



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJIRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 10, Issue 9, September 2021

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.569



Smart Sanitizer with Temperature and RFID Monitoring Using Internet of Things

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ABSTRACT: In recent days, due to pandemic like Covid-19, Automatic Sanitization is gaining popularity. Hand sanitizers are used by one hand pressing a sanitizer pump. This brings people to come into contact with the sanitizer pump handle which increases the risk of spreading. Internet of Things (IoT) is the key technology which can convert the dumb things into smart things by adding computing and communicating power to it. It is one among the leading technology which leads the world to the digital path. In this paper IoT based Automatic safety measures for covid has been proposed. The Automatic sanitizer should perform when hand is placed near to it. It measures the temperature and display it. When it goes above certain limit then the person will not be allowed inside. Person will be monitored with temperature and based on temperature condition the person will be allowed by using the RFID tag.

KEYWORDS: IoT Covid -19 Safety, Ultrasonic sensor, Servomotor, DHT11, RFID

I. INTRODUCTION

An automatic hand sanitizer machine is automated, avoids contact with people which finds its use in hospitals, work places, offices, schools and much more. Let's avoid contact and go with touch less Smart Sanitizer that will ensure you to maintain a proper hygiene and health in public places. Many Automatic Hand Sanitizers are available in market but it sanitizes only your hands and it is useful but sometime we need something more. So we come with something different idea that is employee access using RFID and automatically check their body temperature when it sanitizes their hands. Automatic hand sanitizer will be done at entrance. The Hand sanitizer is done simultaneously with the activation of the sensors, keeping the particular region sanitized and as it keeps us free from virus, bacteria or any infectious agents. Temperature sensor senses the body temperature of the person as soon as it is sanitized and displays the temperature. If the temperature sensed is above then the person will not be allowed inside and if the temperature sensed is below then the person will be allowed inside. Person will be monitored with temperature while entering into the campus at entrance only. It helps to solve the challenges faced by security guard at different places such as, school, office, hospital, etc.

II. RELATED WORKS

Design of Automatic Hand Sanitizer System Compatible with Various Containers. The automatic hand sanitizer system will be designed in two stages that is instrument structure and control parts [1]. Structure Design the motor, control board, and sensor are located at the top of the automatic hand sanitizer device. The device is processed by converting the DC motor of rotary motion to linear motion by pressing the pump handle of the sanitizer container. Controller Design the Automatic hand sanitizer device consists of a power supply, sensor board, motor controller, and motor. The power supply provides current and voltage for the motor, board and its source power is a battery. The work focuses on the elasticity of pumps and increasing people using to devices [2]. IoT-based sensor fusion efficient technology for COVID-19 disinfection. The research work is about a smart epidemic tunnel that can provide an individual in immediate causes from COVID-19 infections. The authors have presented a sensor fusion-based automatic hand sanitizer tunnel that detects a person with help of an ultrasonic sensor that is height of 1.5 feet and disinfects the person using the spread of a hand sanitizer spray. The smart tunnel is operated using a solar cell during the day time and during night timings it switches to a solar power-bank power mode using a light-dependent resistor sensing unit. The presented smart epidemic tunnel is embedded with an intelligent hand sanitizer sensing unit which stores the essential information in a cloud platform such as Google Fire-base. Therefore, the proposed system helps the world by saving time and in decreasing the spread of coronavirus. Cashless Payment Vending Machine With Automatic Hand Sanitizer [3].

Cashless Payment Vending Machine is introduced to reduce the man power, time and cash payments. It is similar to which we get the required items at vending machine any time and any place. It proposes a cashless payment vending



machine hand sanitizer system using ultrasonic sensor and servo motor. When the user uses the vending machine first the user need to wash or clean their hand before used machine. But now when the sensor is on the user put their hands in front of the sensor. An ultrasonic wave is reflected to the Rx of ultrasonic sensor at that time the servo motor will rotate and sprays the hand sanitizer liquid. Then coin acceptor accepts the coin and machine also accept the online payment. Auto-Activating hand Sanitizer with Battery Imposed System for Sanitizing Hands.

