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AUTOMATED FUMIGATION FOR CORONA VIRUS DISEASE

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Abstract

The SARS-CoV-2 virus, which is the source of the Corona Disease Virus 2019 (COVID-19), has spread across the nation, including Malaysia. Environmental surfaces are particularly prone to COVID-19 viral infection in healthcare settings when certain medical procedures are carried out. As a result, these surfaces must be adequately cleansed and disinfected to prevent additional transmission, especially when COVID-19 patients are being cared for. The goal of this project is to design a fumigation device in reducing of Corona Virus for decontaminate close area using microcontroller system for autonomous disinfecting robot. The effectiveness for this project shown that it is successfully can be used for different areas automatically even at long distances by using automated fumigation. Furthermore, the project system uses the Internet of Things (IoT) through a mobile application which, it greatly simplifies the user through control on a smartphone.

Keywords: COVID-19, fumigation, autonomous robot, Internet of thing (IOT).

1. Introduction

The novel coronavirus disease 2019 (COVID 19), a novel pneumonia disease originating in Wuhan, was confirmed by the World Health Organization on January 12, 2020, before becoming an outbreak in all countries. The wave of COVID-19 spread in Malaysia has 3 in total. The first wave begins in February. The second wave began in March

. The positive case continues to rise and the third wave, which starts in early October (World Health Organization, 2020). The group of cases who get COVID-19 will have mild to moderate symptoms and will recover without any increase in potential.

When an infected person coughs, sneezes, speaks, performs, or breathes, the virus spreads in microscopic liquid particles from their mouth or nose (World Health Organization, 2020). On the other hand, they will become seriously ill and require medical attention. The virus is more easily disseminated indoors and in crowded places (Leonardo, 2019).

This project designs and develop an automated fumigation device using Internet of Things (IOT) that users can perform the device individually from mobile phone. Although coronaviruses may survive on surfaces for hours, they are immediately destroyed by cleaning and disinfection. Regularly cleaning frequently touched surfaces with a detergent solution is advised, as is cleaning frequently used fittings and surfaces as quickly as spills are visible to the human eye (Australian Government, 2020).

Figure 1: Block diagram of cleaning and disinfection

Physical cleaning with detergent and water is advised for general cleaning. Other than that, it is suggested to regularly clean the floor using detergent and water (Health et al., 2020) Follow the directions on the package and use warm water and a neutral detergent to clean most hard surfaces.

Figure 2: General cleaning

Disinfectants are chemicals that immediately destroy or render the majority of infectious agents inactive. For this disinfection, it is necessary to clean floors that have been contaminated with many resistant species, organisms that have the potential to spread an epidemic, and other potentially contagious materials like blood and other body fluids that have been spread on the floor (Health et al., 2020).

Figure 3: Disinfection Processing

2. Methodology

This chapter explains how to developed this project effectively, including the processes required. Design the mechanical components of automated fumigation devices, as well as block and flow diagrams of operating systems and the IoT systems needed for these devices.

2.1 Design the mechanical part and component of Automated Fumigation device.

Figure 4 shows the Automatic Fumigation Device. It was designed with Thinkercad. A free online application for 3D design, electronics, and coding is called Tinkercad.

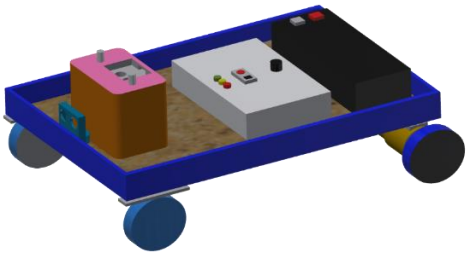

Figure 4: Mechanical Design of Automated Fumigation using Tinkercad

2.2 Developing the hardware and Internet of Things (IoT) application for Automated Fumigation.

The circuit installation system of the automated fumigation device is shown in Figure 5. The ESP32 Wi-Fi module performs the role of a device controller and may be programmed using the Arduino IDE. Driver motor to control the device's movement.

