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ijirset@gmail.com

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SMART FOG DISINFECTOR

Miss.Mehjabeen Mujawar¹, Miss.Sanika Patil², Miss.Bhumika Sawant³, Miss.Sakshi Kamble⁴,
Mr.Ravindra Dhongadi⁵

Student of Third Year, Department of Electronics and Telecommunication Engineering, Sanjay Ghodawat Institute,
Atigre, Maharashtra, India^{1,2,3,4}

Head of Department, Department of Electronics and Telecommunication Engineering, Sanjay Ghodawat Institute,
Atigre, Maharashtra, India⁵

ABSTRACT: Frequent hand washing is necessary during epidemics of infectious diseases like covid-19 and eye flu. Since the start of COVID pandemic it is been suggested to wash your hands multiple number of times per day. But can we afford to waste such huge amount of water. The problems that would be created by wastage of water would create a greater problem than the pandemic itself. To help solve this system we here design a system that provides hand washing while consuming over 95% less water. Disinfecting our hands from time to time is a very important factor in fighting the pandemic. But does it actually require so much water to disinfect your hands. Additionally many people actually end up over washing their hands over 15- 20 seconds with full tap released. Disinfection actually just requires that water reaches every millimeter of your hand along with a disinfectant or soap and it should be just enough to kill any infection or help it slide out of your hand. When we turn on tap only 10 – 30%water actually touches our skin and rest just flows over this first layer of water.

KEYWORDS: Infectious diseases, Fog disinfection, Hand Washing

I. INTRODUCTION

With the existing system of Hand Sanitizer, the wastage of water as well as wastage of sanitizer is becoming a great issue. Also, at the public places where gathering of people, the utilization of the sanitizer has become the strong issue and hand hygiene is the major factor that should be considered during sanitization.

Since the start of the COVID-19 pandemic, public health officials have stressed the importance of proper hygiene, with increased advice on using hand sanitizers in schools and childcare settings. The frequency of hand sanitizer use during the pandemic was found to be as high as 25 times per day in children and over 9 times per day in adults. Notable differences were found when comparing the frequency of hand sanitizer use by children in the home to children in a school or childcare setting.

To meet the challenge of increased demand and raw material shortages, many countries have permitted manufacturers and medical institutions to develop and produce hand sanitizers independently. Unfortunately, this has led to a situation where some manufacturers fail to adhere to proper quality control measures or use denatured alcohol, resulting in a notable increase in substandard hand sanitizer products in the market.

Even the cost of the hand sanitizers is increasing in day to day life, as the demand for the same is more due to the viral diseases like covid-19 & eye flue etc.

A smart Fog Disinfector machine is designed to enhance hygiene practices by automating the hand washing process. This system integrates advanced technology to provide an efficient and convenient way for individuals to clean their hands. Unlike conventional hand washing methods, this machine utilizes a fogging mechanism to dispense a fine mist of disinfectant solution, ensuring thorough coverage and effective sanitization. Additionally, the smart features of this machine may include touch less sensors for activation, customizable settings, and connectivity options for monitoring and maintenance. Overall, it represents a significant advancement in promoting cleanliness and reducing the spread of germs in various environments.

II. LITERATURE SURVEY

In [1], the relevance of hand washing cannot be downplayed, particularly in improving countries where it is common practice to eat with hands. In some emerging societies, there is often a hesitation to wash hands before meals; and in some, hand washing has established a generally common practice. Wanting to eat with your hands has been continuing for decades before anyone suddenly learned of washing their hands. So, along the way, through technologies and hygiene measures, individuals are taught to improve hand washing. Hand washing is the perhaps most effective way to avoid the transmission of diseases.