This paper gives a brief idea about the automatic hand sanitizer. The motor pumps the sanitizer liquid to the person when the IR Sensor is been detected. The IR Sensor is the photodiode used for sensing or detecting the human hand and it is used to control the motor pump from the hand sanitizer. The motor is connected to an RC timer delay setup and the pipe connected to a reducer are used to control the flowing liquid of the sanitizer. It has three modes of Control LED's in the system, White LED is used to understand for the user that it is made in working mode and battery is in use. Red LED is used to understand for the user that battery is in charging mode. Green LED is used to understand for the user that battery is in charged mode fully. It has switch On/ Off to control the all setup from the battery supply. The consumer is able to use them and the user also saves the money and power [4]. Temperature Detection and Automatic Sanitization and Disinfection Tunnel COVID -19 [5].

This paper proposes the measure of temperature and it finds the temperature is above then it gives a danger sign sound so that every one may be alert. In this paper designed an efficient temperature detection and hand sanitization that can function in an automated way with the help of Arduino UNO.

In this when a person enters then PIR sensor detects the person at entrance only then using temperature sensor it measure the temperature of the person at the entrance when it sanitizes. The measured temperature is always analog and with the help of analog pins of Arduino and it reads the temperature and then it converts it to degree Celsius and Fahrenheit using temperature baseline. Here considering baseline temperature to be 40 degree Celsius.

PIR sensor is connected to the pin 6 of the Arduino and it will do its job detecting the person. When it detects the person then it will show the red led that will turn on as a sign that some work has to be done by tunnel and that red led is connected to pin 9 otherwise green led turns on which is connected to pin 8 Automated Temperature Reader with Hand Sanitizer Dispenser. The Automated temperature reader and hand sanitizer dispenser has two systems that is the temperature reader and the hand sanitizer dispenser which will be controlled from a normal microcontroller and by design, simultaneously it cannot be operate. The temperature reader is designed to perform in terms of accuracy with existing and handheld infrared thermometers and the temperature read will be display to the user and gives visual and alerts when the temperature exceeds the high body temperature of 38 degrees centigrade. The sanitizer dispenser is designed to spray the sanitizer only once and only at a needed quantity when it get activated.

III. HARDWARE REQUIREMENTS

Processor boards: NodeMCU is a open source IoT platform and cost efficient. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Express if Systems and hardware which is based on the ESP-12 module . The firmware and prototyping board designs are open source. Later support for the ESP -32bit MCU is added.

Ultrasonic Sensor: An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound that is the sound that person can hear. Ultrasonic sensors have two main components that is the transmitter which emits the sound with the help of piezoelectric crystals and the receiver which encounters the sound after it has travelled to the target.

Servomotor: It is a rotary actuator or linear actuator that allows for accurate control of angular or linear position, velocity and acceleration. Servomotor which pushes or rotate an object. If we want to rotate an object at specific angle or distance in that case servo motor is been used.

DHT11 Sensor: It measures the Temperature & Humidity. Features a temperature & humidity sensor complex with a calibrated digital signal output. With the help of the exclusive digital-signal-acquisition technique and temperature & humidity sensing technology, it make sures high reliability and excellent long-term stability. This sensor includes a resistive-type humidity measurement component and an NTC (temperature measurement component), and it will connect to a highperformance, fast response, offering excellent quality, and cost-effectiveness.



RFID: It is an acronym for “radio-frequency identification” and refers to a digital data encoded technology in RFID tags or smart labels are captured by a reader via radio waves. RFID is like the barcoding in the data from a tag or label are captured by a device as it stores the data in a database. However, it has several advantages of the systems that use barcode advantage tracking software. The most important is the RFID tag data can be read outside the line-of-sight, but in the barcodes will be aligned with an optical scanner.

Power supply and jumpers: Jumper wires are essential wire that has connector pin at each end that allows to connect them to be used to connect two points to each other without soldering. Jumper wires are typically used with breadboards and prototyping tools to make it easily change a circuit as needed. Jumper wires typically come in three types that is male-to-male, male-to-female, female-to-female.