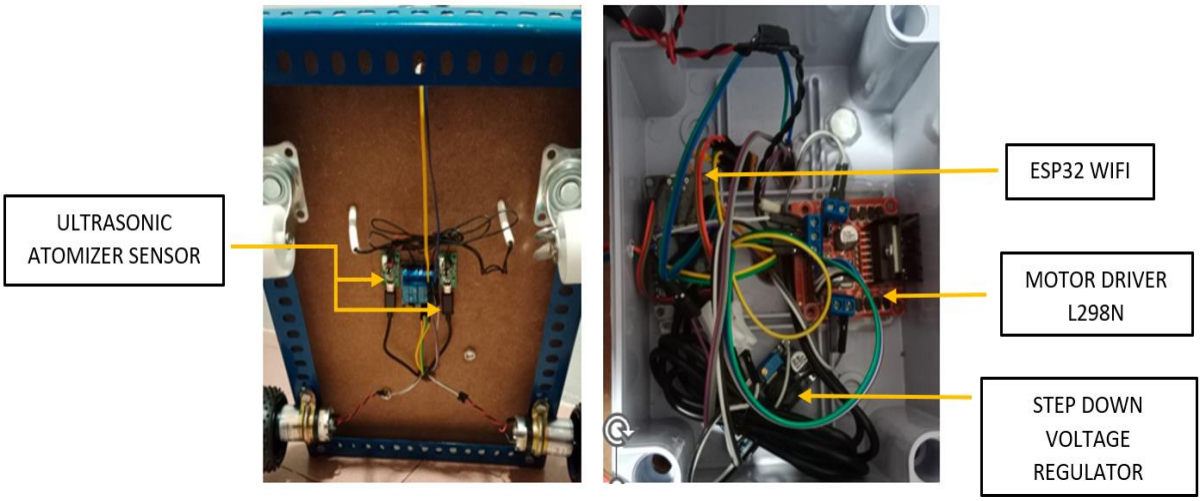

Figure 5: An Automated Fumigation device circuit installation

Figure 6 had showed the development of electronic and mechanical part of Automated Fumigation device. The main components of the device in this project are the ESP 32 Wi-Fi module where it is connected to the application Blynk, the motor driver that controls the movement of the device, the 12v battery

which will be the power supply for the movement of the device, the atomizer sensor as the component that converts the sanitizer liquid to fumigation, and the ultrasonic sensor as the component that detects the distance of the device from obstacles.

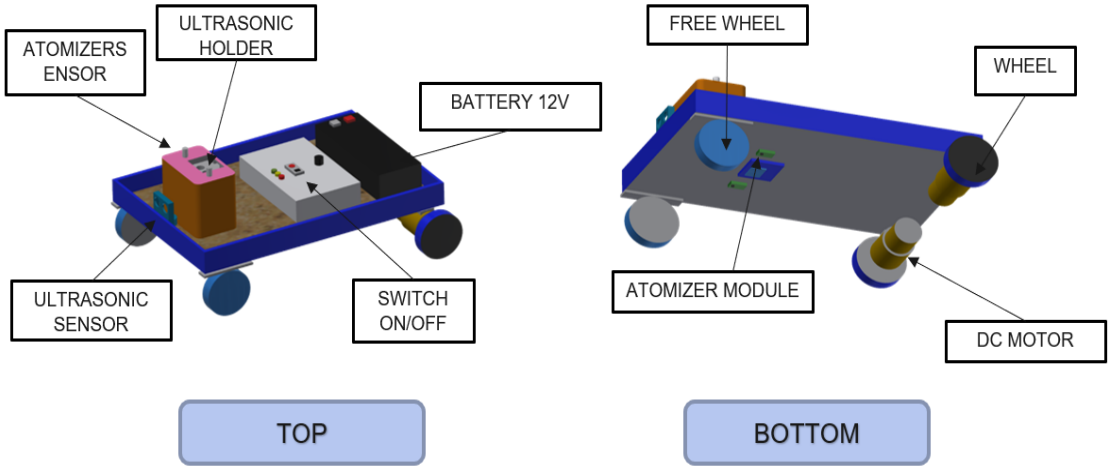

Figure 6: Development of mechanical and electrical components for Automated Fumigation device

Referring to Figure 7, the interface of Internet of Things (IoT) application for Automated Fumigation device. Blynk was created to be used with the Internet of Things. For IOS and Android system users, the Blynk programme is simple to download and has many fascinating features, including the ability to remotely operate devices, display sensor data, store data, and visualise it. Based on Table 1, which describes each button's use in the Blynk programme when the device is in use.

