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CONTACTLESS HAND SANITISER DISPENSER SYSTEM

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***Abstract*—Hand sanitization is important to stop spreading Covid-19 and other transmissible diseases. Even touching the container spout is unhygienic, so it is better to deploy an auto-dispenser to sanitize your hands without touching anything except the sanitizing liquid. It can be useful especially for industrial units, workplaces, hospitals, and shopping centers, etc.**

***Keywords*—Hand Sanitizer, Automatic Dispenser**

I. INTRODUCTION

A. Background

Hand hygiene is a critical component of infection control and preventing the spread of germs in healthcare settings and public spaces. The World Health Organization (WHO) has identified hand hygiene as one of the most important measures to prevent the spread of infectious diseases. In recent years, the outbreak of infectious diseases such as COVID-19 have highlighted the importance of good hand hygiene and the need for effective hand sanitization systems.

Traditionally, hand sanitizer dispensers have required physical contact, such as pressing a button or pulling a lever, to dispense the sanitizer. However, this can increase the potential for cross-contamination, as people may touch common surfaces and potentially spread germs. To address this problem, contactless hand sanitizer dispenser systems have been developed. These systems use various types of sensors, such as infrared sensors, to automatically dispense a pre-measured amount of hand sanitizer without requiring physical contact.

Contactless hand sanitizer dispensers have been shown to be an effective tool in promoting hand hygiene and reducing the transmission of infectious diseases. They can be widely used in public spaces such as hospitals, airports, schools, and office buildings. However, there is a limited number of studies on the actual efficacy of the contactless hand sanitizer dispensers on infection control and hand hygiene promotion. Therefore there is a need to study the use of contactless hand sanitizer dispensers in various settings and to understand their impact on infection control and hand hygiene promotion.

B. Research Objective

This research aims to study the current state of the art of contactless hand sanitizer dispenser systems, including their design, functionality and effectiveness in promoting hand hygiene and reducing the transmission of infectious diseases. The paper also aims to provide guidance on selecting and installing a contactless hand sanitizer dispenser system in various settings.

II. LITERATURE REVIEW

The current outbreak of COVID-19 has prompted numerous preventative measures to limit the spread of the virus, one of which is using hand sanitiser regularly. The use of automatic hand sanitiser systems has become increasingly popular due to the higher levels of convenience and safety that they offer over traditional hand washing methods. This paper will review the existing literature examining automatic hand sanitiser systems and consider their effectiveness in reducing transmission risks posed by SARS-CoV-2. An increasing number of studies have been published examining the efficacy of automatic hand sanitiser dispensing systems. A systematic review by Boonsong et al (2020) found that contactless dispensers can improve adherence to hygiene protocols when operated correctly and auto-start modes provide improved usability over manual start models. Zhang et al (2020) reported that these systems can reduce bacterial counts on hands by up to 81%, making them highly effective in preventing the spread of disease. Furthermore, Galván and Ruiz (2021) argued that contactless mechanisms are more efficient and more resistant to vandalism than manual activation devices. Santiuste et al (2020) noted that certain design features could benefit users: for example, transparent screens allowed for a better visualisation of information included next to the product, while preening trays were useful for handling waxes & liquids sold alongside them. They also identified issues associated with these systems such as high costs associated with installation, maintenance & refilling stock, in addition to occasional malfunctions or errors due to incorrect operation by users or companies installing them incorrectly. Fu et al (2021) asserted there is still scope for development: motion sensors could utilise augmented reality cues or provide real-time feedback regarding usage adherence. Automatic hand sanitiser systems have been found to be an effective tool in preventing transmission through improved adhesion to hygiene protocols, reduced bacterial count on

hands and greater resistance against vandalism compared with manual activation devices. However, cost considerations for installation & maintenance must be taken into account along with potential issues such as user error or incorrect operation leading to malfunctioning machines, which are worth exploring further in future research studies alongside developing new features such as AR cues & real-time feedback regarding usage adherence

III. RESEARCH METHODOLOGY

A. Requirement and Feasibility study

Most conventional contactless sanitizers use an LDR and infrared (IR) sensors, which frequently malfunction due to the ambient sunlight and high ambient, etc. So here is an auto-dispenser that uses ultrasonic sensing instead to dispense the sanitizer. The dispenser uses ultrasonic sensor HC-SR04 to detect hands when these are put beneath the container. It dispenses the required amount of sanitizer automatically for specific time and then gets ready for the next action within half a second.

For this research the tools and software that used are shown in and table 1-2.

TABLE I. HARDWARE AND PURPOSE OF THE USE

Components	Purpose
8051 Microcontroller	It is a single chip IC which contains memory and interfaces needed for a specific application.
LCD	It reads and displays the operations performed
Interfacing Circuit LM358	Works as a comparator device that compares two voltages or currents.
Ultrasonic Sensor	Measures and calculates the distance from the sensor to the specified target object.
Buzzer	Signaling device
ULN2003	Used in relay driving and stepper motor driving applications.
Relay	Electromechanical Switch
LED	Emits light when current pass through it.

