

## Design of Automatic Hand Sanitizer During the Covid 19 Pandemic

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### ABSTRACT

At the beginning of 2020, the world was shocked by an incident of severe infection with unknown causes, which started with a report from China to the World Health Organization (WHO). Coronavirus is an RNA virus with a particle size of 120-160 nm. The effort to prevent the spread of the coronavirus is by maintaining cleanliness and health, by implementing health protocols (wearing a mask, washing hands, and keeping a distance). An innovation to break the chain of transmission of the coronavirus is to create an automatic hand sanitizer, a technology designed with the main components Arduino UNO, ultrasonic sensors, and servo motors to reduce interaction between humans in using hand sanitizers without touching a hand sanitizer pump. The purpose of designing an automatic hand sanitizer during the Covid 19 pandemic is to reduce the spread of the coronavirus and make hand sanitizers automatic and practical. The methods used include problem analysis, tool design, and planning, tool making, testing, and evaluation. This automatic hand sanitizer is for the community to minimize transmission by not touching the hand sanitizer container in public places.

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### INTRODUCTION

At the beginning of 2020, the world was shocked by the incidence of severe infection with unknown causes, which started with a report from China to the World Health Organization (WHO) that there were 44 patients with severe pneumonia in an area, namely Wuhan City, Hubei Province, China (Davies, 2002). Covid-19 was first reported in Indonesia on March 2 2020 with a total of two cases. Data for March 31, 2020, showed that there were 1,528 confirmed cases and 136 deaths. Coronavirus is an RNA virus with a particle size of 120-160 nm. The virus primarily infects animals, including camels and bats. Before the Covid-19 outbreak, there were 6 types of corona viruses that could infect humans, namely alphacoronavirus 229E, alphacoronavirus NL63, betacoronavirus OC43, betacoronavirus HKU1, severe Acute Respiratory Syndrome coronavirus (MERS-COV) (Susilo et al., 2020).

Covid-19 has symptoms similar to influenza (Gorbalenya et al, 2020; Lin et al, 2020), however, this virus develops faster, causing more severe infections and causing organ failure (Maksum, 2020). Common features of infection include respiratory symptoms, fever, cough, shortness of breath, and difficulty breathing. In more severe or more severe cases, an infection can cause pneumonia, acute respiratory syndrome, kidney failure, and death. Based on official documents from the Ministry of Health, a person can be infected with the

Coronavirus if they touch a surface or object that is affected by droplets, then touch their mouth, nose, or eyes (Menkes RI, 2020)(Setiawan & Pritivi, 2020). To overcome this problem, the government urges people to work and study from home and diligently wash their hands with soap or diligently use hand sanitizers to prevent viruses from sticking to the body which may be in someone's hands (Dewey, 1958).

Hand sanitizer is a hand sanitizer that is equipped with a function to prevent or inhibit and kill bacteria on the hands (Maharani et al., 2021). Hand sanitizer is one of the antiseptic ingredients commonly used by the public as a practical hand-washing agent. Using hand sanitizers is more effective and efficient than using soap and water so people are more interested in using hand sanitizers (Noval et al., 2020). According to Diana (2012), hand sanitizer is divided into two, the first is hand sanitizer spray and the second is hand sanitizer gel. Hand sanitizer gel is a hand sanitizer in the form of a gel and has the benefit of sterilizing or eliminating bacteria on the hands, has an active alcohol content of up to 60%. Hand sanitizer spray is a hand sanitizer in the form of a spray to sterilize or eliminate bacteria on the hands which has the active ingredient niganas, DP 300: 0.1% and 60% alcohol. Diana's research revealed that hand sanitizer spray is a sanitizer that will be effective for use to reduce the spread of bacteria on hands (Maharani et al., 2021).

Research on the effectiveness of hand sanitizers that can kill germs and bacteria has been carried out by several researchers, including the use of hand sanitizers used in Saudi Arabia against bacteria (Bherlinda & Kartika, 2021). The use of hand sanitizers is generally still mostly applied manually, namely by pressing the pump on the cap of the hand sanitizer bottle. Rapid and increasing technological advances have made people think and innovate to create a design, namely an automatic hand sanitizer. With this automatic hand sanitizer tool, it can make it easier for all of us to control hand hygiene without touching the hand sanitizer.

To fulfill this, we need an automatic hand sanitizer tool and a practical body temperature meter. The Arduino UNO microcontroller, ultrasonic sensor, and this tool are equipped with a water pump and buzzer to control the system.

Arduino or Genuino is an electronic prototype for microcontroller chips that are open source and open hardware (Tafrikhatin & Dwi Sri Sugiyanto, 2020). The hardware has an Atmel AVR processor, the software consists of several tools, namely the Integrated Development Environment (IDE), Text-editor, compiler, serial monitor, and serial ISP programmer. Arduino Mega originally used the ATmega1280 chip and was later replaced with the ATmega 2560 chip, because the name was changed to Arduino Mega 2560(Kri, 2021).

An ultrasonic sensor is a sensor that functions to convert physical quantities (sound) into electrical quantities and vice versa (Tafrikhatin & Dwi Sri Sugiyanto, 2020). The way these sensor works is based on the principle of the reflection of a sound wave, where this sensor produces sound waves and then captures them back with a time difference as the basis for sensing (García Reyes, 2013).

