IOT BASED TEMPERATURE MEASUREMENT AND SMART SANITIZER DISPENSER SYSTEM WITH AUTOMATIC DOOR CONTROLLER

Project Report
by

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ABSTRACT

COVID’19 pandemic has influenced human life in various sectors. Various attempts were made to reduce the virus transferring by work from home, social distancing, and also including hand hygiene. So far, most of the available hand sanitizers do not operate automatically. This project aims to make an automatic temperature detection of a person and design of smart hand sanitizer where medicine alcohol can come out automatically by spraying in hands and person carrying belongings. The infrared (IR) will sense the presence of heat and motion of the object with the distance up to 50 cm. It sends data to the Arduino UNO to activate the pump. If the ultrasonic sensor detects the distance of the person within 50 cm it will send data to node MCU that connect to Blynk server. After measuring the temperature and the system opted for automatic sanitized, It can transfer the data to the automatic door controller so that the person with suitable temperature are allowed inside the campus, home, office, or any other working environment based on the Internet of Things (IoT). The results of the hand sanitizer testing that the system can run smoothly with a minimum detection error of transferring data. Besides that, automated hand sanitizer will make notification to the owner, if the liquid has run out to the smartphone.

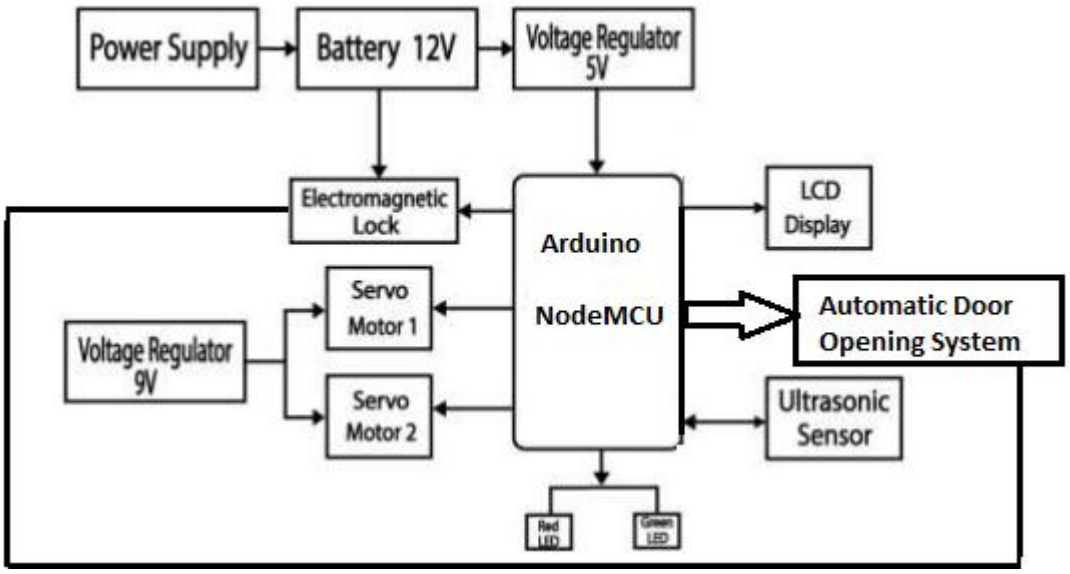
PROBLEM IDENTIFICATION

The existence of Covid’19 disease has a big impact on both socials and economics. WHO has declared this a pandemic disease and many cities around the world are in a lockdown situation. To prevent the cause of this virus, it can be done by keeping a distance at least 3 meter, avoid going to crowded places, avoid touching the eyes, mouth, and nose when outside and cleaning hands with soap or alcohol-based hand rub. Providing containers for cleaning fluids in public spaces is a form of Covid-19 prevention, but the provision of containers is currently ineffective because there are parts that are often touched. This could be a point of transmission for Covid-19. Many health actions are carried out using automatic systems including air quality monitoring, hand sanitizers, hand hygiene.

Hand sanitizers are an alternative for washing hands during a pandemic. It can be used when and water is not available. Hand sanitizer is also available in several forms such as liquid (spray) or gel. Hand sanitizer is usually made from materials such as alcohol, polyacrylic acid, glycerin, propylene glycol, or plant extracts. The process of killing germs starts with removing the oil on the skin, and then the bacteria in the body will come to the surface. Soap or alcohol will kill bacteria after rubbing to your hand. Hand sanitizer is effective against Covid-19. Most of the available hand sanitizers do not operate automatically. This article aims to make an automatic hand sanitizer where soap and water can come out automatically. Besides that, automated hand sanitizer will make notification to the owner, if the liquid has run out to the smartphone.

