International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 04 | April - 2023 Impact Factor: 8.176 ISSN: 2582-3930

Dry Hand Washing Machine Using Fog Disinfection

"Yogesh Gopal Gole, Abhilasha Sheshrao lanjewar

Rohan Kishor Dhumal, Pramod Chintaman Sase''

Department of Mechanical Engineering, ''Prof. Rajesh Kumar Dept. of Mechanical Engg.''

ARMIET, Shahapur, Thane, Mumbai University

Abstract

Since the onset of the COVID-19 pandemic, it is recommended that you wash your hands several times a day. But can you waste so much water? The problem of irrational water use will cause more problems than the epidemic itself. To solve this problem, we have developed a system that allows you to wash your hands without using more than 95% water. Sometimes hand disinfection is a very important factor in the fight against infectious diseases. But do you need a lot of water to disinfect your hands? After all, many wash their hands (more than 15-20 seconds when turning the tap). To disinfect with disinfectant or soap, water is enough to reach every millimeter of your hand. This should be enough to kill the infection or get out of your hands. When the faucet is open, only 10-30% of the water touches the skin and the rest flows through this first layer of water. Our machines go even further and save more water through the wrong base system. The engine is integrated with the tank at the bottom. If necessary, the tank is filled with water with a safe herbal disinfectant. When the user rubs his hands against the soap system, the wate r mist system activates automatically, converting the water in the reservoir into mist leading to the bathroom. Since it is in a gas (water vapor) state, it can be reached in less than 5 seconds. After exposing the user to water mist for 5-15 seconds, wash off the soap from hands with water mist. Use less than 95% of the water needed to wash your hands in a traditional mixer. The machine consists of a fan that moves the air needed to float the fertilizer in the toilet. This hand-held washing machine is equipped with a manual control system based on Atmega. This parameter includes the amount of time that the device must pass for each user. Thus, the machine we offer can be sterilized by hand washing while saving a lot of water.

Key Words: Atmega238u, COVID-19, Sanitizer, Dry hand washing system, Disinfection

Introduction:

The project is fighting the coronavirus pandemic by regularly washing hands and keeping public areas clean, taking into account the useless access to water caused by regular hand washing and control measures. The lives of residents to protect access to water use. When the user's hand is placed in the specified position on the machine, the sensor is activated and the water mist system is automatically activated, turning the water in the reservoir into a malfunction and directing it to the bathroom. When the liquid material evaporates at the end of the resonator and condenses on contact with cold ambient air, it forms ultrafine aerosols and creates a noticeable thick cloud of fog. Pure oil solutions or aqueous liquids with a glycol component are especially suitable. The DC fan is used to mechanically drive and deliver the generated mist to the manual chamber. Here we are using ATMEGA328P, a high performance, low power controller from Microchip. ATMEGA328P is an 8-bit microcontroller based on AVR RISC architecture. It is the most popular of all AVR controllers as it is used in ARDUINO boards. Here, an embedded 8051 family controller (AT328P) is used to control according to a data pattern generated by the input port of the microcontroller. The right job will do. The logic is generated by programs written in the embedded C language. The program is created in the KEIL microvision environment. After simulation, the resulting program is converted into a HEX code and written to the microcontroller as microvision FLASH. Dry Fogging is a relatively new disinfection method that uses liquid disinfectants and compressed air as consumables. The ultra-fine dry mist droplets prevent the chamber from falling easily onto the surface, which is a desirable quality for a disinfection chamber. Liquid peracetic acid (LPA) has excellent microbial activity. But there are problems with other ingredients and normal skin type. The aim of this study was to simultaneously determine bactericidal activity, compatibility with electronic devices in public places, and water conservation. This dry hand fog hand sanitizer can be widely used when used properly. In densely populated cities and metropolitan areas, there are several public spaces such as hospitals, shopping malls, and theatre toilets. Like trains and airports, this system ensures proper sanitation and efficient management of water consumption, while saving about 95%. Plain water is used to wash your hands and maintain a non-contact environment. It also helps prevent the spread of the virus by allowing multiple people to have access to these affected public faucets. Ease of use as users simply place their hands where indicated and the LED illuminates before the process is complete via a series of manually programmable timers. Dry hand washing machines have been developed as an alternative to traditional hand washing methods, particularly in situations where water is scarce or unavailable. These machines typically use a combination of air and a cleaning agent to clean and disinfect hands without the need for water or towels. One of the methods used for disinfecting hands in these machines is fog disinfection, which involves the use of a fine mist or fog of disinfectant to kill germs and bacteria on

