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AUTOMATIC HAND SANITIZER DISPENSER

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ABSTRACT

COVID pandemic has influenced human life in various sectors. Various attempts were made to scale back the virus transferring by work from home, social distancing, and also including hand hygiene. So far, most of the available hand sanitizers don't operate automatically. this text 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 bent the smartphone. The infrared (IR) will sense the presence of warmth and motion of the object with the distance up to 50mm. It send data to the Arduino Nano to activate the pump. If the ultrasonic sensor detect the space of water to he sensor 35 cm it will send data to node MCU that connect to Blink server. It can transfer the info to the output devices such as smartphones or PC 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.

Keywords: Automatic Hand Sanitizer, Infrared Sensor, Ultrasonic Sensor.

I. INTRODUCTION

In early 2020, an epidemic emerged that was spreading rapidly to several countries. the primary case related to the virus was reported in Wuhan, Hubei Province [1]. WHO named this disease the 2019 novel coronavirus (2019-nCoV), then changed its name to Coronavirus Disease (COVID-19) which was caused by the virus of Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-Cov-2) [2]. This virus is zoonotic (a virus that's transmitted between animals and humans) and originates from bats [3]. Besides, this virus also can be transmitted from humans to humans [4]. Coronavirus are often transmitted either by air, direct contact, or indirectly. However, it's most commonly spread by droplets. Symptoms caused by this virus include the mild flu, namely a chilly , pharyngitis , cough, fever, and difficulty breathing. In severe cases, Covid-19 can manifest as pneumonia. Patients can develop acute respiratory distress syndrome for a brief time and die from multiple organ failure [5].

The existence of this disease features a big impact on both socials and economics. WHO has declared this a pandemic disease and lots of cities around the world are in a lockdown situation. to stop the cause of this virus, it are often done by keeping a distance at least 1 meter, avoid visiting crowded places, avoid touching the eyes, mouth, and nose when outside, and cleaning hands with soap or alcohol-based hand rub [6]. Providing containers for cleaning fluids publicly spaces is a form of Covid-19 prevention, but the supply of containers is currently ineffective because there are parts that are often touched. this might be a point of transmission for Covid-19. Many health actions are administered using automatic systems including air quality monitoring [7], hand sanitizers [8][9], hand hygiene [10],[11]. Hand sanitizers are an alternate for washing hands during a pandemic. It are often used when and water are not available. Hand sanitizer is additionally available in several forms such as liquid (spray) or gel [12]. Hand sanitizer is typically made from materials such as alcohol, polyacrylic acid, glycerin, propanediol , or plant extracts [13]-[14]. the method of killing germs starts with removing the oil on the skin, then the bacteria within 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 [15].

So far, most of the available hand sanitizers don't operate automatically. this text 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 bent the smartphone. The infrared (IR) will sense the presence of warmth and motion of the object and send data to the Arduino Uno so that it can activate the pump. If the water height is a smaller amount than 10 cm, the ultrasonic sensor will send data to node

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ESC8266 as a Wifi microcontroller to the output devices like smartphones or PC 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.

II. LITERATURE SURVEY

In [1], the paper mainly says about the hospital grasped ,infections, which is about 2 Million Patients per year and also says that it is 8th leading cause for deaths annually in USA. It also says that handwashing is important and also effective with proper hand washing steps, but washing with soap and water is time consuming for peak hours in hospitals. This paper also showed the effectiveness of the alcohol based hand sanitizers, which reduced infection rates by whopping 30%. They used hand sanitizers with 60 to 70 percent ethanol or isopropanol for reducing significant number of pathogens. The patients were also given about 4.25 ounce containers of hand sanitizer alongside their bed

III. METHODOLOGY

Several steps were carried out in this research to test the Automatic hand sanitizer container has shown in Figure.1. Due to the spread of Covid desease, first we analyse the importance of environment needed for automatic hand sanitizer. The second step we make the literature study about the related article. We design the hardware, examine the product and report the result

