IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

DRY HANDWASH USING FOG TO SAVE WATER

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Abstract: An embedded system is a combination of software and hardware to perform a dedicated task. Some of the main devices used in embedded products are Microprocessors and Microcontrollers. Microprocessors are commonly referred to as general purpose processors as they simply accept the inputs, process it and give the output. In contrast, a microcontroller not only accepts the data as inputs but also manipulates it, interfaces the data with various devices, controls the data and thus finally gives the result. The project "Dry Hand washing Machine by Fog Disinfection to Save Water" by using arduino is exclusive project that can find the hands inside the machine and based on the selective time the system sanitize the hands and switches on the UV light for disinfection of corona virus. If the person remove the hands from working machine then system gives the alerts in the form of buzzer. The status of the project will display on LCD. To performance this intelligent task microcontroller loaded embedded C language.

I. INTRODUCTION

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.

Our machine goes ahead another level to enable even more water saving using a fog based system. 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 and the status of the project is display on LCD. This system gives the audible alerts when the person remove the hands from working machine .User only remove the hands after complete the working of UV lam, fog sanitizer. To performance this intelligent task microcontroller loaded embedded c language.

3.1Existing system

The major forms of automatic hand washing machines involve the use of sensor based water turn-on and turn-off units. This is usually aimed at avoiding physical contact between the user and faucet surfaces. In most of these automatic hand washing machines, the means to provide automatic soap dispensing integration into the same system are absent. Amongst the few, a design that follow standard hand washing procedures considering scenarios of COVID-19 and involving the use of sensors during the wetting, lathering, scrubbing, rinsing and drying was implemented . The existing design contains a hand washing chamber with a pair of openings covered by rubber gaskets for receiving users' hands, pumps, valves, hot blower mechanism and an electronic control unit. The Proposed system was designed to consider commercial building scenarios. The hand wash design is focused on automatic faucets using infrared (IR) sensors and a microcontroller. The Proposed system used a single infrared sensor that detects hands and the microcontroller actuates pumps to simultaneously and automatically release water and soap. The method is ineffective as dispensing water and soap at the same time would waste the soap before the user gets it.

3.2 Problems identified

Moreover, this method also has a drawback of portability and hence has limited suitability to be easily installed in public places, But here we design our system that is portable easily. The problems that would be created by wastage of water would create a greater problem than the pandemic itself. To solve this problem, we here design a system that provides hand washing while consuming less water. The authors in reference method they built a solar-powered, automated water tap prototype. The system detects human hand presence using an ultrasonic sensor and an Arduino microcontroller. It instructs the relay to activate the solenoid valve and allow water to flow by sending "on" and "off" commands.

3.3 Theoretical framework

The authors in reference paper devised and constructed an automatic faucet for standard hand-washing that is user-friendly and simple to hook into a conventional water pipe.

The faucet used an infrared proximity sensor to identify the presence of hands and start the hand-washing procedure automatically. To force users to use soap, it first exited water and soap at the same time.

The authors in developed a hand washing and drying system that contains a wall mounted cabinet, proximity sensor, and processor that controls the washing and drying of the user's hands. The cabinet houses the circuits, water lines and soap dispenser so as to avoid a possible damage of the electronic components due to water and soap leakage. Soap dispensing technologies in use are mostly similar to the currently available sinks. They are mostly mechanically operated to dispense the soap or sanitizing fluid . Such devices are based on a push of a button that triggers internal rollers forcing nozzles to extract soap . Other soap dispensers operate by the use of motion sensors that provide a fixed amount of soap for the user.

ΡΕΣΕΑΡΧΗ ΜΕΤΗΟΔΟΛΟΓΨ

The methodology section outline the plan and method that how the study is conducted. This includes sample of the study,Data and Sources of Data, study's variables and analytical framework. The detailsare as follows;

3.1Proposed system

The system presented in this work is portable, low cost and suitable for public use. It contains two sensors to separately release soap and water, giving enough time for the user to apply standard hand washing procedures and it includes UV light to kill harmful virus also we design a fog based system to save 95% of water consumption. The duration of the scrubbing was indicated by a buzzer and LED light. The sensor selected is less sensitive to external variables such as temperature, light and pressure, hence yielding an improved performance. Moreover, an electronic buzzer is triggered to remind users of the duration of washing thereby providing the user a means of engagement with the washing procedure.