the hands. It is important to note that while dry hand washing machines may be a convenient and effective option in certain situations, they should not be relied upon as the sole method of hand hygiene. Regular hand washing with soap and water remains the most effective way to prevent the spread of germs and disease. Additionally, it is important to use disinfectants that have been proven effective against a wide range of pathogens and to follow proper hand hygiene protocols to ensure that hands are thoroughly cleaned and disinfected.

STRUCTURE AND COMPONENTS

1.1 MICROCONTROLLER:- The ATmega328u is a microcontroller developed by Atmel Corporation, which is now a part of Microchip Technology Inc. It is an 8-bit AVR microcontroller based on the RISC (Reduced Instruction Set Computer) architecture. The ATmega328u is a member of the popular AVR family of microcontrollers, which are widely used in various applications such as robotics, embedded systems, industrial control systems, and more.

Some of the features of the ATmega328u microcontroller are:

- It has a clock speed of up to 20 MHz.
- It has 32 KB of in-system programmable Flash memory for storing program code.
- It has 2 KB of SRAM for storing data and variables.
- It has 1 KB of EEPROM memory for storing non-volatile data.
- It has 23 general-purpose I/O pins, which can be configured as inputs or outputs.
- It has 6 ADC (Analog-to-Digital Converter) channels, which can convert analog signals to digital values.
- It has 3 timers/counters, which can be used for various timing and counting operations.
- It has a USART (Universal Synchronous/Asynchronous Receiver/Transmitter) for serial communication.
- It supports various communication protocols such as SPI, I2C, and USART.

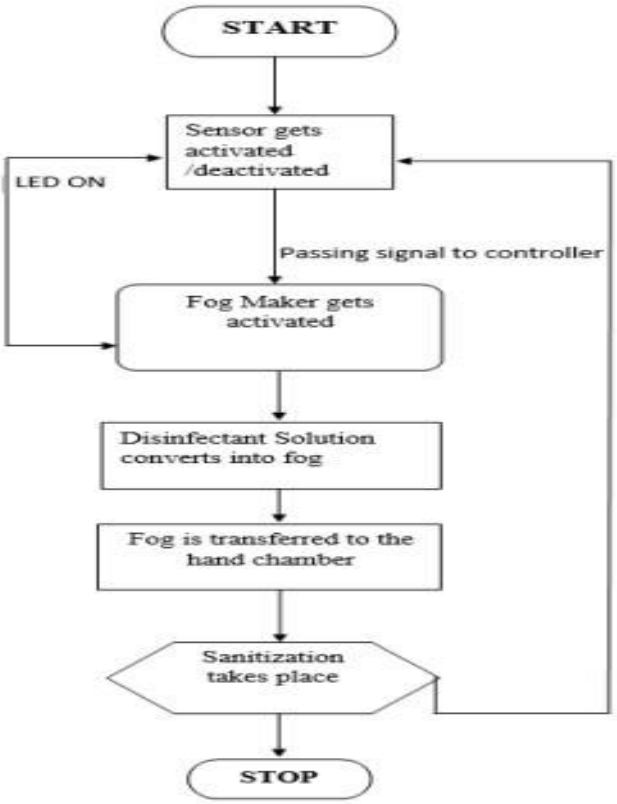
The ATmega328u microcontroller is widely used in various development boards such as Arduino Uno and Nano, which makes it popular among hobbyists and students for learning and prototyping purposes. It is also used in various commercial products such as consumer electronics, automotive systems, and more.

1.2 Fog Maker/Machine A fog machine, also known as a fog maker, is a device that creates a fog or mist by heating a mixture of water and a special fog fluid. The fog fluid is made of a mixture of glycol, glycerin, and water, which is heated by an electric element in the fog machine. As the fluid heats up, it vaporizes and is expelled from the machine as a fine mist or fog. Fog machines are commonly used in theatrical productions, concerts, haunted houses, and other events to create a dramatic or spooky atmosphere. They can also be used in film and television productions to create special effects. In addition to theatrical and entertainment applications, fog machines can also be used for industrial purposes, such as testing ventilation systems, as well as in fire training exercises to simulate smoke.