In [2], the study mostly discusses hospital grip infections, which affect roughly 2 million patients annually and are ranked as the eighth leading cause of mortality in the USA. Additionally, it states that washing your hands with soap and water takes time, especially at busy times in hospitals, but that it is important and effective when done correctly. This study also demonstrated the efficiency of alcohol based hand sanitizers, which significantly decreased infection rates (by 30%). They employed hand sanitizers that contained 60 to 70 percent ethanol to significantly lower the quantity of germs. The use of hand sanitizers during a 10-month period resulted in a 36.1 percent decrease in illness.

In [3], the paper says about the infection caused by drug anti micro-organisms which causes raise in death rate and also complication, the multidrug resistant bacteria includes Methicillin Resistant Staphylococcus aureus(MRSA), Extended Spectrum Beta-lactamase (ESBL) producing bacteria, Multidrug Resistant Pseudomonas aeruginosa(MDRP), which are very common globally . Several antibiotics have increasing multidrug microorganisms isolation rate, even personal protection equipment (PPE) can't be effective in segregation rate of MSRA. Hence they highlight about the use of alcohol based hand sanitizers since the alcohol based hand sanitizers had harmful association with MRSA isolation rate, which means that hand hygiene is very important in hospitals .

In [4], the paper discusses the advent of a novel coronavirus (SARS-CoV-2), which has presented unexpected problems to human health. The paper also tries to lower the disease's transmission rate. The paper discusses the structure of viruses and how it differs from that of bacteria, explaining that viruses have single-stranded or double-stranded RNA or DNA enclosed in capsids, can replicate only in the presence of a host, and are therefore considered to be living organisms. Bacteria may replicate on their own and have a structure similar to that of a human cell membrane, DNA, or RNA. In the research, hand sanitizers and soap are thoroughly compared along with foam and gel.

III. PROPOSED SYSTEM

A smart fog disinfectant it is a machine, designed to enhance hygiene practices by automating the hand washing process. This system integrates advanced technology to provide an efficient & convenient for individuals clean their hands. In Conventional hand washing method we use lot of water this can Cause Scarcity of water in future hence the smart fog disinfectant utilizes a fogging mechanism to dispense a fine mist at disinfectant solution ensuring thorough Coverage & effective sanitization.

Additionally the smart feature of this machine is temperature sensor with GSM module which detects the temperature and sends the data to user.

Overall it represents a significant advancement in Promoting cleanliness & reducing the spread of germs in various environments.