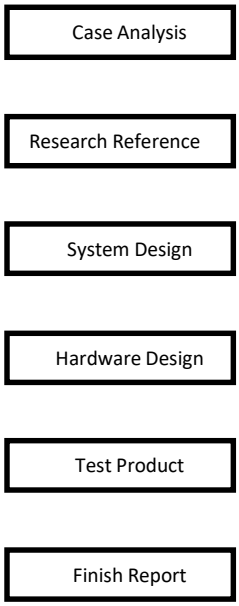

Figure 1: Flowchart Automatic hand sanitizer container

IV. SYSTEM DESIGN

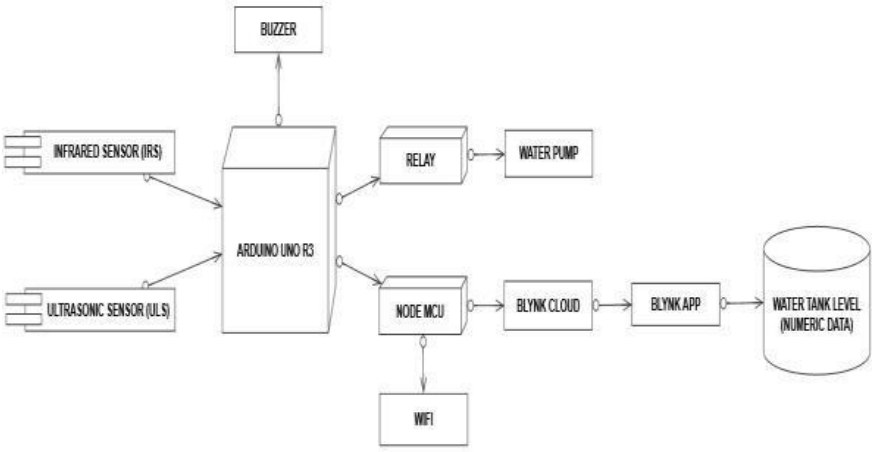

Figure 2: System design automatic hand sanitizer Dispenser.

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Figure 2 demonstrates the design of the Automatic hand sanitizer container system consisting of block an infrared sensor and an ultrasonic sensor. If the infrared sensor sense the motion of hand, it will send data to Arduino. Arduino send data to the relay to activate the water pump. If the distance of water from sensor up to 35 cm in the clean water container, the sensor will send data to Arduino. Arduino will transfer data to the node MCU as connectivity to a Blynk server. The Blynk App connected to the node MCU. It sends a notification to the user that the water is empty.

V. HARDWARE DESIGN

The circuit scheme can be shown in Figure 3 and Figure 4.

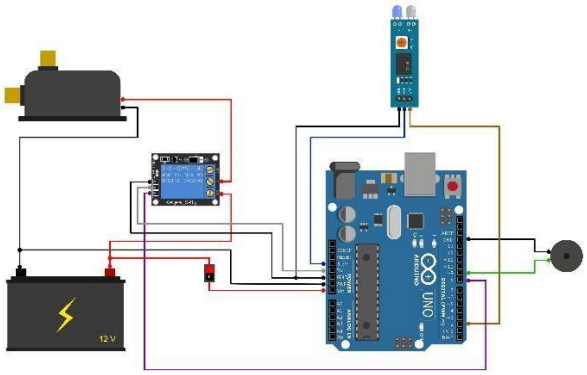

Figure 3: Arduino IR sensor and buzzer circuit

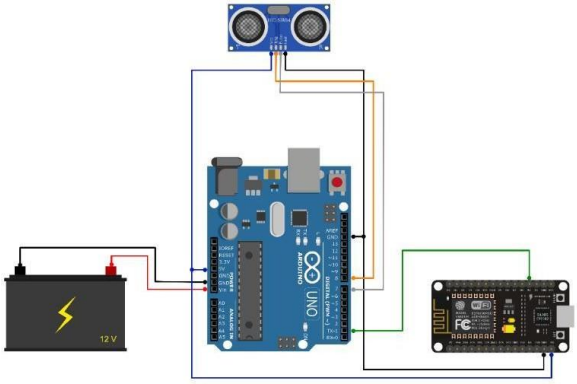

Figure 4: Arduino node MCU ultrasonic circuit

The circuit in this research has two systems that can work simultaneously. In Figure 3, if infrared (IR) senses heat and motion of objects, it will send data to the Arduino Uno so that it can activate the spray pump and the cleaner reaches the hand through a small pipe.

The sensor connected to the Arduino will start working when the device is activated. The ultrasonic sensor in this circuit is used to detect the distance to an object. The circuit in Figure 4 works when the water level is less than 10 cm, the ultrasonic sensor will send data to the node MCU which will then be sent to an output device such as a PC or smartphone as a Wifi microcontroller.

VI. NODE MCU

The NodeMCU (Node MicroController Unit) is an open-source software and hardware development environment built around an inexpensive System-on-a-Chip (SoC) called the ESP8266. The ESP8266, designed and manufactured by Espressif Systems, contains the crucial elements of a computer: CPU, RAM, networking (WiFi), and even a modern operating system and SDK. That makes it an excellent choice for Internet of Things (IoT) projects of all kinds.

VII. RESULTS AND DICUSSIONS

Figure 5 shows a flow chart of the Automatic hand sanitizer container which will automatically dispense water and fill the tank for the hand sanitizer process.