IV. SOFTWARE REQUIREMENTS

4.1 Coding Environments (Arduino IDE, etc)

The Arduino Integrated Development Environment or Arduino Software (IDE) holds a text editor for writing code, message area, a text console, a toolbar with buttons as common functions and a series of menus. It connects to the Arduino and hardware to upload programs and communicate with it.

Programs are written using Arduino Software IDE are known **sketches**. Sketches are written in the text editor and then it is saved with the file extension. The editor has features for cutting and pasting and for searching and replacing text. The message area gives feedback while it is saving and exporting and also errors are been displayed. The console displays text output by the Arduino Software IDE, and it includes complete error messages and also other information. The bottom right hand corner of the window displays the configured board and serial port. The toolbar buttons allow to verify and upload programs, create, open, and save sketches, and open the serial monitor.

The Arduino environment can be extended through the use of libraries, just like most programming platforms. Libraries provide extra functionality for use in sketches, e.g. working with hardware or manipulating data. To use a library in a sketch, select it from Sketch- Import Library. A number of libraries come installed with the IDE, can also download. The DHT11 library by Adafruit has been installed to measure the temperature. To build a web server we used the ESPAsyncWebServer library that provides asynchronous web server. ESPAsyncWebServer library requires the ESPAsyncTCP library to work.

4.2 Display Environments (HTML, Android App, PHP, etc)

Hypertext Markup Language (HTML) is the standard markup language for documents designed to be displayed in a web browser. It can be assisted by technologies such as Cascading Style Sheets (CSS) allow to style a web page and scripting languages such as JavaScript. HTML uses tags to create the structure for a website. These tags allow you to create headers, images, and other elements that will appear on a web page. A web page can be accessed by entering the URL address into the browser. The values are read by the sensor will be displayed in the web page. The web page is designed using HTML and CSS to style a web page. The sensor value will be automatically updated every 10 second.