TABLE II. SOFTWARE AND PURPOSE

Software	Purposes of use
Keil Software	Machine language code is written and the source code is converted to hex file which is dumped into the microcontroller. It supports C.
Embedded c	Programming language

B. Block Diagram

Figure 1. shows the functional block diagram of system. At first the input power supply is given to the system then it will convert the input voltage to required Dc voltage(5v).Then the 5v dc supply is given to the node Mcu and through the node mcu analog pin the mq2 gas sensor is connected to it. And for the indication purpose led is connected to it. And the OLED is connected to node MCU to display the measured values on the display.APR9600(voice module) is connected to the node MCU to record and paly back the voice. And speaker is connected to it to play pre record

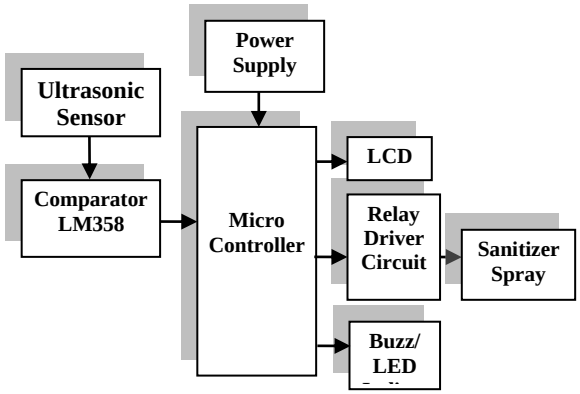


FIGURE.1.Block Diagram

C. Hardware Design

1. POWER SUPPLY

The power supply section is the section which provide +5V for the components to work. IC LM7805 is used for providing a constant power of +5V.

The ac voltage, typically 220V, is connected to a transformer, which steps down that ac voltage down to the level of the desired dc output. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation.

2. 8051 MICROCONTROLLER

A Microcontroller (or MCU) is a computer-on-a-chip used to control electronicdevices. It is a type of microprocessor emphasizing self-sufficiency and cost-effectiveness, in contrast to a general-purpose microprocessor (the kind used in a PC). A typical microcontroller contains all the memory and interfaces needed for a simple application, whereas a general purpose microprocessor requires additional chips to provide these functions.

A microcontroller is a single integrated circuit with the following key features:

- central processing unit - ranging from small and simple 8-bit processors to sophisticated 32- or 64-bit processors
- input/outputinterfaces such as serial ports
- peripherals such as timers and watchdog circuits RAM for data storage
- ROM, EEPROM or Flash memory for program storage
- clock generator - often an oscillator for a quartz timing crystal, resonator or RC circuit

Microcontrollers are inside many kinds of electronic equipment (see embedded system). They are the vast majority of all processor chips sold. Over 50% are "simple" controllers, and another 20% are more specialized digital signal processors (DSPs) (ref?). A typical home in a developed country is likely to have only one or two general-purpose microprocessors but somewhere between one and two dozen microcontrollers. A typical mid range vehicle has as many as 50 or more microcontrollers. They can also be found in almost any electricaldevice: washing machines, microwave ovens, telephones etc.

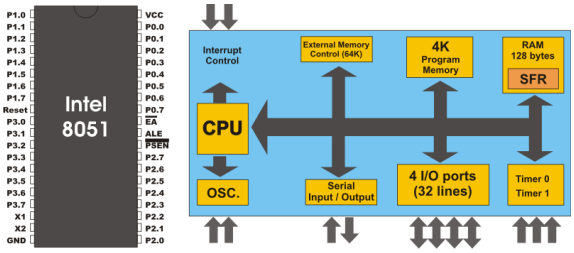


Figure.2. 8051 Microcontroller

3. LIQUID CRYSTAL DISPLAY (LCD)

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. The data is the ASCII value of the character to be displayed on the LCD

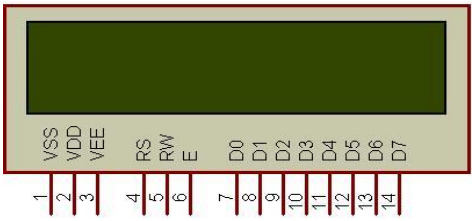


Figure.3. 16x2 LCD

4. INTERFACING CIRCUIT (LM358)

A Comparator is a device that compares two voltages or currents and outputs a digital signal indicating which is larger. It has two analog input terminals V_+ and V_- and one binary digital output V_o.

Application areas include transducer amplifiers, dc gain blocks and all the conventional op amp circuits which now can be more easily implemented in single power supply systems. For example, the LM158 series can be directly operated off of the standard +5V power supply voltage which is used in digital systems and will easily provide the required interface electronics without requiring the additional ±15V power supplies

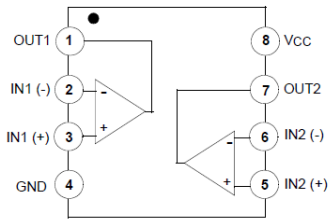


Figure.4.Internal Block Diagram

5. ULTRASONIC SENSOR

Ultrasonic sensors are industrial control devices that use sound waves above 20,000 Hz, beyond the range of human hearing, to measure and calculate distance from the sensor to a specified target object.