3.2 System Description

The main controlling device of the project is Arduino microcontroller.SR04 ultrasonic sensor, timer buttons ,LCD display ,fog sanitizer, Buzzer and UV lamp is interfaced to the microcontroller. User need to set the time through buttons. After select the time user inserts the hands into the machine. Automatically detects the hands using ultrasonic sensor and based on the selective time the machine switches on the fog sanitizer and UV lamp. If the person remove the hands from working machine then system gives the alerts in the form of buzzer. The status of the project will display on LCD. To performance this intelligent task microcontroller loaded embedded C language.

3.3 Language and Program used

Embedded C is a set of language extensions for the C programming language by the C standards committee to address commonality issues that exist between C extensions for different embedded system .

Embedded C programming typically requires nonstandard extensions to the C language in order to support enhanced microprocessor features such as fixed - point arithmetic , multiple distinct memory banks, and basic I/O operations. The C Standards Committee produced a Technical Report, most recently revised in 2008 and reviewed in 2013, providing a common standard for all implementations to adhere to. It includes a number of features not available in normal C, such as fixed-point arithmetic, named address spaces and basic I/O hardware addressing. Embedded C uses most of the syntax and semantics of standard C.

An embedded system is a hardware-and-software system that performs a dedicated function within a larger mechanical or electrical system. Embedded systems are typically designed to deal with real-time computing constraints, and are controlled by a real-time operating system (RTOS) that can process data as soon as it is received without buffer delays. Most embedded systems today are based on programmable microcontrollers, small computers with integrated memory housed on a single integrated circuit. We can think of embedded systems as having three main components: the hardware component, the software component, and the real-time operating system.

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. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others.

A power supply may include a power distribution system as well as primary or secondary sources of energy such as

- Conversion of one form of electrical power to another desired form and voltage, typically involving converting AC line voltage to a well-regulated lower-voltage DC for electronic devices. Low voltage, low power DC power supply units are commonly integrated with the devices they supply, such as computers and household electron A transformer is a device that transfers electrical energy from one circuit to another through inductively coupled conductors without changing its frequency. A varying current in the first or primary winding creates a varying magnetic flux in the transformer's core, and thus a varying magnetic field through the secondary winding. This varying magnetic field induces a varying electromotive force (EMF) or "voltage" in the secondary winding. This effect is called mutual induction.

If a load is connected to the secondary, an electric current will flow in the secondary winding and electrical energy will be transferred from the primary circuit through the transformer to the load. This field is made up from lines of force and has the same shape as a bar magnet. ics.

3.4Hardware Compoents

Regulated power supply. ,Arduino Controller., Fog sanitizer., UV lamp., LCD Display., Buttons & Switches. ,Relays . Ultrasonic sensor., Buzzer.

3.4.1 Ultrasonic sensor

An ultrasonic sensor measures the distance between its transmitter and an obstacle in front using ultrasonic sound waves (operational at 40 KHz) beyond the human audible sound wave range. The transmitter element sends out the ultrasonic wave which is reflected from the target and is picked up by the receiver module. Using the time-of-flight principle and the known speed of sound (~340 m/s), the distance between the sensor and the target is calculated.

The HC-SR04 is a popular sensor among the maker community. Its operational field of view is essentially a straight line along the sensor's line-of-sight. The sensor needs a 5 V power supply and has a Trigger and an Echo pin. The Trigger pin sends out a high ultrasonic pulse that is reflected and received by the Echo pin, which records the difference in time between the two events. The crystal visible on the module is responsible for the clock pulse. Sound waves can reflect off any air-other media boundary; thus, an ultrasonic sensor can also measure the distance from a water surface or glass.

The HC-SR04 module Trigger pin when set HIGH does not immediately set off an ultrasonic wave. Instead, a burst of 8 ultrasonic waves are sent out from the transmitter, invoked on the falling edge of the Trigger pin (after set HIGH). The minimum length of the Trigger pin HIGH pulse needed to invoke the ultrasonic pulse burst is 10 microseconds.

3.4.2 Control Buttons

A push-button (also spelled pushbutton) (press-button in the UK) or simply button is a simple switch mechanism for controlling some aspect of a machine or a process. Buttons are typically made out of hard material, usually plastic or metal. The surface is usually flat or shaped to accommodate the human finger or hand, so as to be easily depressed or pushed. Buttons are most often biased switches, though even many un-biased buttons (due to their physical nature) require a spring to return to their un-pushed state. Different people use different terms for the "pushing" of the button, such as press, depress, mash, and punch.