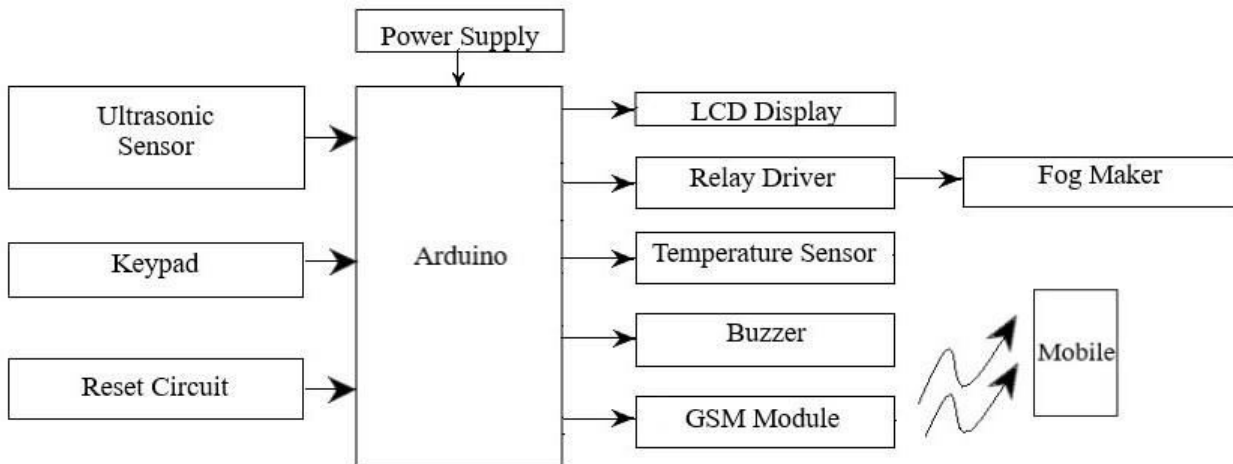
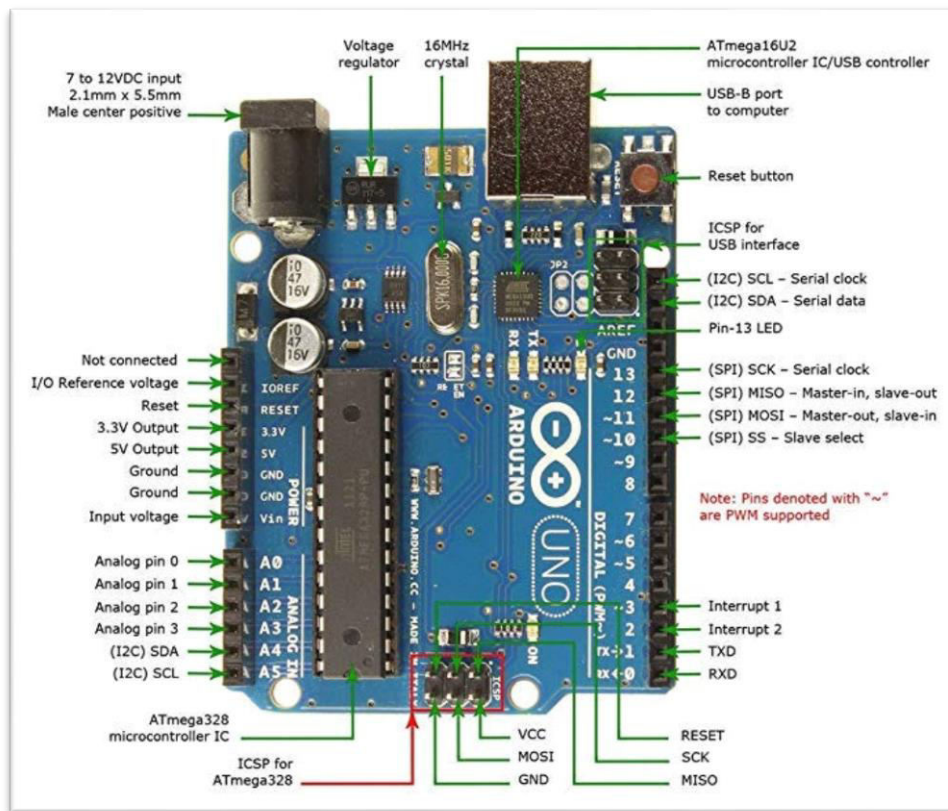


Fig.1. Block diagram

3.1 Arduino UNO

Arduino UNO is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

- Operating Voltage: 5V
- Input Voltage (recommended): 7-12V
- Input Voltage (limits): 6-20V
- DC Current per I/O Pin: 40 mA
- DC Current for 3.3V Pin: 50 mA
- Flash Memory: 32 KB of which 0.5 KB used by bootloader
- SRAM: 2 KB
- EEPROM: 1 KB
- Clock Speed: 16 MHz



3.2 Ultrasonic Sensor

An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves.

An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity.

High-frequency sound waves reflect from boundaries to produce distinct echo patterns.

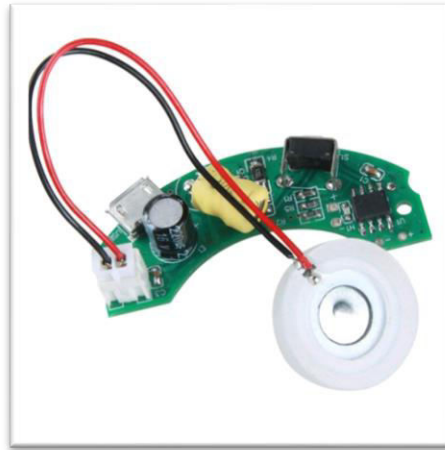
Ultrasonic sensors work by sending out a sound wave at a frequency above the range of human hearing. The transducer of the sensor acts as a microphone to receive and send the ultrasonic sound. Our ultrasonic sensors, like many others, use a single transducer to send a pulse and to receive the echo. The sensor determines the distance to a target by measuring time lapses between the sending and receiving of the ultrasonic pulse.