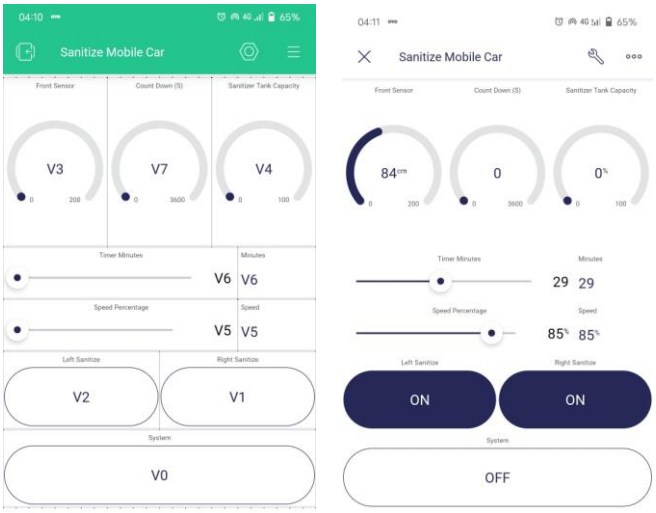

Figure 7: Interface of Internet of Things (IoT) application for Automated Fumigation device

Table 1: Function of the Blynk application button

NO	Button
V0	Button on and off for device
V1	Button on and off for sensor atomizer on right
V2	Button on and off for sensor atomizer on left
V3	Display value of distance in centimeter (cm)
V4	Display volume sanitizer tank in percentage (%)
V5	Slider for adjusting speed percentage (%)
V6	Slider for adjusting timer in minutes
V7	Display timer in second

2.3 Block Diagram of the Operating System

The block diagram displayed inn Figure 8. The system's operation is represented by the three part of the diagram which is inputs, process, and outputs. This device is meant to help with disinfection by getting rid if fumigation.

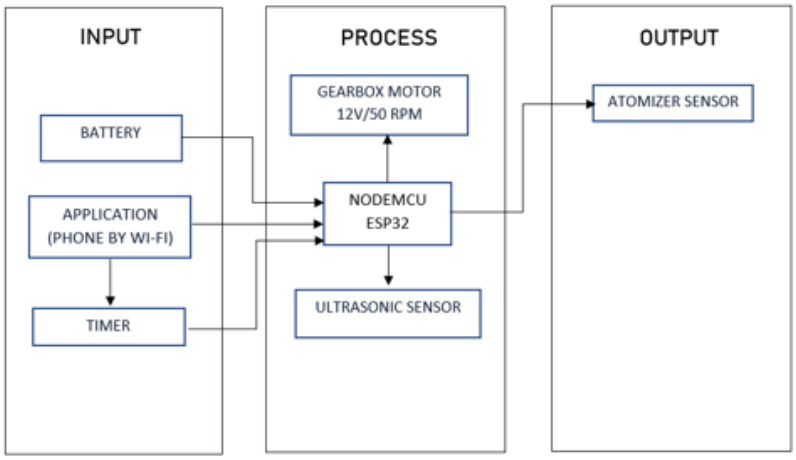

Figure 8: Block Diagram of Automated Fumigation device

2.4 Making Flow Chart of the Operation Device

The automated fumigation procedures used to treat coronavirus infections are shown in the flow chart in Figure 8. The given button will turn the device on, and it will then establish a wireless connection with the Blynk app. By using a mobile phone, users may change the desired time. When the timer ends, the device will shut off automatically.

