

Automatic Water/Soap Dispenser and Self-Tissue Dispenser

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Abstract: The Automatic Water/Soap Dispenser and Self-tissue Dispenser project proposes to reduce the spread of Covid-19. The Covid-19 virus can spread through contact transmission at the sink and lack of awareness in the community to the right washing hands. The project is to build a touch-less system of handwashing that helps overcome the problem that can prevent people from exposure to the virus. The contact transmission happens at the sink, and the project has soap, water, and tissue dispenser that fulfil the requirement for proper washing hands. The soap has come out for 0.2 seconds, or 1ml of soap, and the water comes out for 15 seconds to wash hands after placing a hand in the proximity of the sensor without touching the sink. The tissue will rotate for 1.5 seconds to dry hands and monitor the soap through the smartphone. This research work has successfully presented functional water, soap, and tissue dispenser in a touch-less system with the soap-monitoring system, which is usable in public places, especially in the restaurant

Keywords: Covid-19 virus, touch-less system, soap-monitoring system, microcontroller

1.0 INTRODUCTION

In early 2020, the world was shaken by a virus that spread throughout the world, and the virus was named coronavirus or covid-19. The first identification of coronavirus is at the end of the year 2019 in China. The WHO announced that the outbreak Public Health Emergency of International Concern is on January 30 2020 and announced the virus as a pandemic on March 11. The whole world is currently battling with coronavirus and Malaysia is the country that also battling with coronavirus. Based on the study made, people can be infected with coronavirus by touching the surface contaminated with the virus and then touching their mouth, nose, and eyes. So, wash hands frequently with soap and water is one of the best ways to prevent the coronavirus spread. But in the public, all the people will touch the sink to make water flowing and here the virus can spread to all people who touch the sink if one of them is infected with coronavirus

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to make water flowing and here, the virus can spread to all people who touch the sink if one of them is infected with the coronavirus.

The idea of the project is to make a touch-less system that allows dispensing soap and water to wash hands. The project is called an Automatic Water/Soap Dispenser and Self-Tissue Dispenser and to make the water and soap flowing, simply show your hands to the sensor. The system also has a self-tissue dispenser to make hands dry after people wash their hands. The project's main component is Arduino Uno R3, NodeMCU, Ultrasonic Sensor, Water and Soap Pump, and Power Supply. The monitoring system for soap also has been installed in the project to monitor the soap quantity through a smartphone using a Wi-Fi connection. So, the project is to prevent people to touch the sink and can help to reduce the spread of the Covid-19 virus

2.0 LITERATURE REVIEW

Austin Ikechukwu, Okeke Ogochukwu Clementina, and Chima Lazarus Onyebuchi proposed auto washing and drying hand by using the photoelectric sensor. The sensor detected the hand and activate the water and also the heater to dry the hand. Similarly, Hurriyatul Fitriyah, Edita Rosana Widasari, Eko Setiawan, and Brian Angga Kusuma developed the auto faucet to wash hands which can be

easily used by elderly people. The advantage of this system is that the water and soap flow simultaneously. The components that are used in this system is an infrared proximity sensor, microcontroller AT8353, motor, LED lamp, buzzer.

M. M. Srihari proposed a touch-less system for automatic hand sanitizer to prevent the spread of coronavirus disease. In this system, the components used are IR detector, Battery Management Modes, 3.7V battery, control system, LED, 5V 1A adaptor, and pump motor. The IR Detector is to detect the human hand for touchless sensor and the LED use to show that the detector has already powered up the module. Then, the control system is to control the process of the system because the control system has the components which are transistors that are connected to the other components such as the water pump, and sensor. There are three (3) types of modes that control the LED to show the user about the identification of the system. For example, when the system is using battery mode, the white LED will be activated. For another LED is green which shows when the battery is already full and a red LED shows the system in charging state.

V.Sri Ram, V.Tharun, and A.Vandana proposed a system that uses float less water level sensor to prevent the wastage of water without the presence of the operator. The proposed system can control the water tap accordingly when the sensor senses the lower-level water tank. The main components used in this system are Arduino UNO, IR sensor module, relay, and water tap control. The power supply using a 5V regulated power supply based on the LM7805 voltage regulator. The IR sensor module detects the presence of hands while the user wants to open the water. The solenoid valve is used in this project to open and close the water after the IR sensor senses the hands.

