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IoT implemened Covid-19 Safety Device

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Abstract - throughout the days of pandemic many inventions square measure being done to avoid the direct contact of individuals and supply utmost safety to scale back the chance of unfold of virus through air or the other medium like bit etc. to scale back the impact, the authors have developed the {concept} to develop an automatic mechanism that will need no human effort or physical dealings of any kind and can be operated mechanically mistreatment the concept of IoT. the most plan of this project is to create a mechanism which will attempt to forestall the unfold of COVID-19. So, the authors took this initiative to create this automatic cleaning and watching System as well as thermal detection. The automatic cleaning and watching System could be a demonstration of however it's been designed to produce most protection to folks passing through the tunnel in around fifteen seconds. This initiative could influence be a milestone in protection against Covid-19.

Index Terms - Automated Sanitization, Motion Sensing, Thermal Detection.

I. INTRODUCTION

The mere objective of the entire project is to create an automated mechanism to help prevent the spread of *COVID-19* within an area, the sub objectives include **collecting data and creating data sets to measure covid sensitivity in an area.** The mechanism of the project is such that it maintains and follows the norms of social distancing and provides a technically sustainable solution to the no contact policy in the COVID-19 prevention norms. The device we will make will be placed at a particular office or institution and will be connected to an ***RFID***, so anyone who passes through the mechanism can be registered and this data can later be used for analysis purposes (future scope of project).The thermal scanner will be similar to the scanning guns being used nowadays. These guns due to their manual mechanism pose a threat to the user, our system will have an **integrated scanner** that will automatically scan the person passing within the mechanism and will generate the temperature. If the temperature is found to be above the safe temperature, we will incorporate a red light that will glow in such a case and will inform us about the situation. If the temperature is accurate the person can move ahead for further sanitization purposes. A regular automated sanitization mechanism will be incorporated so as to sanitize the person moving ahead. It will be attached to sensors to identify the movement and process the task accordingly so that wastage of the sanitizer can also be kept under check.

II. WORKING OF THE SYSTEM

The sensing element senses the proximity of hands once placed beneath the machine. It works on supersonic waves reflection principle.2cm - 400cm non-contact mensuration operate with the move accuracy reaching up to 3mm are often achieved by supersonic move module HC-SR04. the fundamental elements of the module ar feedback loop, supersonic transmitters, receiver. the fundamental principle of work:

(1) victimisation IO triggers for a minimum of ten high level signals.

(2) This Module will mechanically send eight forty kHz and notice whether or not there's a pulse signal back or not.

(3) If the signal is back, through a high level, time of high output IO period is that the time from causation supersonic to returning. take a look at Distance = (high level time*velocity of sound (340M/S) / two. because the controller receives high signal from the sensing element module, it triggers the pump to drag water from the cargo deck and send it to the nozzle in mist type. The program runs the pump for three seconds. it's been seen throughout testing that three seconds ar spare to sanitize the hands with mist spray. we will modification the time as per user wants through programming.

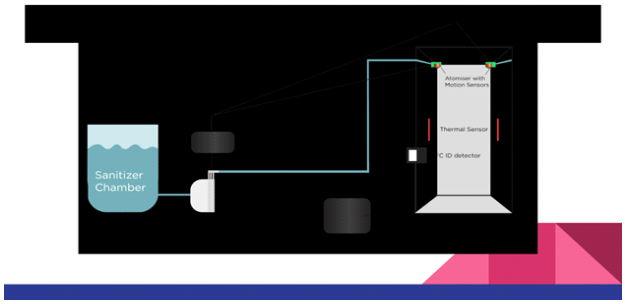

Fig 1. System Design of proposed project.

III. TECHNICAL REQUIREMENTS

The specification of the unit is mentioned below:

i) Sanitizer capacity of the unit: 5L

ii) Mode of operation: Automatic Mist mode

iii) Usage: Contactless

iv) Weight: 5 kg (without sanitizer)

v) Electrical Input - 230V AC, 5 Amp

vi) Power Consumption:

a) Idle Mode - < 3VA

b) When Spraying - 25VA approx.

