

# Contactless Hand Sanitizer for Healthy Village in Corona Pandemic Outbreaks

1<sup>st</sup> Hari Maghfiroh  
Dept. Electrical Engineering  
Universitas Sebelas Maret  
Surakarta, Indonesia  
hari.maghfiroh@staff.uns.ac.id

3<sup>rd</sup> Henry Probo Santoso  
Dept. Electrical Engineering  
Universitas Sebelas Maret  
Surakarta, Indonesia  
henryprobo140198@gmail.com

2<sup>nd</sup> A. Sujono  
Dept. Electrical Engineering  
Universitas Sebelas Maret  
Surakarta, Indonesia  
agus.sjn.te16@gmail.com

4<sup>th</sup> Joko Slamet Saputro  
Dept. Electrical Engineering  
Universitas Sebelas Maret  
Surakarta, Indonesia  
jssaputro89@staff.uns.ac.id

**Abstract** – The corona pandemic has caused global problems, including Indonesia. One way to reduce the spread of the coronavirus is to wash your hands frequently with soap or hand sanitizer. Many types of hand sanitizers were developed to support efforts to prevent the spread of the corona. For this reason, this paper proposes two types of Contactless Hand Sanitizer (CHS) prototypes. Function tests and user satisfaction tests were carried out to determine the performance of the CHS. The test results show that type A CHS which only works fully electrically is more reliable than type B which works with electrical and mechanical systems. Of the 10 respondents, 90% chose CHS type A.

**Keywords**—corona, pandemic, hand sanitizer, contactless

## I. INTRODUCTION

The corona pandemic caused by the Covid-19 virus which emerged at the end of 2019 is still not over and is now troubling almost all countries in the world. According to data from John Hopkins University as of October 12, 2020, confirmed cases worldwide have reached 37,378,245 victims [1]. Indonesia itself ranks 21 in the world in the number of corona cases with positive confirmed cases reaching 333,449 cases.

COVID-19 (Coronavirus disease-2019) which spreads through recent coronavirus 2 (SARS-CoV-2) characterize by acute respiratory disorder, pneumonia, dry cough, fever, and body pain at a high rate of mortality [2]. The virus, which first appeared in China, has a lower-Case Fatality Rate (CFR) than SARS, but the distribution is faster. So that the World Health Organization (WHO) established the status of Public Health Emergency of International Concern on January 30, 2020 [3].

Several ways have been done by countries in the world to prevent the spread of the coronavirus. Among them by providing special health facilities, carrying out rapid tests, carrying out regional quarantine, or lockdowns. In addition, as a preventive measure, several countries closed schools [4].

Infection caused by the coronavirus can spread through contact with sufferers, droplets, and airborne transmission. Until now, no treatment or vaccine has been found and the rate of infection with this virus is still increasing. To reduce the spread of the coronavirus, a preventive effort that can be done

is to routinely wash your hands using soap or hand sanitizer and use a mask [5].

Based on the official website of the Indonesian government for developments in the condition of corona cases in Indonesia [6], positive confirmed cases of Covid-19 are still increasing every day, as can be seen in Figure 1. There have been many efforts made by the central and local governments to stop this corona pandemic. Both preventive and treatment for positive sufferers. The best effort to stop the spread of the corona is prevention because now there are many sufferers, and it is feared that the hospital will no longer be able to accommodate them.

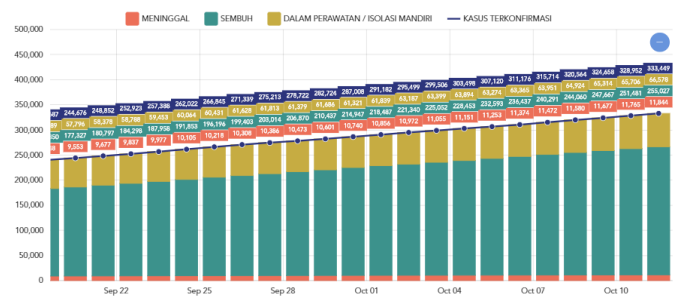


Fig. 1. Corona case in Indonesia Sept 22 to Oct 10 [6]

Many government campaigns have campaigned for preventive efforts to prevent corona, both in terms of regulations and suggestions for healthy living. One of the regulations is that the government has imposed a Local Lockdown or known as Pembatasan Sosial Berskala Besar (PSBB), as well as a ban on going home from another places. Meanwhile, in terms of prevention, the government by advising people to wear masks when leaving the house, wash their hands frequently with soap or hand sanitizer to prevent transmission of the coronavirus [7]. For this reason, in this study, a Contactless Hand Sanitizer (CHS) prototype is proposed. This prototype will later be placed in one of the public places in Prayunan Village to create a healthy village during the Corona pandemic outbreaks.

This paper is organized as follows. Section II presents the material and method. In section III, the result and discussion are presented. Finally, the conclusion is in section IV.