- Control buttons used in the project are push buttons which are connected to the Arduino.
- Different buttons when pressed generate different data to the arduino.
- This buttons are used to select the time like 5,10,15,20 seconds for dry hand wash.

3.4.2.1 UV lamp

- Ultraviolet lamps to disinfect surfaces in the home or similar spaces.
- UV radiation is a known disinfectant for air, water, and nonporous surfaces. UV radiation has effectively been used for decades to reduce the spread of bacteria, such as tuberculosis. For this reason, UV lamps are often called "germicidal" lamps.

3.4.2.2 Relay

We know that most of the high end industrial application devices have relays for their effective working. Relays are simple switches which are operated both electrically and mechanically. Relays consist of an electromagnet and also a set of contacts. The switching mechanism is carried out with the help of the electromagnet. There are also other operating principles for its working. But they differ according to their applications. Most of the devices have the application of relays.

The main operation of a relay comes in places where only a low-power signal can be used to control a circuit. It is also used in places where only one signal can be used to control a lot of circuits. The application of relays started during the invention of telephones. They played an important role in switching calls in telephone exchanges. They were also used in long distance telegraphy. They were used to switch the signal coming from one source to another destination. After the invention of computers they were also used to perform Boolean and other logical operations. The high end applications of relays require high power to be driven by electric motors and so on. Such relays are called contactors.

There are only four main parts in a relay. They are

- Electromagnet
- Movable Armature
- Switch point contacts
- Spring

3.4.3 Comparison of the Models

Improvements can be made in the existing system with respect to the following parameters.

- The reference method also has a drawback of portability and hence has limited suitability to be easily installed in public places. But here we design our system that is portable easily.
- The problems that would be created by wastage of water would create a greater problem than the pandemic itself. To solve this problem, we here design a system that provides hand washing while consuming over 95% less water.

3.4.3.1 Proposed system description

Above is the quite simple schematic. The LCD panel's Enable and Register Select is connected to the Control Port. The Control Port is an open collector / open drain output. While most Parallel Ports have internal pull-up resistors, there is a few which don't. Therefore by incorporating the two 10K external pull up resistors, the circuit is more portable for a wider range of computers, some of which may have no internal pull up resistors.

We make no effort to place the Data bus into reverse direction. Therefore we hard wire the R/W line of the LCD panel, into write mode. This will cause no bus conflicts on the data lines. As a result we cannot read back the LCD's internal Busy Flag which tells us if the LCD has accepted and finished processing the last instruction. This problem is overcome by inserting known delays into our program.

The 10k Potentiometer controls the contrast of the LCD panel. Nothing fancy here. As with all the examples, I've left the power supply out. We can use a bench power supply set to 5v or use an onboard +5 regulator. Remember a few de-coupling capacitors, especially if we have trouble with the circuit working properly.

3.4.3.2 Software used

This project is implemented using following software's:

- Express PCB – for designing circuit
- Arduino IDE Studio Compiler - for compilation part

Breadboards are great for prototyping equipment as it allows great flexibility to modify a design when needed; however the final product of a project, ideally should have a neat PCB, few cables, and survive a shake test. Not only is a proper PCB neater but it is also more durable as there are no cables which can yank loose.

Express PCB is a software tool to design PCBs specifically for manufacture by the company Express PCB (no other PCB maker accepts Express PCB files). It is very easy to use, but it does have several limitations.

It can be likened to more of a toy then a professional CAD program.

It has a poor part library (which we can work around)

It cannot import or export files in different formats

It cannot be used to make prepare boards for DIY production

Express PCB has been used to design many PCBs (some layered and with surface-mount parts. Print out PCB patterns and use the toner transfer method with an Etch Resistant Pen to make boards. However, Express PCB does not have a nice print layout. Here is the procedure to design in Express PCB and clean up the patterns so they print ni

Express PCB comes with a less then exciting list of parts. So before any project is started head over to Audio logic and grab the additional parts by morsel, ppl, and tangent, and extract them into your Express PCB directory. At this point start the program and get ready to setup the workspace to suit your style.

Click View -> Options. In this menu, setup the units for "mm" or "in" depending on how you think, and click "see through the top copper layer" at the bottom. The standard color scheme of red and green is generally used but it is not as pleasing as red and blue.cely.

IV. RESULTS AND DISCUSSION

4.1 Results of Descriptive Statics of Study Variables

The project "Dry Hand washing Machine by Fog Disinfection to Save Water" was done with an arduino UNO. Our machine goes ahead another level to enable even more water saving using a fog based system. 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 active the buzzer for alert. The status of the project will display on LCD. To performance this intelligent task microcontroller loaded embedded c language.