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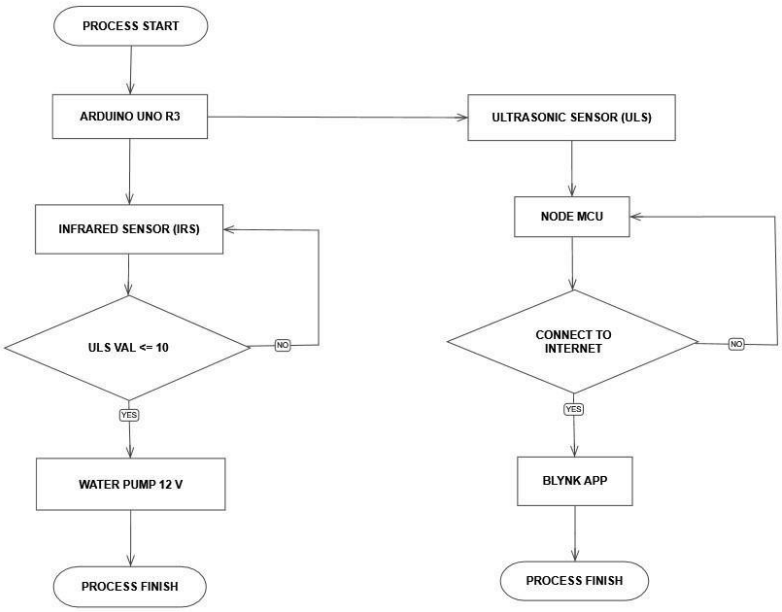

Figure 5: Flow chart automatic hand sanitizer dispenser

The flow chart shows a program that is loaded into the microcontroller. Figure 5 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.