Ultrasonic sensors use electrical energy and a ceramic transducer to emit and receive mechanical energy in the form of sound waves. Sound waves are essentially pressure waves that travel through solids, liquids and gases and can be used in industrial applications to

measure distance or detect the presence or absence of targets

Ultrasonic sensors (also known as tranceivers when they both send and receive) work on a principle similar to radar or sonar which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object.

This technology can be used for measuring: wind speed and direction (anemometer), fullness of a tank, and speed through air or water. For measuring speed or direction a device uses multiple detectors and calculates the speed from the relative distances to particulates in the air or water. To measure the amount of liquid in a tank, the sensor measures the distance to the surface of the fluid. Further applications include: humidifiers, sonar, medical ultrasonography, burglar alarms, and non-destructive testing.

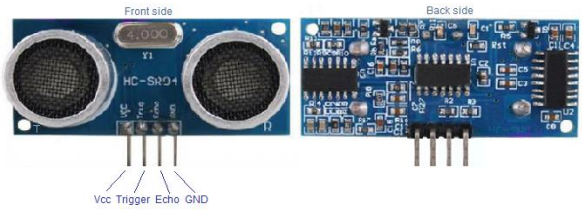


Fig 5. Ultrasonic Sensor

6. BUZZER

A buzzer or beeper is a signaling device, usually electronic, typically used in automobiles, house hold appliances such as a microwave oven, or game shows.

It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a preset time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. Initially this device was based on an electromechanical system which was identical to an electric bell without the metal gong (which makes the ringing noise). Often these units were anchored to a wall or ceiling and used the ceiling or wall as a sounding board. Another implementation with some AC-connected devices was to implement a circuit to make the AC current into a noise loud enough to drive a loudspeaker and hook this circuit up to a cheap 8-ohm speaker. Nowadays, it is more popular to use a ceramic-based piezoelectric sounder like a Sonalert which makes a high-pitched tone. Usually these were hooked up to “driver” circuits which varied the pitch of the sound or pulsed the sound on and off.

Fig.6. Buzzer

7. ULN2003

The ULN2003 is a monolithic IC consists of seven NPN darlington transistor pairs with high voltage and current capability. It is commonly used for applications such as relay drivers, motor, display drivers, led lamp drivers, logic buffers, line drivers, hammer drivers and other high voltage current applications. It consists of common cathode clamp diodes for each NPN darlington pair which makes this driver IC useful for switching inductive loads. ULN2003 is widely used in relay driving and stepper motor driving applications.

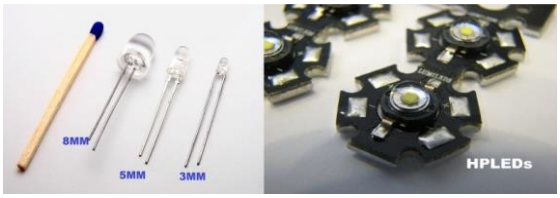
8. RELAY

A relay is an electromechanical switch, which perform ON and OFF operations without any human interaction. General representation of double contact relay is shown in fig. 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.

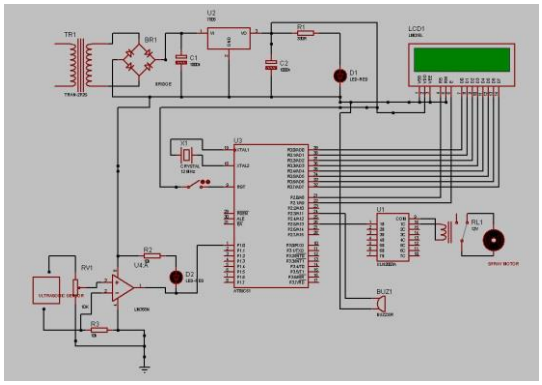
Fig.7. Relay

9. LIGHT EMITTING DIODE(LED)

LED is abbreviation of Light Emitting Diode. It’s nothing, but just a combination of semiconductors which emits light when current pass through it. Over the years, semiconductor technology has advanced to bigger heights, Light Emitting Devices have also been a part of this revolution and as a result, now we have LED’s which give better illumination with low power consumption.



IV. SCHEMATIC DIAGRAM



V. CONCLUSION

Implementing of Contactless Automatic Hand Wash Dispenser for Sanitation is efficient and the cost price is minimized. It works like the normal contactless automatic machine. The human gets the limited sanitizer liquid for sanitation in hand, to wash the hands and to protect themselves from the corona disease. This system can be utilized in malls, high populated areas. The economic cost of the seminar, it will be better quality when considering the life of the system and the seminar. The most goal of this seminar was to use current advanced technologies to develop an Automatic hand sanitizing machine to improve hygiene and prevent the infectious viruses entering our body. Automatic hand sanitizers are priced less when compared to any other hand sanitizing tools or dispensers. At the same time it is environment friendly as because the disposable wastage is very minimal, since it can be refilled easily without any technical assistance. These automatic hand sanitizer machines are developed keeping in mind about its affordability by underprivileged sections of the society as it can be purchased by lower income groups in pursuit of their well being and also they are easily available and can be used by everyone without any hassle

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