An embedded system is a computer system designed to perform one or a few dedicated functions often with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts. By contrast, a general-purpose computer, such as a personal computer (PC), is designed to be flexible and to meet a wide range of end-user needs. Embedded systems control many devices in common use today.

Embedded systems are controlled by one or more main processing cores that are typically either microcontrollers or digital signal processors (DSP). The key characteristic, however, is being dedicated to handle a particular task, which may require very powerful processors. For example, air traffic control systems may usefully be viewed as embedded, even though they involve mainframe computers and dedicated regional and national networks between airports and radar sites. (Each radar probably includes one or more embedded systems of its own.)

Since the embedded system is dedicated to specific tasks, design engineers can optimize it to reduce the size and cost of the product and increase the reliability and performance. Some embedded systems are mass-produced, benefiting from economies of scale.

Physically embedded systems range from portable devices such as digital watches and MP3 players, to large stationary installations like traffic lights, factory controllers, or the systems controlling nuclear power plants. Complexity varies from low, with a single microcontroller chip, to very high with multiple units, peripherals and networks mounted inside a large chassis or enclosure.

FiguresandTables

Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested.

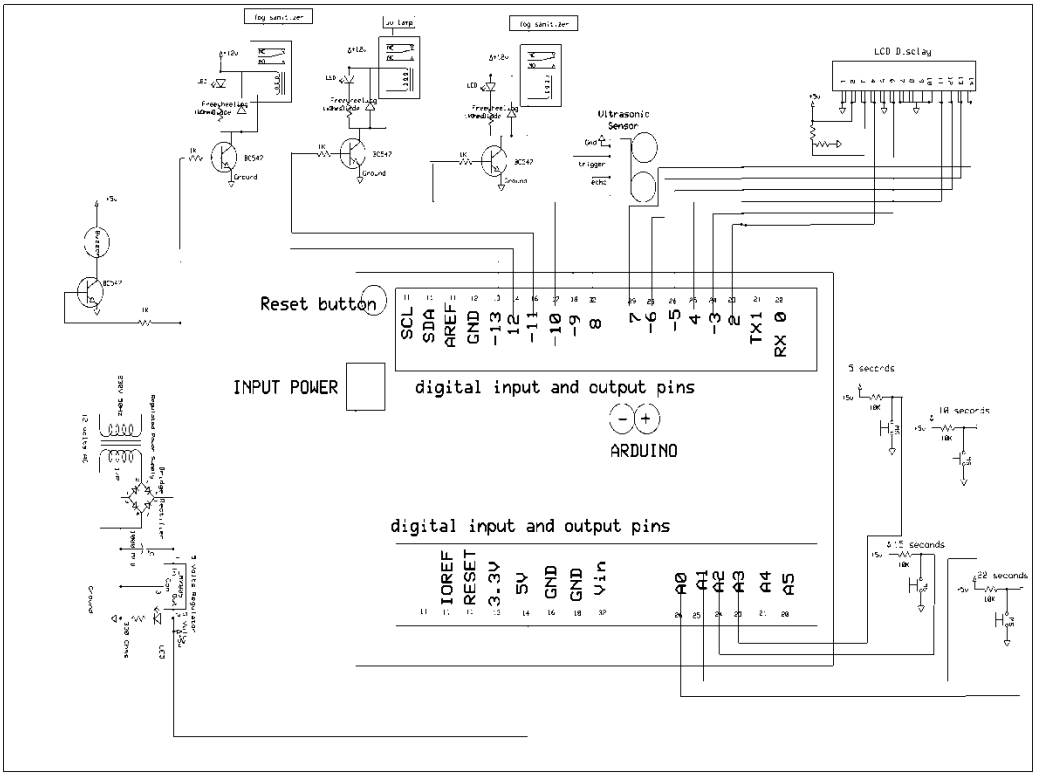

Table 1 Table Type Styles

II. ACKNOWLEDGMENT

Thepreferredspellingoftheword "acknowledgment" inAmericaiswithoutan "e" afterthe "g".Avoidthestiltedexpression, "Oneofus(R.B.G.)thanks..." Instead,try"R.B.G.thanks".Putapplicablesponsoracknowledgmentshere;DONOTplacethemonthefirstpageofyourpaperorasafootnote.

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