PROJECT DESCRIPTION

BLOCK DIAGRAM OF THE PROJECT



The smart hand sanitizer is stationed at the entrance door and it is connected to the door in such a way that it controls it. That is to say, when a person(s) wants to access the entrance door, they must first sanitize their hands or else the door will remain locked. With this smart hand sanitizer dispenser, an ultrasonic sensor is used to check the presence of hands below the outlet of the sanitizer machine. It will continuously calculate the distance between the sanitizer outlet and itself tells the microcontroller to turn on the servo motor whenever the distance is less than 10cm to push the sanitizer out and immediately after the sanitizer outlet dropping some amount into your hands, the electromagnetic lock will de-energize (unlock the door) lighting up a green LED and display a word "The Entrance Door is Open" on the LCD display, then the second servo motor will open the entrance door. Otherwise, the door will neither unlock nor open but a red LED will continuously be on with the "Please Sanitize Here" words displayed on the LCD display.

PROJECT METHODOLOGY

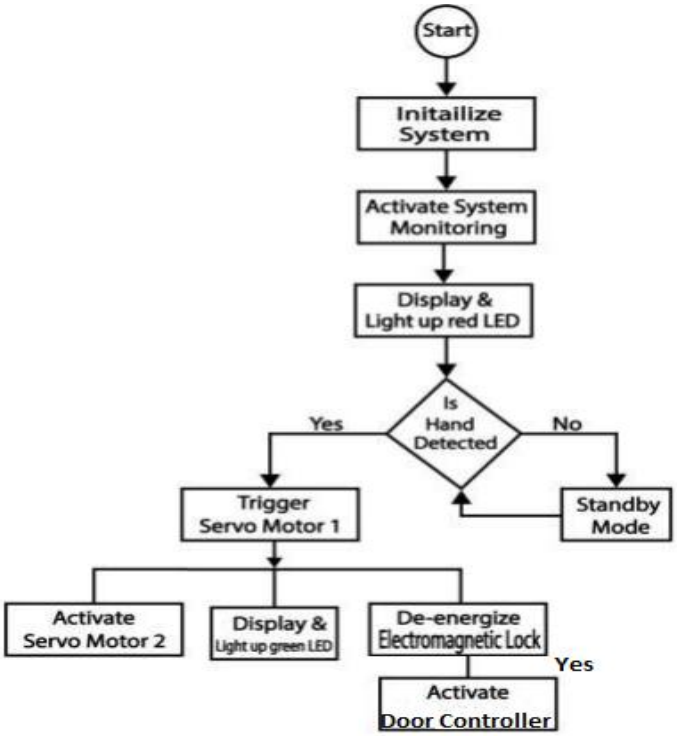
The main objective of this research paper is to design and implement a low cost touch free smart hand sanitizer dispenser with door controller that includes features such as ultrasonic sensor, LCD display and servo motor, based on Arduino Microcontroller. In this project, we are using the ultrasonic sensor (HC-SR04) to detect the presence of a hand. When it detects presence of hand below 10cm, it will trigger the first servo motor to move from 0 degrees to 180 degrees in order to pour the liquid on the hand. It will delay for two (2) seconds before returning back to 0 degrees. After returning to 0 degrees, the electromagnetic lock will de-energize and a green LED will light up immediately, a word "The Entrance Door is Open" will appear on the LCD display then the second servo motor will open the entrance door. We added a delay of six seconds to energize the electromagnetic lock and a delay of two seconds to reset the system. In this system, arduino microcontroller is used to control all the attached devices across the external electronics equipment which includes ultrasonic sensor, servo motor, electromagnetic lock, LCD display and LEDs.

The power supply provides the voltage and current required for effective performance of the system. The electromagnetic lock taps directly from the 12V DC power source and then Microcontroller and servo motor are fed with regulated DC power supply, which is 5V and 9V respectively. This system consists of two parts, Hardware and Software.

Hardware parts include: • Arduino NodeMCU • Ultrasonic sensor • Electromagnetic lock • 12V DC Power Supply, 9V and 5V DC Regulator • LCD display • Relay • Servo motor • Saleae Logic 16.