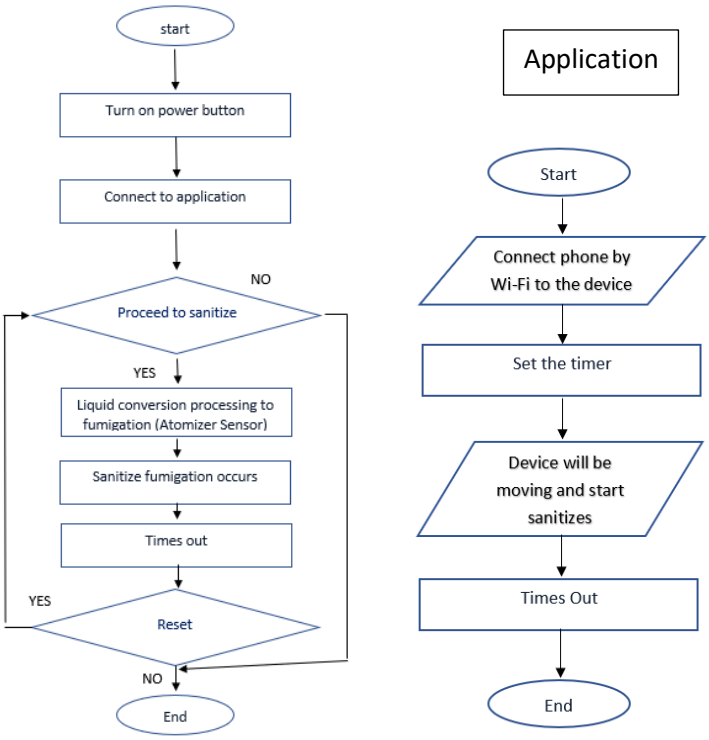

Figure 10: Flow Chart of Automated Fumigation device and application

3. Result and Discussion

Results from testing the performance of the device are collected after the completion of the final hardware prototype. To analyse the Automated Fumigation device's usability, hardware and software tests were conducted an experiment device are used to collect data.

3.1 Experiment on Living Room

Figure 9 shows the living room in this collection is modest, measuring approximately 12 by 18 feet. There is data collection for three distinct speeds, including 100% speed, 60% speed, and 30% speed. This test involves adjusting the speed and duration of operating the sanitising tank (percent), shows in Table 2.

Figure 11: Experiment of the hardware and software of the device on medium living room

Table 2: Comparison

Speed (%)	Timer (Minutes)	Sanitizer Tank % (Before)	Sanitizer Tank % (After)
100 %	20	80%	78%
	40	78%	74%
	60	74%	65%
60 %	20	80%	78%
	40	78%	75%
	60	75%	66%
30 %	20	80%	78%
	40	78%	74%
	60	74%	66%

As shown in Table 2, reducing the percentage of sanitizer tank by 2% in 20 minutes works to disinfect even when running at different speeds. The tank sanitizer volume is reduced by only 2% at speeds of 100%, 60%, and 30%. 4 percent, the sanitizer tank is reduced when the set time is 40 minutes. The remaining 8% of the sanitizer tank that was disinfected within 60 minutes.

The purpose of this correlation test between speed and water tank is to evaluate the ability of speed to reduce tank senizer fluid. But as can be shown, the difference in speed does not affect the amount of liquid reduced in fact, the liquid decreases the effect of the time used. Therefore, the more time it takes to remove the device, the more liquid is reduced from the tank.

4. Conclusion

Automatic fumigation devices have been designed to decontaminate enclosed spaces while reducing coronaviruses. This disinfection robot microcontroller system is an autonomous device. In addition, the device is set up to be controlled via the Internet of Things (IOT), which is accessed through the Blynk app. The effectiveness of automatic fumigation for this infection was evaluated according to the speed, time, and percentage of the sanitizer tank. The longer it takes for fumigation to disinfect, the more sanitizer liquid in the tank is reduced. So, germs in the room are also eliminated a lot, and it will not have a bad effect on humans.

5. Acknowledgment

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