1.Sanitizer Container - This is the container where the sanitizer is stored/refilled. MoC - ABS

Capacity - 5 Liters

2. Solenoid Valve - This valve prevents water to drip from the nozzle when the pump is not working MoC - Polypropylene

Working voltage - 24V DC

3. Diaphragm pump - This pump is used to provide increased pressure to the inlet of the mist atomizer. MoC - ABS Make - Luxcru

Pressure: 5-6 bar

4. Mist Atomizer - This atomizer sprays sufficient amount of sanitizer at a cone angle of 60 to wet both the hands for 12 seconds

Material - Polypropylene/Brass

Sanitizer Discharge - 5-6 ml for each operation

5. Waterproof non-contact ultrasonic sensor - This module, with air as medium, is a non-contact target detection and distance measurement module. This sensor is not affected by color or other visuals from the detected object. It sends out high frequency sound waves in the direction of detection, and receives the reflection from nearby objects and then gives distance reading by processing the echo time.

MoC - Epoxy filled ABS

IP Rating - IP 67

Min sensing distance - 2 cm

Max hand distance - 20 cm

Field of View - 8-10 degree

6. Switch Mode Power Supply (SMPS) - The power supply unit (PSU) is used in the unit to convert the AC voltage into the acceptable range for working of the pump and solenoid valve. This device has the facility handling electronic components that converts electric power efficiently.

Material - ABS

Output - 24VDC, 2Amp Material - ABS

Output - 24VDC, 2Amp

7. Control Circuit –

Type of Controller: ESP8266 controller.
Once the hand is detected it switches on the pump for a pre-defined time.
Firmware upgrade: Over the air i.e. by creating smart-phone Wi-Fi hotspot.

8. Arduino Uno- The Uno may be a microcontroller board supported the ATmega328P. it's fourteen digital input/output pins (of that 6 are often used as PWM outputs), vi analog inputs, a sixteen MHz quartz , a USB association, Associate in Nursing influence jack, Associate in Nursing ICSP header and a button. every of the fourteen digital pins are often used as Associate in Nursing input or output, victimisation pinMode(), digitalWrite(), and digitalRead() functions. They operate at five volts. every pin will give or receive twenty mA as suggested in operation condition and has an indoor pull-up resistance (disconnected by default) of 20-50k ohm. A most of 40mA is that the value that possesses to not be exceeded on any I/O pin to avoid permanent injury to the microcontroller.

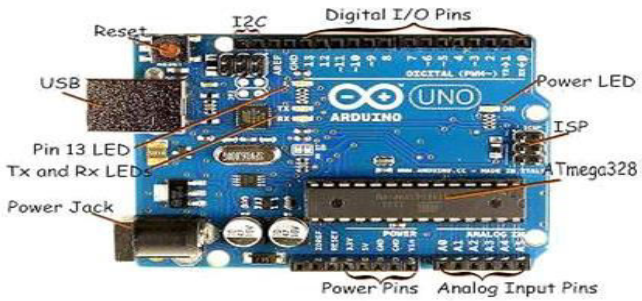

Fig 2. Arduino Uno

9. Liquid Crystal Display- LCD may be a style of show utilized in digital watches and lots of transportable computers. alphanumeric display displays utilize sheets of polarizing material with a liquid resolution between them. an electrical current delicate the liquid causes the crystals to align so as that light-weight cannot endure them. Technical achievements have resulted in brighter displacement, higher resolutions, reduced response times and cheaper producing method. The liquid crystals square measure typically manipulated through AN applied electrical voltage so as that light-weight is allowed to pass or is blocked. By fastidiously dominant wherever and what wavelength (color) of sunshine is allowed to pass, the {lcd|liquid crystal show|LCD|digital display|alphanumeric display} monitor is during a position to display pictures. A backlight provides the alphanumeric display monitor's brightness.