3.0 MATERIALS AND METHODS

The idea of the project is to make a touch-less system that allows dispensing soap and water to wash hands. The user only needs to place the hand under the faucet and the water will flow automatically. When the user needs to use soap, the user only places the hand under the soap container and the soap will drop automatically. Finally, the system also has a self-tissue dispenser to make hands dry after people wash their hands. The monitoring system for soap also has been installed in the project to monitor the soap quantity through the smartphone. So, the project can prevent people from touch the sink.

A. Methodology

The proposed project will be more towards used in public places, especially in the restaurant. All people need to through three (3) steps to wash their hands which are using soap, wash hands for 15 seconds, and take the tissue to dry their hands. The added function to monitor the quantity of soap through smartphones is implemented in the project. All the touchless systems are using ultrasonic sensor which is the electronic device that measures the distance of target object by emitting ultrasonic sound waves.

B. Materials

This project consists of several materials that are important to complete the system process. The main components used to make the Automatic Water/Soap Dispenser and Self-Tissue Dispenser project works are ultrasonic sensor, Arduino UNO, water pump, soap pump, servo motor, and battery 12V power supply.

The Soap Monitoring System has several components that are important to complete the system process which is ultrasonic sensor to calculate the quantity of soap, NodeMCU as a microcontroller to connect the Wi-Fi connection, and LiPo battery to supply the NodeMCU and ultrasonic sensor. The hardware requirement for the system is any smartphone in the market either android or IOS because the important thing is can connect to the Wi-Fi connection and download the Blynk application.

C. Block Diagram

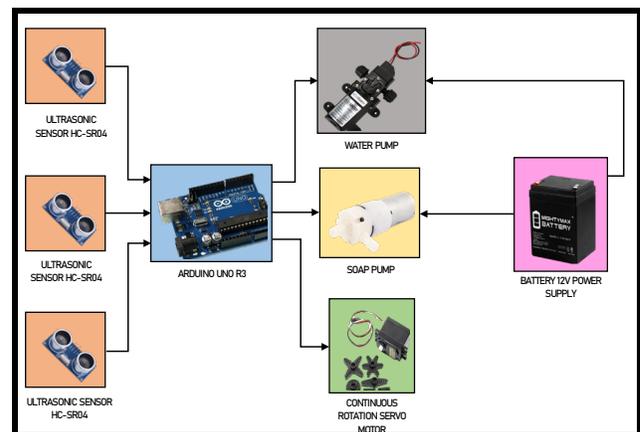


Figure 1: Block Diagram of Automatic Water/Soap Dispenser and Self-Tissue Dispenser

Figure 1 shows the role of components and describes the component that used for the project. In this project, the Arduino Uno is the microcontroller that controls the process of the system. The ultrasonic sensor will sense the movement of hands and the Arduino will receive and send commands to make the water, soap, and self-tissue dispenser activate. The water pump and soap pump are

powered by a battery 12V power supply directly to make the water dispenser and soap dispenser works.

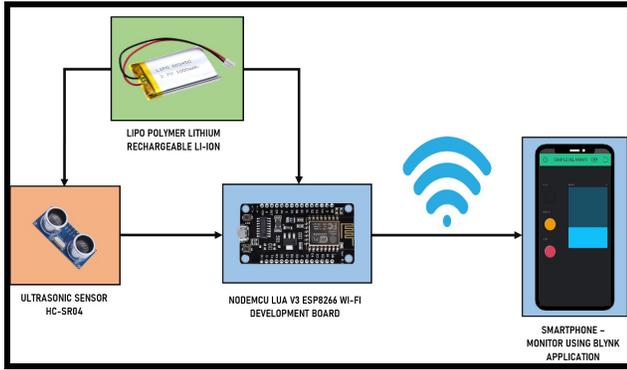


Figure 2: Block Diagram of Soap Monitoring System Using Blynk Application

Figure 2 shows the components used for the soap monitoring system using the Blynk application. The ESP8266 Wi-Fi module use as a connection to a Wi-Fi network and microcontroller to send and received commands to a smartphone through the Blynk application that monitors the quantity of water. The ultrasonic sensor is used to sense and calculate the distance of water. The LiPo battery is used as the power supply for the ultrasonic sensor and ESP8266.