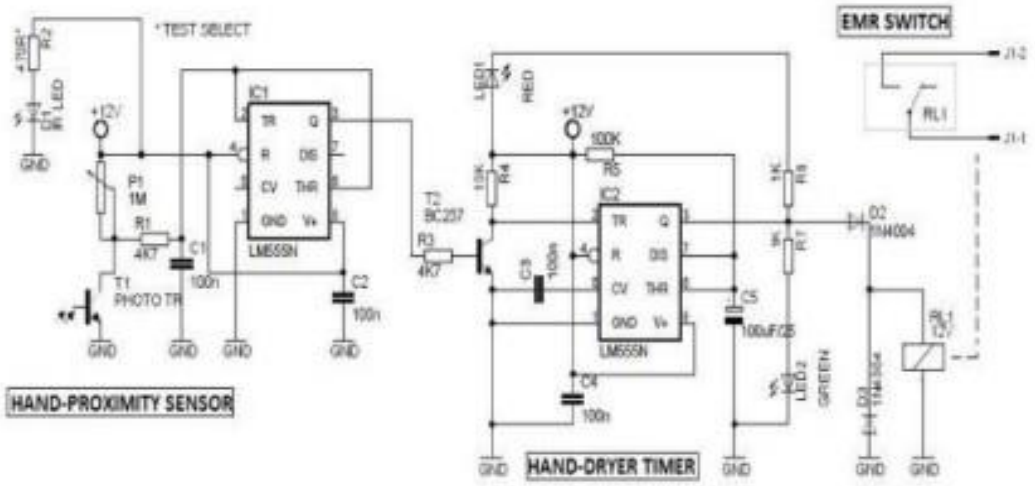
1.3 Water Tank A water tank is a container that stores water. Water tanks are used to store water for use in drinking water, agricultural irrigation, firefighting, agriculture, crop and livestock production, chemical production and many other fields. The parameters of the water tank include the general design of the tank and the choice of building materials and coatings. Various materials are used to make water tanks, such as plastic (polyethylene, polypropylene), fiberglass, concrete, stone and steel (welded or threaded, carbon or stainless). Earthen pots, such as matki used in South Asia, can also be used for water storage. Water tanks are an efficient way to help developing countries to store clean water.

1.4LCD or Liquid Crystal Display, is a type of flat panel display commonly used in electronic devices such as televisions, computer monitors, and mobile phones. An LCD is made up of several layers, including two polarized glass plates with a layer of liquid crystal material in between. When an electrical current is applied to the liquid crystals, they align and allow light to pass through, creating images or text on the display.LCDs offer several advantages over other display technologies, including low power consumption, high brightness, and a slim profile. They also have a wide viewing angle and are relatively affordable to produce. However, one of the main drawbacks of LCDs is their limited color gamut, which can lead to color distortion and reduced image quality in some situations. They are also susceptible to ghosting or image persistence, which occurs when an image remains visible on the screen after it has been replaced by a new one.These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special used in most embedded projects, the reason being its

1 Block diagram



1. Circuit diagram



2 METHODOLOGY

The methodology for a dry hand washing machine using fog disinfection involves the following steps:

1. Design and construction of the machine: The machine should be designed to enable a user to insert their hands into an enclosed compartment, which will then release a fog disinfectant solution. The solution should be able to cover the hands entirely and disinfect them effectively. The machine should be constructed from materials that are easy to clean and sanitize.
2. Selection of disinfectant: A suitable disinfectant should be selected for use in the machine. The disinfectant should be effective against a broad range of microorganisms and should be safe for use on skin.
3. Calibration of the fogging system: The fogging system should be calibrated to ensure that the disinfectant is dispensed in the right amount to effectively cover the hands.
4. Testing and optimization: The machine should be tested and optimized to ensure that it is functioning as expected. This may involve testing the effectiveness of the disinfectant, adjusting the fogging system, and making any necessary changes to the design.
5. Installation and maintenance: The machine should be installed in a suitable location, such as in a hospital or public restroom. Regular maintenance should be performed to ensure that the machine is functioning correctly and that the disinfectant is being dispensed correctly.
6. User education: Users of the machine should be educated on how to use it correctly to ensure that their hands are properly disinfected. They should also be informed about the benefits of using the machine and how it can help prevent the spread of infectious diseases.