V. SYSTEM ARCHITECTURE

5.1 Block Diagram

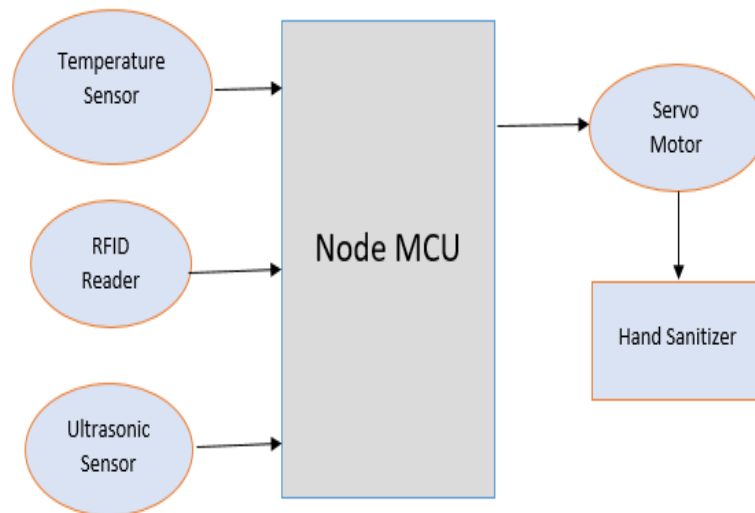


Figure 4.2.1 Block Diagram

5.2 Circuit Diagrams

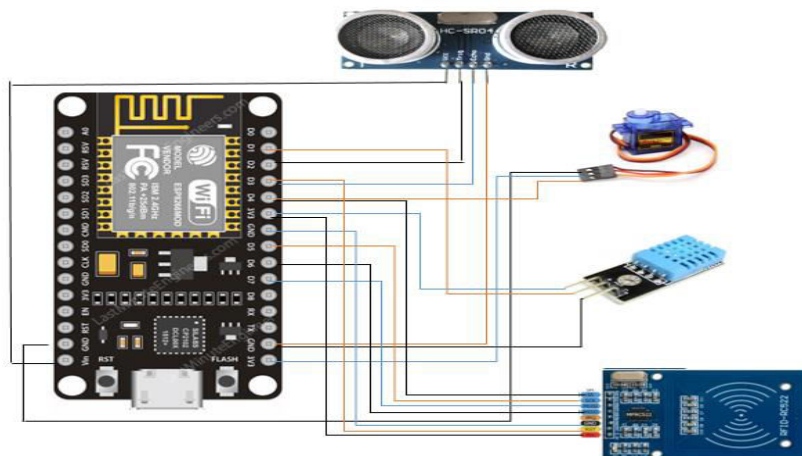


Figure 4.2.2 Circuit Diagram

5.3 Working Procedure

The system is designed with using nodemcu and all the modules are interconnected together and are programmed with Arduino IDE tool.

An ultrasonic sensor it is an electronic device that helps to measures the distance of a target object and we have given condition to the distance and based on the distance the servo motor will rotate. If the distance is less than 10 then the servo motor will rotate.

DHT11 sensor will monitor the temperature and it will be displayed in the web server. RFID refers to a technology whereby digital data encoded in RFID tags or smart labels. Here RFID is used when the person entering will be scanning the RFID tag or ID card while entering into the campus and based on the temperature condition the scanned

RFID tag or id card will be displayed in serial monitor whether the person need to be allowed or not. If temperature is above the given condition then the access denied that is person will not be allowed inside and if temperature is below the given condition then the access granted that is person will not be allowed inside.

5.4 Flowchart

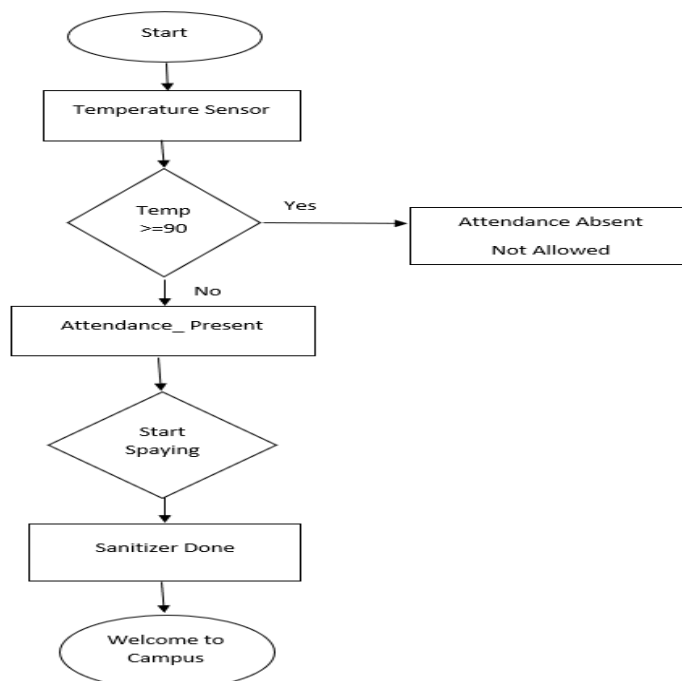


Figure 4.2.3 Flow Diagram

VI. CONCLUSION

Smart Sanitizer with Temperature can help everyone in maintaining safety and stop the virus from spreading. The healthy person is sanitized as well, as a safety measure. This can be placed at the entrance and every person entering can be monitored. In this way we can avoid any interaction with an infected person and the spread of the virus can be stopped.

The system surely helps in implementing the hand hygiene without any challenges as it is a must to sanitizer if you are to access any entry point. It is much safer and it is highly recommended due to its touch less property. It is a user friendly system that everyone can use.

FUTURE SCOPE

At this time we can target Offices, Factories, Companies employees but in the upcoming version we add the functionality for a Visitor like any Shops, hotels, Banks, hospitals etc. So this machine can work for both employee of organization and Visitor also.

It is Cost-effective and The employee attendance will be maintained with health record track features.

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