Preliminary Study of Door Opener Design in Automatic as A Prevention Means Spread of Coronavirus Disease

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Abstract. COVID-19 is an outbreak of the Corona virus in 2019 (coronavirus disease 2019) around the world. This disease is caused by a new type of corona virus that is named SARS-CoV-2. The World Health Organization (WHO) more than 1,500,000 cases of COVID-19 have been reported in Indonesia. The SARS-CoV-2 virus can spread between people mainly through the respiratory droplets (droplets) generated during coughing. The virus can also survive on surfaces contaminated by the mouth or nose of an infected person. This can be a media spread if you monitor a contaminated surface and then come in contact with someone's face. The doorknob is one of the things we touch often. Very potential as a medium for spreading viruses. This research applies the Arduino module and the ultrasonic sensor which will be used to control two motors to open the door. The ultrasonic sensor is applied to detect two times the wave of the hand if someone wants to enter the room which then sends the information to the Arduino controller module. The Arduino module sends a signal to a mechanical motor to open and then closes the door with a wave of a hand.

1. Introduction

COVID-19 is a contagious disease caused by coronavirus. Coronavirus is part of a group of viruses that cause respiratory infections in humans. The new coronavirus was discovered in December 2019 in Wuhan, People's Republic of China. Symptoms of the coronavirus are fever, dry cough and feeling tired. In early 2020, many countries had implemented a lockdown system to ward off this deadly virus. In fact, Indonesia is experiencing social restrictions in almost all regions due to the coronavirus pandemic. The anticipation of the coronavirus in society is wearing masks, washing hands diligently, and keeping a distance from other people. Many people still don't care about the health protocol that has been given [1].

At the beginning of 2020, the world was shocked by the outbreak of a new virus, namely a new type of corona virus (SARS-CoV-2) and the disease is called Coronavirus disease 2019 (COVID-19). It is known, the origin of this virus came from Wuhan, China. Found at the end of December 2019. Initially, epidemiological data showed 66% of patients were related or exposed to a seafood market or live market in Wuhan, Hubei Province, China. Until the isolates from the patients were studied with the results showing the presence of coronavirus infection, a new type of beta coronavirus was given the name 2019 novel Coronavirus (2019-nCoV) [2]. On February 11, 2020, the World Health Organization named the new virus severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) and the name of the disease as Coronavirus disease 2019 (COVID-19). through humans. Finally it was confirmed that the

transmission of this pneumonia can be transmitted from humans to humans. The number of cases continues to grow over time.

The spread is very fast and deadly. It is spread by direct physical contact with humans and is transmitted through the mouth, nose and eyes. Efforts to break the chain of the spread of Covid-19 are carried out by the government and religious institutions by issuing several regulations to be obeyed by the public.

This virus is spreading very fast throughout the world and many countries announced that a case of COVID-19 had been found [3]. This virus spreads through small droplets produced from the mouth and nose so that all countries make and implement mandatory rules for using masks, maintaining distance and other health protocols to minimize the spread of this virus. Because of this, many social activities were temporarily banned [4].

The economic sector most affected by the presence of this virus. Because COVID-19 can be transmitted from touch, we must get used to reducing touch to things that are touched by other people, one of which is the door, with Arduino technology it is hoped that it can reduce the rate of spread of this virus because it will use an ultrasonic sensor that reads the input so as to produce an output door that opens and closes automatically without a touch.

Therefore, the purpose of this research is to make Arduino-based automatic doors that have low production costs to effectively prevent the spread of COVID-19. When this virus outbreak is over, this door can still be used because of its practical and easy use without using it, just bring the object closer to the sensor at a predetermined distance then the door will open and close automatically without pushing.

2. Method

The working mechanism of this research tool such as the screw jack mechanism. The screw jack is one type of lifting equipment made of steel plate, where the removal of the load is driven by a threaded rod [5]. Lifting height or length is determined by the length of the steel arm or the length of the steel plate and driven screw rod as shown in Figure 1.
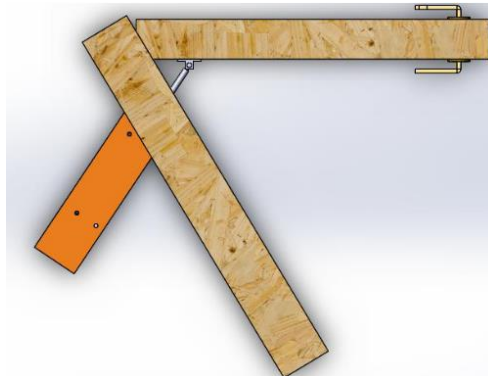

Figure 1. Mechanism of door opener.

Parabola actuator has a working system and shorten the elongated shaft by an electric motor that uses electricity as its energy source. This tool is used as a driver of a system that requires a shaft lengthening and shortening work system to open the door.

Figure 2. Ultrasonic sensor.

The sensor used in this study is an ultrasonic sensor as shown in Figure 2. In ultrasonic sensors, ultrasonic waves are generated through a device called a piezoelectric with a certain frequency. This piezoelectric will produce ultrasonic waves (usually 40kHz frequency) when an oscillator is applied to the object [6]. In general, this tool will shoot ultrasonic waves towards an area or a target. After the wave hits the target surface, the target will reflect the wave back. The reflected wave from the target will be captured by the sensor, then the sensor calculates the difference between the time of sending the wave and the time of the wave.

This research uses the Arduino Uno microcontroller as shown in Figure 3 which has been programmed into it using the C programming language. In the design of automatic door openers based Arduino UNO uses HC-SR04 ultrasonic sensor, there are three main parts: the input (input), process (process), output (output). The third part is the basis for determining the performance of the prototype automatic door openers based Arduino UNO uses ultrasonic sensors. These three parts must be interconnected and linked to each laim. It can be said that the three parts are already said to be a system.

Figure 3. Arduino Board Circuit.

3. Results and discussion

This section discusses the results of testing the automatic door opening system that has been carried out. This test is used to test the functionality of the circuit system with integrated ultrasonic sensor control program created on the Arduino Uno board as shown in Table 1.

Table 1. Sensor Response to Wave Hand

Distance (cm)	Actuator
1	Response
2	Response
3	Response
4	Response
5	Response
6	Less response
7	Less response
8	Less response
9	Not response
10	Not response

Figure 4. Instalment of Door Opener

This hardware test is to find errors or deficiencies in the Arduino UNO R3-based automatic door opener prototype using the HC-SR04 ultrasonic sensor. especially on the hardware components used in building the system. The purpose of testing and analysis performed on ultrasonic sensors is to obtain parameters about the accuracy of the distance detected by the sensor. This is done to get maximum results for the detected hand wave distance. So that the test results of the ultrasonic sensor HC-SR04 are shown in table 1.

4. Conclusion

From the research that has been done, it can be concluded that the push door opens and closes automatically without touching which is practical and easy to use by anyone. How to operate by bringing the object closer to the sensor in front of the door at 1 to 5 cm a predetermined distance then the door will open automatically. This automatic door is expected to be a means of preventing the spread of the Corona Virus (Covid-19). After this COVID-19 ends, automatic doors can still be used because of their practicality and ease of operation. This series of door system consists of ultrasonic sensor, Arduino uno R3, parabolic actuator, jumper cable and L298N motor.

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