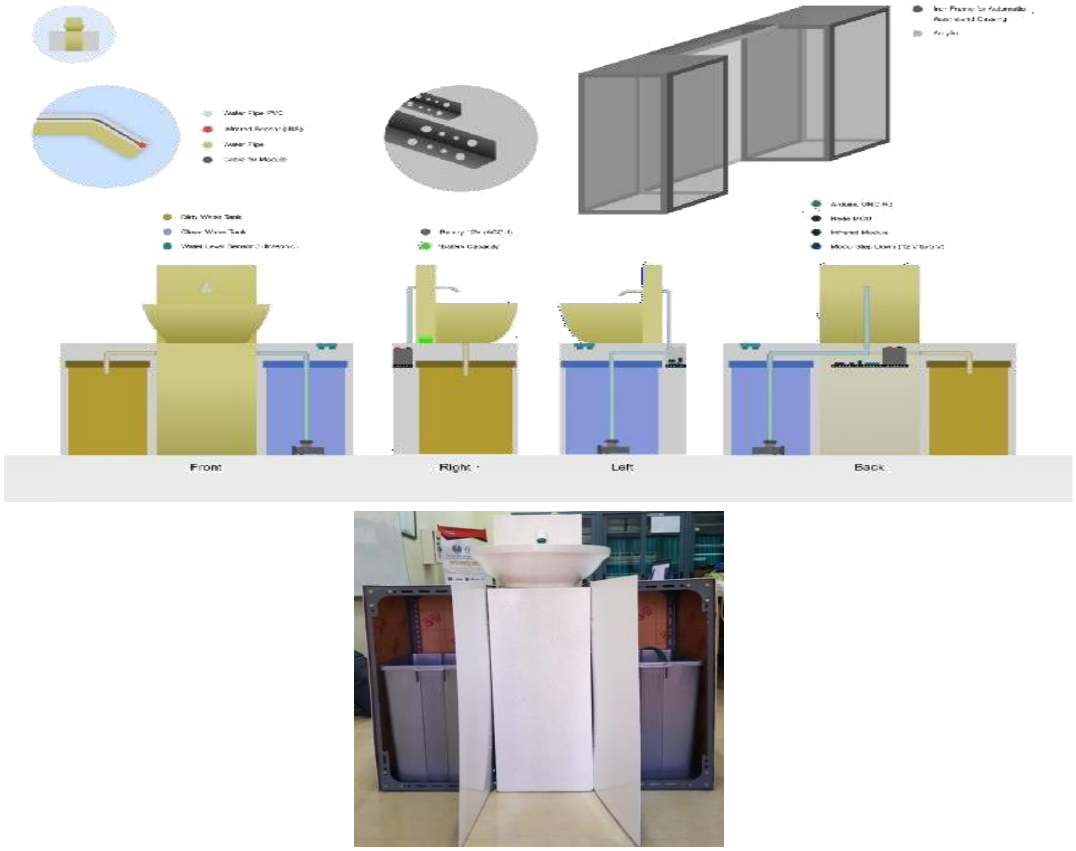

Figure 6: Design automatic hand sanitizer dispenser

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

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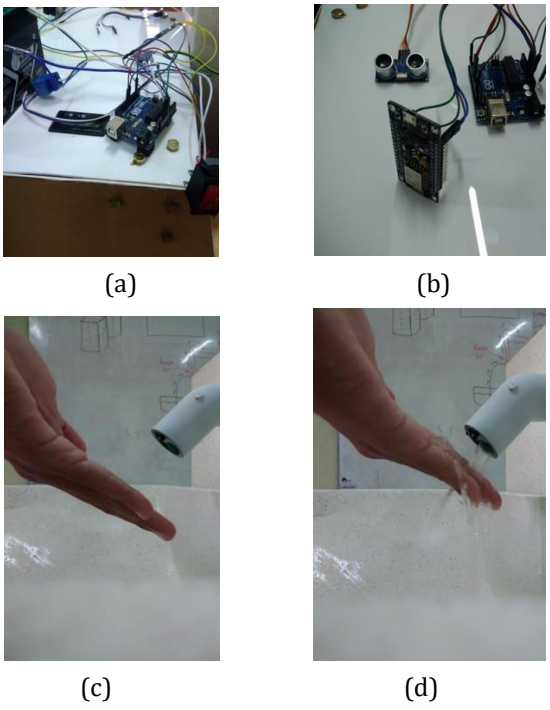
from the ultrasonic sensor will send to Arduino. Processed by Arduino and transferred to the node MCU as connectivity to a Blynk server. Then Blynk App can be connected to the node MCU to get the data that has been sent to the Blynk server. And that application gets to send a notification if the clean 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.

Besides, the infrared sensor connected with the microcontroller will work automatically detect heat and object motion. When the input gets a signal, the water will come out automatically through the pump. This can prevent the spread of bacteria or viruses because there is no need to touch the water(a) pump directly. To find out the results of the ultrasonic sensor system, this research has (b)conducted seven experiments. With an experimental distance of 10 mm to 70 mm.



(a) (b)

(c) (d)

Figure 7: (a) Ultrasonic sensor system, (b) Infrared sensor system, (c) Experimental result of infrared sensor for left > 50 mm (d). Experimental result of infrared sensor for right < 50 mm

Table 1. Hand Distance Experimental Result Of Infrared Sensor

Distance(mm)	Sensor Information
10	Sensor Detection
20	Sensor Detection
30	Sensor Detection
40	Sensor Detection
50	Sensor Detection
60	Sensor not Detection
70	Sensor not Detection

From the Table 1, it has been set on the work sensitivity of the infrared module, by adjusting it according to the hand distance requirements of the infrared sensor. When experimenting with the tool, the object (hand) has degrees of 0° thus the object to the infrared sensor is in a parallel position.

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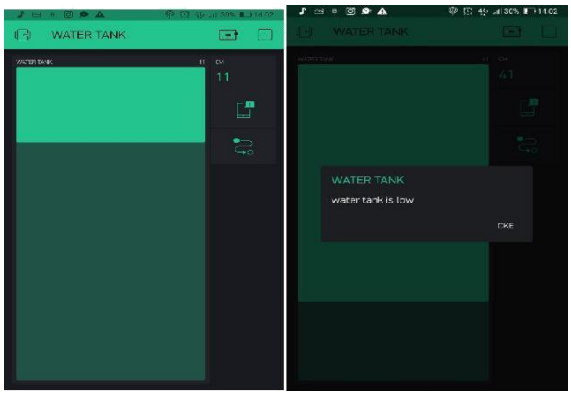

Figure 8: Application design (Blynk app) for monitoring clean water tank

In this display, the user can monitor the contents of the clean water tank. The way this monitoring work is by using an ultrasonic sensor to detect the water level in the tank. The data from the ultrasonic sensor will be processed by a microcontroller in the form of an Arduino. Processed by Arduino and transferred to the node MCU as connectivity to a Blynk server. Then Blynk App can be connected to the node MCU to get the data that has been sent to the Blynk server. That application gets to send a notification if the clean water tank has been low. With information "Water Tank is LOW".

VIII. CONCLUSION

Based on the testing result and discussion, it can be concluded that the results of the automatic hand sanitizer testing can run smoothly with a minimum detection error of transferring data. Infrared can detect the motion up to 50mm and ultrsonic sensor can detect the level of water with the distance to the snsor 35 cm. Ultrasonic sensor can send data to the MCU and Blink server and send notification to the user. So that it canbe conclude that the system can work smoothly that can prevent the spread of Covid-19.

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