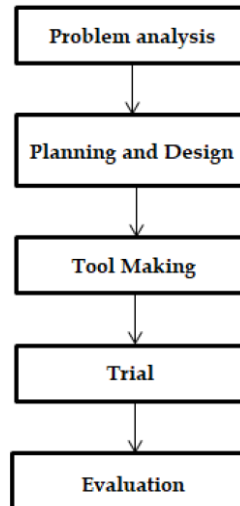
Servo motors are a type of actuator that is widely used in industry and robotics (Tafrikhatin & Dwi Sri Sugiyanto, 2020). This motor consists of a motor, a series of gears, a potentiometer, and a control circuit. The potentiometer functions to determine the limit of servo rotation. Meanwhile, the angle of the servo motor axis is set based on the pulse width sent through the signal leg of the motor cable (Hilal & Manan, 2015). A series of gears attached to the DC motor shaft will slow down the rotation of the shaft and increase the torque of the servo motor (Setyawan et al., 2018).

The purpose of this research is to reduce the spread of the coronavirus and make automatic and practical hand sanitizers. The benefit of this research is to reduce direct contact with many people when using hand sanitizers in public places. So that it can prevent the transmission of the coronavirus.

## **METHOD**

Implementation of this community service activity, namely by trying to break the rope of the spread of covid in the Gunung Putri Village community by making automatic hand sanitizers, by making automatic hand sanitizers to prevent the spread of the coronavirus due to holding hand sanitizers in public places.

This activity was carried out in collaboration with the Gunung Putri Village office. The methods used in this activity include: (1) Analysis of the problems encountered, discussions with Village staff about the problems and their solutions; (2) Tool planning and design, in which calculations and media images are carried out at this stage to meet design needs; (3) Making tools, which is done by manufacturing and assembling; (4) Trial and learning how to use it; (5) Evaluation of the results of the activities carried out.



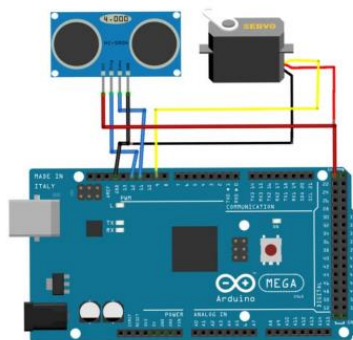
**Figure 1. Activity Implementation Method**

## RESULTS AND DISCUSSION

This community service activity begins with the process of analyzing the problems experienced by the people of Gunung Putri Village. The rampant spread of the coronavirus requires the government to provide safe facilities for the community, one of the cases of transmission of the coronavirus is due to holding objects from person to person. If this is allowed to continue, the corona case in Indonesia, especially in Gunung Putri Village, will not pass quickly. Therefore, in this activity, an automatic hand sanitizer was made, to reduce cases of the spread of the coronavirus.

This tool has benefits for the local community to avoid transmission of the coronavirus by not touching the hand sanitizer container. And it makes it easier for people to use without the need to touch a button, and the Hand Sanitizer liquid will come out sufficiently. The goal of making this tool is for residents of Gunung Putri Village who will enter the Village office with no need to press the hand sanitizer bottle pump anymore, but only need to hold their hand closer to the automatic hand sanitizer, then the hand sanitizer liquid will come out by itself. The purpose of making this tool is to reduce the chain of transmission of the coronavirus by not touching the hand sanitizer bottle.

After analyzing the problem, the next step is planning and designing the tool. At this stage, an automatic hand sanitizer design was created using one of the 3D design software. The shape and size of this hand sanitizer are adjusted to the needs. This automatic hand sanitizer uses an Arduino microcontroller as a controller, ultrasonic sensors as input from the system, and servo motors as output from the system, which is built into a system so that it can run according to its purpose.



**Figure 2. A series of automatic hand sanitizers**

After the planning and design stage of the tool is the stage of making an automatic hand sanitizer tool, the stage of making this tool is also assembling the existing devices in the automatic hand sanitizer so that the tool will run. Making this tool includes hardware and software, the manufacturing process requires tools and materials, and hardware is the electronic circuitry of this tool. The way this automatic hand sanitizer works is an ultrasonic sensor as a detection that will read the hand at a certain distance as input, and will be forwarded

to the microcontroller as a processor and controlling the servo motor which functions as an output to pull the rope so that the pump closes the hand sanitizer bottle and releases liquid.

The workings of this automatic Hand Sanitizer circuit are by using one of the controller software used, namely Arduino. The programming of this system consists of two general parts, namely the sensor reading program and the servo motor control program. In the ultrasonic sensor circuit, two sensors will read when there is a hand. This ultrasonic sensor is located in front of the hand sanitizer area.

In the trial phase, the tool will be installed at the Gunung Putri Village office to determine whether the tool can work properly or not. This tool will work if there is a hand approaching the sensor, if the sensor reads that there is a hand approaching, the sensor will forward the command to Arduino to instruct the servo motor to move to pull the rope so that the hand sanitizer liquid will come out. So people don't need to touch the hand sanitizer container.



**Figure 3. Trial of the hand sanitizer tool**

The final stage, namely product evaluation, is very important to find out the feasibility of the tool and the advantages and disadvantages of the product, in which the performance of this automatic hand sanitizer conducts experiments so that the hand sanitizer can be issued or not. The obstacle that existed when making this tool was the sensor which was difficult to read where the hand was, it had to be at a close distance, so the tool often did not work properly.

## CONCLUSION

Coronavirus is a disease that is very easily transmitted and spreads, not only by touch but from the air, therefore humans need to maintain health and also maintain cleanliness to avoid contracting the coronavirus. The stages in the process of community service activities are problem analysis, design and planning stages, tool manufacturing stages, testing stages, and data evaluation stages. Automatic hand sanitizer is one of the newest ideas or innovations whose manufacturing process has several stages. This automatic hand sanitizer is for the community to minimize transmission by not touching the hand sanitizer container in public places.

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