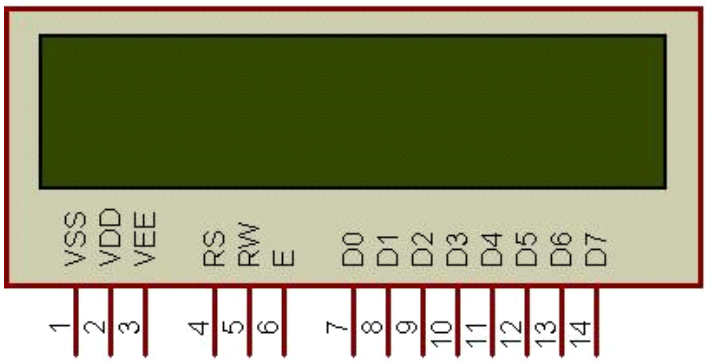

Fig 3. LCD

10. Crystal Oscillator- A oscillator is associate electronic circuit that uses the mechanical resonance of a moving crystal of electricity material to form associate electrical signal with a extremely precise frequency. This frequency is typically used to keep track of some time, to produce a stable clock signal for digital integrated circuits, and to stabilize frequencies for radio transmitters and receivers. A crystal could also be a solid throughout that the constituent atoms, molecules, or ions square measure packed throughout an often ordered, repetition pattern extending altogether 3 spacial dimensions. virtually associatey object created from an elastic material may be used quite a crystal, with acceptable transducers, since all objects have natural resonant frequencies of vibration. as an example, steel is very elastic and options a high speed of sound.

11. RFID- The RFID tags connected to things can communicate with RFID reader which can observe each item inside the cart and ring every up virtually instantly. for many of our RFID based mostly Arduino comes, RC522 RFID Reader/Writer module might even be a wonderful selection. it's low power, low cost, pretty rugged, and straightforward to interface with. RFID or oftenness Identification system consists of 2 main parts, a transponder/tag connected to associate object to be known, and a Transceiver conjointly stated as interrogator/Reader. A Reader consists of a frequency module associated an antenna that generates a high frequency magnetism field. On the other hand, the tag is usually a passive device, that means it doesn't contain battery. Instead it contains a micro chip that stores and processes info, associated an antenna to receive and transmit a proof. To browse the information encoded on a tag, it's placed in shut proximity to the Reader (does not have to be compelled to be inside direct line-of-sight of the reader). The battery-powered chip within the tag then responds by causation its hold on info back to the reader inside the type of another electromagnetic wave. this is often known as break up. The break up, or amendment inside the electromagnetic/RF wave, is detected and taken by the reader that then sends the information bent a pc or microcontroller.

12. PIR sensors- PIR sensors allow you to sense motion, nearly always won't to detect whether a person's has moved in or out of the sensor's range. They are small, less expensive, low-power are easy to use and they do not wear out. For these reasons they're commonly found in appliances and gadgets utilized in homes or businesses.

IV. SOFTWARE USED

1. EAGLE

EAGLE (Easily Applicable Graphical Layout Editor) by Cad soft is a flexible and expandable EDA schematic capture, PCB layout, auto router and CAM program widely used since 1988.

2. Schematic Capture

EAGLE is a software which contains a schematic editor used for designing circuit diagrams. Different parts are often placed on many sheets and connected together through different ports.

3. PCB layout

The PCB layout editor allows the user to back annotate to the schematic and auto-routing so that to automatically connect traces that support the connections defined within the schematic.

EAGLE saves Gerber and PostScript layout files and ExcellonandSieb & Meyer drill files. These are standard files which are accepted by many PCB fabrication companies.

V. RESULT AND CONCLUSION

An automatic sanitizer dispensing machine designed and developed. The machine is wall mounted at entrance gates of society, schools, colleges or any commercial building. It can spray 40 times with 100 ml liquid and is effective in optimizing use of liquid sanitizer. The machine is tested for 24hour operation for quite every week and is functioning fine. It helped to scale back the contact for getting sanitizer and also reduce manpower employed to spray sanitizer with a sprig bottle. The power consumption is very low. For each spray the utmost current consumption is 2 Ampere at 24 V. Its hourly consumption is 48W if run continuously. The negative feedback circuit is little in size and low cost as compared to available controllers. The power consumption is low and the system can help to achieve contactless sanitizer dispensers. It reduces the danger of community transmission of the virus.

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