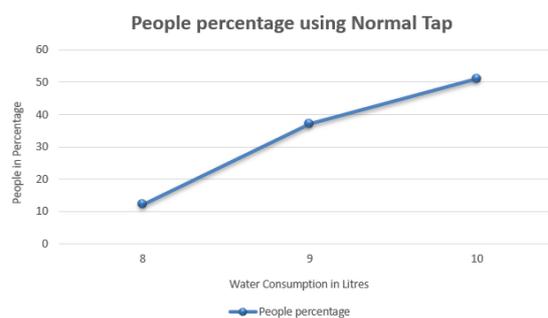


**Figure 3 Percentage Graph of people washing Hands for designated Time in Seconds.**

According to our results people washing their hands based on the time (in seconds) provided is shown in the above figure 3. Percentage of people washing their hands using the Hand cleansing machine varies based on the time given. The results provide us the detail of water consumption done when the machine is used instead of using hand basin tap in a city.

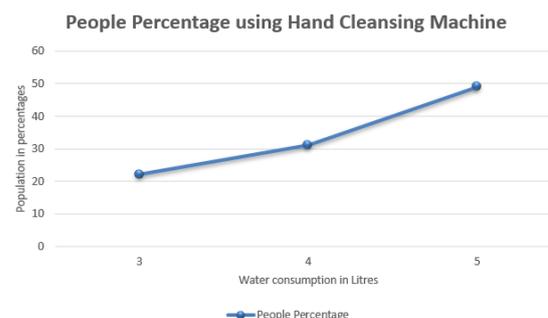
**Table 1 Table based upon the graph for percentage of people cleansing hands for designated Time in Seconds**

People in percentage	Time in seconds	People in numbers
12%	Five	120
28%	Seven	280
40%	Ten	400
20%	Twelve	200



**Figure 4 Representation of people's percentage using normal water based on liters ranging from 8-10L.**

The graph represents the percentage of people using water ranging from 8-10 L in normal tap. The table 2 gives us the result as people using normal tap consumes 8-10 L. By considering them, the above graph has been arrived.



**Figure 5 Representation of people's percentage using Hand cleansing machine based on liters ranging from 3-5L.**

The graph represents the percentage of people using water ranging from 3-5 L in Hand Cleansing Machine. The table 2 gives us the result as people using Hand Cleansing machine consumes 3-5 L. By considering them, the above graph has been arrived.

The above table represents the details of the usage of machine by number of people according to the time (in seconds). Here we arrive to an conclusion by considering the usage of machine by 1000 people. The graph for the above table is represented in the figure 3.

**Table 2 Table based upon the usage of water in normal tap and Hand cleansing machine**

Population in a city	Water consumed when using Normal tap to wash hands	Water consumed while using Hand cleansing machine
11,46,000	8-10 L person/day	3-5 L person/day
	11,46,000 x 10 L = 1,14,60,000	11,46,000 x 5L = 57,30,000

It is concluded from the above table that the water consumed in normal tap is 1,14,60,000 and by using Hand Cleansing machine is 57,30,000. The amount of water consumption totally is

$$1,14,60,000 - 57,30,000 = \mathbf{57,30,000\ L}$$

Half the times of the water consumption is reduced using Hand Cleansing Machine.

## 7. CONCLUSION & FUTURE ENHANCEMENT

The best method for preventing the spread of pathogens is good hand hygiene. A healthy lifestyle is essential for maintaining a strong immune system and preventing sickness. Regular hand washing is another aspect of a healthy lifestyle. But we must save water given the current environmental conditions. This machine with a fog-based mechanism is utilized to accomplish all of the above. Here, the needs of society are satisfied.

One of the best methods to stop or lessen the spread of the corona virus is to wash hands regularly. Test results demonstrate that all standards are met. It precisely complies with the WHO's recommended hand washing and drying regimen. Future development may involve installing solar related hand wash with temperature-reader since power outages occur frequently.

The Governments recommends people to wash hands regularly to keep their hands clean and maintain hygiene. Our fog system provides all the requirements as per the government as we provide timings for each use.

The present invention seeks to a kind of multiple functional, water-saving, and environmental protection, automaticity height is provided, use multipurpose integrated hand washing machine with water fog sterilization and drying extremely easily.

Technical scheme of the present invention is a kind of multipurpose integrated hand washing machine with water fog sterilization and drying comprises that the shower nozzle that links to each other with the tap water supply pipeline through main line, the main solenoid valve of being located on the main line reach the infrared inductor that together is electrically connected controller with described main solenoid valve.

It is characterized in that also comprising hand cleanser container, thimerosal container, ozone generator and dryer, the bye-pass that described hand cleanser container, thimerosal container and ozone generator pass through separately respectively is communicated with main line, and correspondence is provided with hand cleanser magnetic valve, thimerosal magnetic valve and ozone magnetic valve on each bye-pass, also be provided with on the main line in order to produce the booster pump of water smoke, described hand cleanser magnetic valve, thimerosal magnetic valve, ozone magnetic valve, ozone generator, booster pump and dryer all are electrically connected with controller.

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