3.0 RESULTS

The project has divided into two (2) system which is Automatic Water/Soap Dispenser and Self-Tissue Dispenser has and Soap Monitoring System as described below:

A. Automatic Water/Soap Dispenser and Self-Tissue Dispenser System

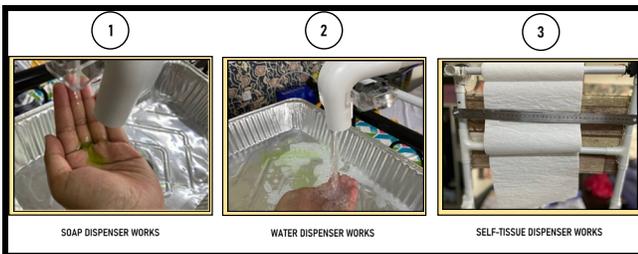


Figure 3: The Soap Dispenser, Water Dispenser and Self-Tissue Dispenser Works

The first result process is the soap dispenser that dispenses the designated amount of soap which is between 0.7ml to 1ml when hands are placed in the proximity of the sensor. The designated amount of soap also to make sure no waste

of soap happens and use the soap can help to lift microbes from the skin.

Then, the water dispenser that makes clean water flowing to wash hands. The water dispenser will dispense the water when hands are placed in the proximity of the sensor as shown in Figure 3. The water will come out for 15 seconds after placing hands in the proximity of the ultrasonic sensor and water will stop automatically after 15 seconds.

The self-tissue dispenser that using a servo motor that rotates 180° degrees in 2 seconds to release the tissue when hands are placed in the proximity of the sensor as shown in figure 3. The tissue is used to make hands dry after washing hands and dry hands thoroughly after washing hands.

B. Soap Monitoring System

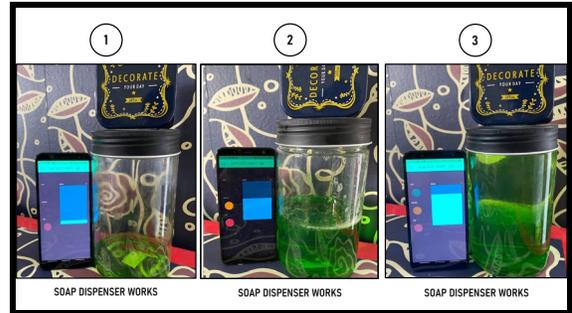


Figure 4: Soap Monitoring System Works

Figure 4 shows that there is three-level of quantity which are low, medium, and high follow the quantity of soap. The level of soap can be monitor using the Blynk application in smartphones using a Wi-Fi connection.

4.0 DISCUSSION

The Automatic Water/Soap Dispenser and Self-Tissue Dispenser are an improvement project from the previous research and add a new function in the project to achieve the objective. The improvement in the project is to implement the touch-less system in the function of the soap dispenser, water dispenser, and self-tissue dispenser. Then, the new function that adds to the project is a soap-monitoring system that allows monitoring the quantity of soap through a smartphone. The quantity of soap in the container does not visible that causes the soap not to be filled on time.

5.0 CONCLUSION

The goal of the project is to increase the awareness of people in the community to the importance of proper washing hands and to make sure people can reduce the spread of Covid-19. The touch-less system of washing hands can be a huge help to prevent the spread of Covid-19 or any virus that can infected people through contaminated objects or surfaces. At the same time, people can make sure their hands are clean from bacteria and viruses even in public places which always share the sink to washing hands. The soap-monitoring system is the function that implements to prevent the soap runs out without being filled and can refill the soap on time because the quantity of soap can be monitored from a smartphone.

REFERENCES

- [1] Ikechukwu, G., Clementina, O., & Onyebuchi, C. (2014, July 01). “*Design and Characterization of Automatic Hand Washing and Drying Machine*”, Annals of Combinatorics 6(4):123-134, July 2014.
- [2] Tarun, D., “*Automatic Handwash & Automatic Control by Pir Module*”, TCRLS, November 11, 2020.
- [3] Department of Health & Human Services, “*Handwashing - why it's important*”, November 2015, <https://www.betterhealth.vic.gov.au/health/conditionsandtreatments/handwashing-why-its-important>
- [4] Fitriyah, H., Widasari, E., Setiawan, E., & Kusuma, B., “*Interaction design of automatic faucet for standard hand-wash*”, MATEC Web of Conferences. 154. 03003, February 2018, doi:10.1051/mateconf/201815403003
- [5] Ellen W. Evans, “*Most people don't wash their hands properly – here's how it should be done*”, July 2020, <https://theconversation.com/most-people-dont-wash-their-hands-properly-heres-how-it-should-be-done-125330>
- [6] M. M. Srihari, “*Self-Activating Sanitizer with Battery Imposed System For Cleansing Hands*”, 2020 Second International Conference on Inventive Research in Computing Applications (ICIRCA), Coimbatore, India, 2020, pp. 1102-1105, doi: 10.1109/ICIRCA48905.2020.9183347