## II. MATERIAL AND METHOD

In this study, two prototypes of Contactless Hand Sanitizer (CHS) were proposed to help inhibit the spread of the coronavirus.

### A. CHS Type A

Hand sanitizer is made using a submersible pump, 1 kΩ resistor, transistor, 3.7 Volt battery, and infrared sensor. Figure 2 shows the CHS Type A circuit scheme. The hand sanitizer works automatically by bringing the hand closer to the infrared sensor, then the liquid disinfectant will be pumped out by the submersible pump.

The hand sanitizer casing uses acrylic material and is designed using Corel Draw software, resulting in design as shown in Figure 3. The casing design is used for laser cutting of acrylic. The casing is designed to be able to store bottles filled with disinfectant liquid and protect electronic components from the outside environment. The bottle containing the disinfectant liquid can be refilled through the bottle cap on the top of the casing. Figure 4 shows the finished CHS Type A, later this CHS can be placed on a table or hung on the wall.



Fig. 4. Hand-sanitizer type A

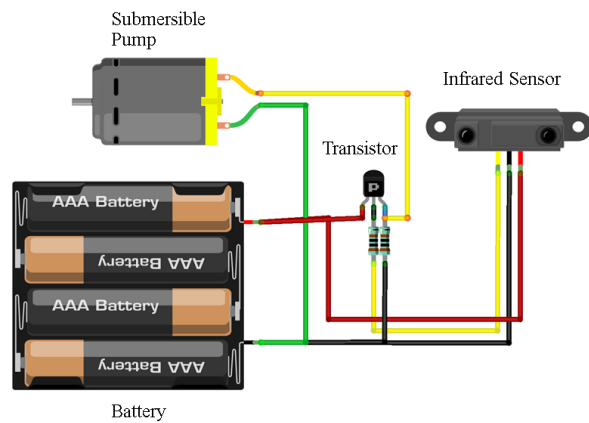


Fig. 2. Schematic of the type A hand sanitizer

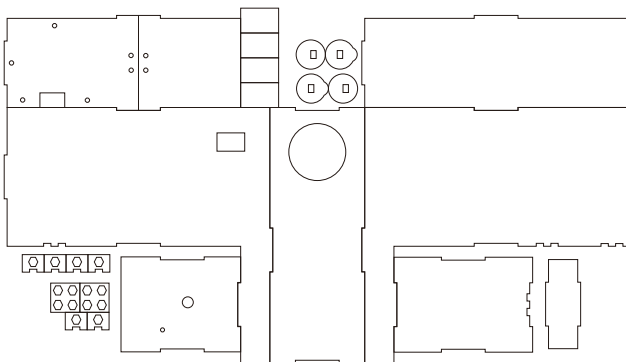


Fig. 3. Type A hand-sanitizer casing design

### B. CHS Type B

Hand sanitizer is made using a dc motor, 1 kΩ resistor, transistor, 3.7-volt battery, and infrared sensor. Figure 5 shows the CHS Type B circuit. The components are the same as the CHS Type A, the differences is the DC motor on the CHS Type A is a mini submersible pump, while in this type, the DC motor is a wheel rotating motor. While the wheels function mechanically to press the hand-sanitizer sprayer.

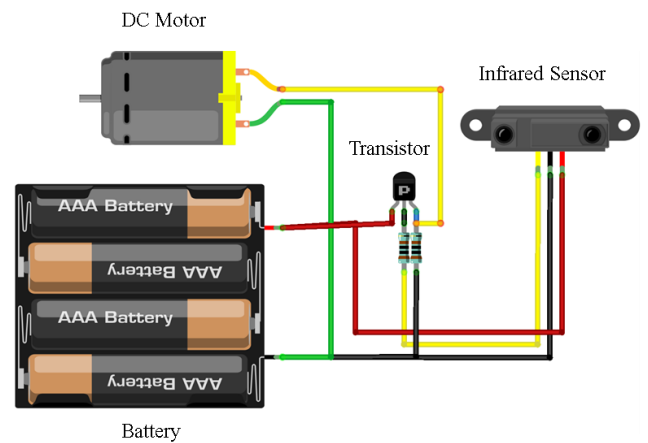


Fig. 5. Schematic of the type B hand sanitizer

The hand sanitizer casing uses acrylic material and is designed using Corel Draw software, resulting in design as shown in Figure 6. The casing design is used for laser cutting of acrylic. The casing is designed to store spray bottles filled with disinfectant liquid and protect electronic components from the outside environment. The bottle containing the disinfectant can be refilled by removing the spray bottle attached to the front. This type of design is devoted to wall-hanging installation only. The final prototype of CHS type B is shown in Figure 7.