Overall, the methodology for a dry hand washing machine using fog disinfection involves careful design, selection of disinfectant, calibration of the fogging system, testing and optimization, installation and maintenance, and user education to ensure that the machine is effective in disinfecting hands and preventing the spread of infectious diseases.

When the user's hand is placed in the desired groove of the machine, the active sensor inadvertently creates water in the tank and activates the water mist system, which automatically connects to the toilet using the ATMEGA328P. The microchip is a powerful controller with low power consumption. The ATMEGA328P

is an 8-bit microcontroller based on the AVRRISC architecture. The liquid evaporates at the edges of the nebulizer (resonator) and condenses on contact with cold

3 RESULTS AND CONCLUSION

Test person	Approx.total time tap on during hand washing (s)	Approx. time hands NOT under tap whilst on during hand washing (s)	Percentage of time (s) tap running without water being used during hand washing
1	10.35	4.92	48%
2	6.47	1.33	21%
3	22.75	13.83	61%
4	21.42	13.95	65%
5	26.57	18.43	69%
6	9.16	4.89	53%
7	9.2	6.13	6

Calculated estimate of total litres of water used and wasted by the 7 employees from the 10 l/min flow rate tap during hand washing

Used daily for hand washing	79.44	47.61
Used a year for hand washing	20,654.40	12,378.60

the effectiveness of any hand washing method, including a dry hand washing machine, depends on several factors, such as the type of disinfectant used, the duration of cleaning, and the technique used to clean hands.

Fog disinfection has been widely used in healthcare settings and has been shown to be effective in reducing the number of bacteria and viruses on surfaces. However, the effectiveness of fog disinfection in hand washing machines may depend on several factors, including the type of disinfectant used, the concentration of the disinfectant, and the duration of exposure to the fog.

It is important to note that while a dry hand washing machine using fog disinfection may be a convenient and effective option in certain situations, it should not be relied upon as the sole method of hand hygiene. Regular hand washing with soap and water remains the most effective way to prevent the spread of germs and disease.

In conclusion, more research is needed to determine the effectiveness of dry hand washing machines using fog disinfection. However, regardless of the method used, proper hand hygiene remains an essential practice for preventing the spread of germs and disease.

4 REFERENCES

Weislander G, Norback D, Lindgren T. Experimental exposure to propylene glycol mist in aviation emergency training: acute ocular and respiratory effects. Occupational and Environmental Medicine. 2001 Oct;58(10):649- 55

Varughese S, Teschke K, Bauer M, Chow Y, van Netten C, Kennedy SM. Effects of theatrical smokes and fogs on respiratory health in the entertainment industry. American Journal of Industrial Medicine. 2005 May;47(5):411-8 .

ANSI HE'.5 - 2003, Entertainment Technology - [Theatrical Fog Made With Aqueous Solutions Of Di- And Triadic Alcohols F&S/1997- 3017r7.5 Theatrical Fog Made With Aqueous Solutions Of Di- And Trihydric Alcohols F&S/1997-3017r7.5] Gregory E. Raymond, Recommended Exposure Liquid Fogging Agents Archived 2013-01-19 at archive.today

nternational Journal of Engineering Research & Technology (IJERT) Published by :ISSN: 2278- 0181 http://www.ijert.orgVol. 9 Issue 07, July-2020

https://www.theguardian.com/world/2020/feb/2 8/hand-sanitiser-or-hand-washing-whichmoreeffective-against- coronavirus-covid

https://www.instructables.com/id/DIY-Easy-NonContact-Automatic-Hand-Sanitizer-Automatichandsanitizer-dis

health impact of handwashing. WELL fact sheet 2006. at: http://www.lboro.ac.uk/well/resources/factsheets/fact-sheets htm/Handwashing.

hewman J, Hancock DD , Davis MA, Sheng H. Comparison of a dry hand-hygiene research and soap and water hand washing to lessen coli forms on hands in animal exhibit settings. Epidemiol Infect. 2006;134:1024–1028