3.3 Fog Maker

A fog Maker is a device that emits a dense vapor that appears similar to fog or smoke. Fog machines can also be found in use in a variety of industrial, training, and some military applications.

It uses ultrasonic transducer to generate fog. The ultrasonic transducer vibrates rapidly at high speeds within the water and then the water molecules can be broke apart into individual droplets with the size of approximately 3-5 microns which can penetrate to the tiny spaces. These droplets are incessantly vaporized into the air to form a thick fog.



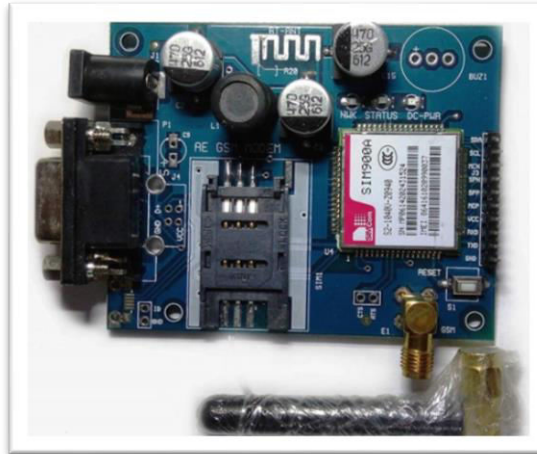
3.4 Temperature Sensor

The LM35 is a widely used temperature sensor known for its simplicity and accuracy. It provides precise analog output proportional to the surrounding temperature in Celsius, with minimal calibration needed. This sensor operates on a low voltage, making it suitable for a wide range of applications, from climate control systems to industrial automation. Its straightforward interfacing and reliable performance have made the LM35 a popular choice among engineers and hobbyists for temperature monitoring solutions.



3.5 GSM Module

A GSM module is a compact electronic device that enables communication over the Global System for Mobile Communications (GSM) network. It allows devices to send and receive data, including voice calls, text messages, and internet connectivity, making it a fundamental component in applications like remote monitoring, tracking and communication systems providing reliable cellular connectivity for seamless data transmission.



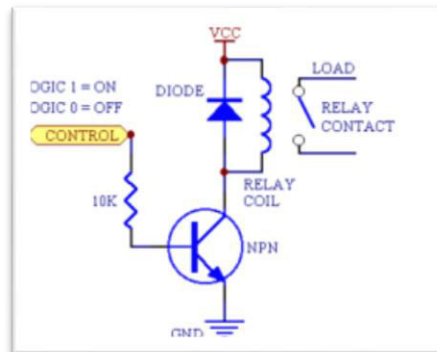
3.6 LCD Display

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. 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 & even custom characters (unlike in seven segments), animations and so on. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD.



3.7 Relay Driver

Relay is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism mechanically, but other operating principles are also used. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal. A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and most have double throw (changeover) switch contacts as Shown in diagram



IV. CONCLUSION

Keeping hands clean is one of the most important to avoid getting sick and spreading germs to others, especially in this pandemic time since many diseases are spread by not washing hands with soap and clean water properly. The system requirement was based on the World Health Organization (WHO) protocol requires that hand washing should be done for duration of 20 seconds, and it will be dry. The use of non-contact automated hand wash with a hand dryer is one of the best strategies to eliminates or decrease the spread of corona virus. Tests show that all the requirements are met. It follows perfectly the required hand wash protocol from the WHO and drying of hands. Future work may include solar-powered automated hand wash as most of the time there are power interruptions. And also we can add fog recycling.

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