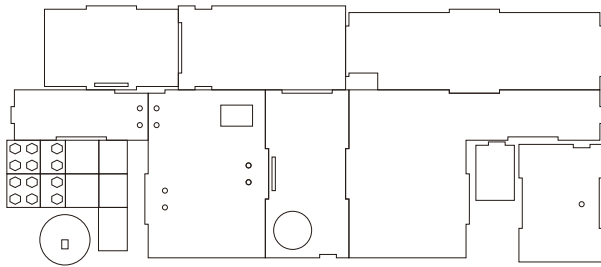


Fig. 6. Type B hand-sanitizer casing design



Fig. 7. Hand-sanitizer type B

### III. RESULT AND DISCUSSION

To find out the performance of the two types of CHS that have been made, function testing and user satisfaction are tested.

#### A. Function Test

The function test was carried out to determine whether the CHS prototype that was made could work properly. The test results showed that the two types of CHS were made to work well. The hand distance to the CHS can be adjusted by adjusting the sensitivity of the sensor by turning the trimpot on the sensor. However, the problem faced is that the sensitivity of the sensor depends on the light around the CHS usage space. If the CHS is set in an open area with light, then when brought to a closed room the sensor reading distance will decrease. Conversely, if the sensor is set in a closed room, then when taken outside the room the sensor will activate itself because there is too much light. The solution to this problem is to place the CHS in a fixed place.

When the CHS is placed in a fixed place, it turns out that after being tested, the difference in the intensity of day and night light also affects the infrared sensor. For this reason, the use of infrared sensors is recommended to be replaced with other sensors such as motion sensors or temperature sensors to detect human body temperature.

Because both types of CHS have the same circuit scheme, the sensor constraints are the same. Meanwhile, because the mechanical system is different, they also have different performance. CHS type A works electrically by utilizing a mini dc-submersible pump so that there are no mechanical obstacles. Meanwhile, CHS type B, which utilizes the motor's mechanical motion to press the spray, found problems, sometimes the spray does not come out smoothly because the spray pressing mechanism by the DC motor is not smooth. However, the system can still work.

#### B. User Satisfaction Test

The user satisfaction test aims to determine user impressions and suggestions of the two CHS designs that have been made. About 10 users were asked to try the CHS that had been made, then a short interview was conducted about the preferred type and the suggestions on the two designs that had been made.

Table 1 shows the test results of 10 users which showed 90% of users liked CHS type A and only 10% chose CHS type B. Since hand laying on type A is easier and better. This is because in type A the hand is below while in type B the hand is in front of the tool. The illustration on how to use both CHS is shown in Figure 8.



(a) Use of CHS type A



(b) Use of CHS type B

Fig. 8. How to use both CHS

TABLE I. USER SATISFACTION TEST RESULT

Users	Type A	Type B
1	√	
2	√	
3	√	
4	√	
5		√
6	√	
7	√	
8	√	
9	√	
10	√	

#### IV. CONCLUSION

Two prototypes of the CHS have been made. Function tests and user satisfaction tests have been carried out. The function test results show that both types of CHS can work, but the CHS type A is more reliable because the system is fully electric. Meanwhile, CHS type B, which works by a combination of electric and mechanical, is often constrained by its mechanical system. User satisfaction test results also show the same thing, CHS type A is in demand by 90% of 10 users. This is because the position of the hand using type A is easier. In addition, CHS type A also rarely chokes because the system is fully electric.

#### ACKNOWLEDGMENT

This research is funded by Hibah Pengabdian Mandiri Penugasan Covid, PNBPN UNS 2020. Contract No. 127/UN27.21/HK/2020.

#### REFERENCES

- [1] <https://coronavirus.jhu.edu/> (accessed: October 12, 2020, at 7.30 Indonesian time)
- [2] Mahmood, A., Eqan, M., Pervez, S., Alghamdi, H.A., Tabinda, A. B., Yasar, A., Brindhadevi, K., Pugazhendhi, A., COVID-19 and frequent use of hand sanitizers; human health and environmental hazards by exposure pathway, *Science of the Total Environment*, 2020. Doi: 10.1016/j.scitotenv.2020.140561.
- [3] Suni, N.S.P., Kesiapsiagaan Indonesia Menghadapi Potensi Penyebaran Corona Virus Desease, *Info Singkat, Kajian Singkat Terhadap Isu Aktual dan Strategis*, Vol. 12, No.3, Badan Keahlian DPR RI.
- [4] Agustino, L., Analysis of Covid-19 outbreak handling policy: the experience of Indonesia, *Jurnal Borneo Administrator*, Vol. 16, No.2, 2020. Doi: 10.24258/jba.v16i12.685.
- [5] Pradhan, D., Biswasroy, P., Naik, P.K., Ghosh, G., Rath, G., A Review of Current Interventions for COVID-19 Prevention, *Archives of Medical Research*, 2020. Doi: 10.1016/j.arcmed.2020.04.020.
- [6] <https://covid19.go.id/> (accessed: October 12, 2020, at 08.00 Indonesian time)
- [7] <https://promkes.kemkes.go.id/menjuju-adaptasi-kebiasaan-baru> (accessed: October 12, 2020, at 08.00 Indonesian time)