Software parts include: • Arduino IDE • Saleae Logic 1.2.18

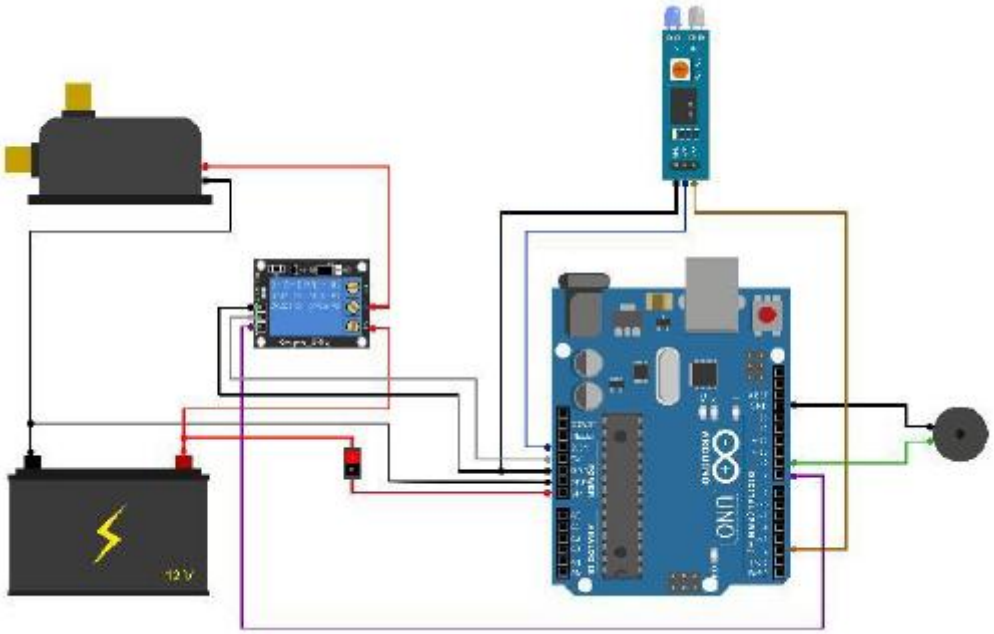
Flow Chart:



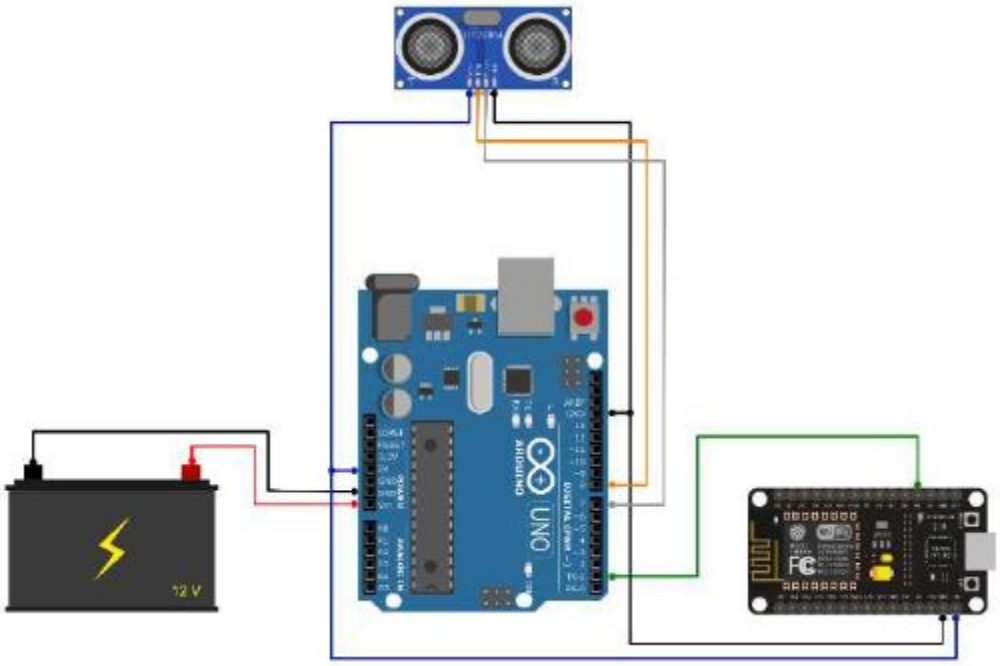
Flow Chart for the Project

Figure 2 shows a flow chart of the Automatic hand sanitizer container which will automatically dispense alcohol water. The flow chart shows a program that is loaded into the arduino. Figure 2 is a flow chart of the Arduino software design. Arduino software will process the input data that has been obtained. The reading data from the infrared sensor and the ultrasonic sensor will be sent to the controller. Then Arduino will send the value to activate the water pump and node MCU. This automatic hand sanitizer container uses sensors to detect temperature, object motion, and water level in the tank. The sensor is programmed as automatic water control connected to the microcontroller. This system uses an ultrasonic sensor and an infrared sensor. The ultrasonic sensor will detect if the water level is 35 cm from the sensor. Data from the ultrasonic sensor will send to Arduino processed by Arduino and transferred to the node MCU as connectivity to a Blynk server.

Blynk App can be connected to the node MCU to get the data that has been sent to the Blynk server. And that application gets to send a notification if the clean water tank has been low. Otherwise, if the undetected water level is less than 10 cm, that application does not send a notification because the input does not receive a signal.



Arduino IR Sensor and Buzzer Circuit



Arduino Wi-Fi Circuit and Ultrasonic Sensor for Automatic Door Control

WORKING SCHEMATIC:

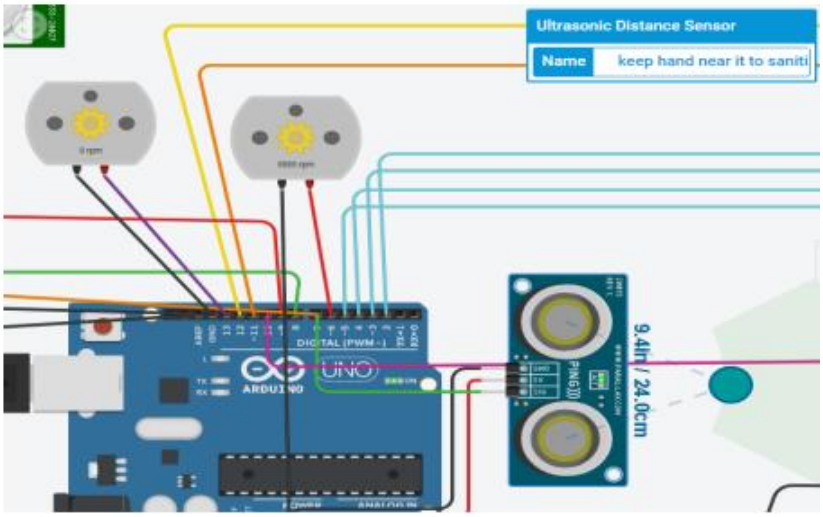


Figure: Detection of Person using Ultrasonic Sensor

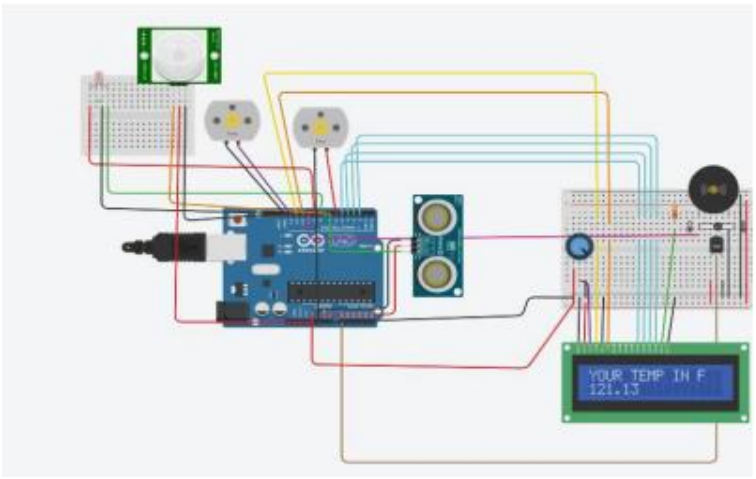


Figure: Sensing of Ambient Body Temperature

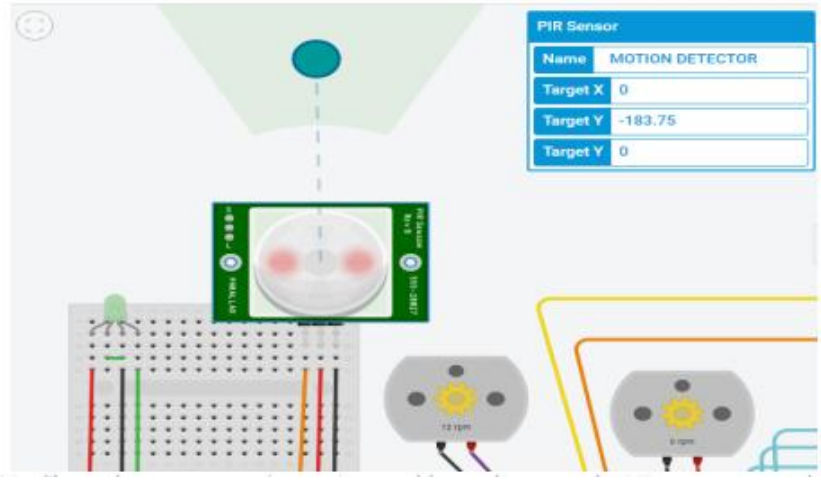


Figure: Activation of Automated Hand Sanitizer Spray

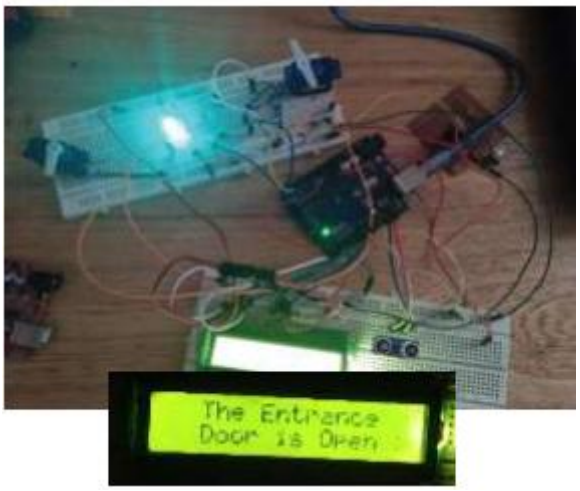
RESULT

The infrared sensor connected with the microcontroller will work automatically detect heat and object motion. When the input gets a signal, the sanitizer will come out automatically through the pipe. This can prevent the spread of bacteria or viruses because there is no need to touch the water pipe directly. To find out the results of the ultrasonic sensor system, this project has conducted with an experimental distance of 20 mm to 70 mm.

Body Temp. Display

Temperature Sensor & Display

The ultrasonic sensor (HC-SR04) detects the presence of a hand. When it detects presence of hand, it triggers the first servo motor to pour the liquid (sanitizer) on the hand. The electromagnetic lock de-energizes immediately lighting up a green LED and displays a word “The Entrance Door is Open” on the LCD display, and then the second servo motor opens the entrance door.



CONCLUSION

The method and technology employed in the project work is to assist to reduce and stop the transmission of spreading COVID-19 virus and can also observe some necessary parameters like person's body temperature using contact less infrared temperature senor, and if high temperature then generate alarm, information regarding health status of system like sanitizer liquid level status, and the device geographical location which is keep in cloud and analyzed using Wi-Fi. One can monitor the device status installed in geographical distributed location from the system latitude and longitude data. From the device data one can understand the sanitizer liquid level and can fill up liquid rapidly ensuing an uninterrupted service that assist to reduce the speedy transmission of COVID-19 virus. y. This framework empowers a completely programmed contactless temperature evaluating for a door (gate) access. Right now the temperature screening is done physically and it not just turns out to be exceptionally troublesome with regards to enormous scope yet there can be carelessness of the gatekeepers as well. In places like air terminals, rail line stations and metro stations a large number of individuals show up and leave which are focal points for spreading of infection. In the event that the computerized temperature screening measure is utilized in such spot, it makes the screening cycle quick as well as stops the conceivable spread of contamination generally. This framework can likewise be carried out in the shopping centers, film, and grocery store and so forth. This framework can be implanted into previously existing programmed entryways (glass entryways) with an extremely less adjustments. The manual framework wherein observing was required, required heaps of cash to keep up and were costly, utilizing the above framework the clients can reduce the expense and reliance on the manual framework.