Design and Construction of Automatic Portable Disinfectant Button to Prevent the Spread of The Covid-19 Virus

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Abstract- The Covid-19 virus is currently rampant in the world, especially in Indonesia, the spread of the Covid-19 virus is getting faster and wider. Even the spike in cases was unpredictable. Since entering Indonesia last March. In an effort to prevent it, almost every area carries out a body temperature test and sprays disinfectants on people who enter the area. This study aims to produce an automatic disinfectant sprayer and test its effectiveness. The method used is the data collection analysis method by testing the product. This tool uses ultrasonic sensors as object detectors, MLX 90614 sensors as temperature readers and Arduino Uno R3 as controllers. The output uses a Relay module that is connected to a Water Pump that sprays disinfectant liquid through a spray mist. This tool is effective in its manufacture and is able to detect objects in the area of the disinfectant booth. The results of the study found that the level of accuracy of the MLX 90614 sensor which was calibrated with the Thermogan measuring instrument had an accuracy of reading the temperature of 98.8% with a difference of 1.16%.

Keywords— Chamber, Covid, Disinfectant, Portable .

I. INTRODUCTION (*HEADING 1*)

COVID-19 is an infectious disease caused by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), which can spread through interactions from the nose or mouth that come out when a person infected with COVID-19 coughs or exhales. mm then falls on nearby objects and surfaces. People who touch these objects or surfaces and then touch their eyes, nose or mouth, can contract COVID-19.[1]

The government is trying to suppress the spread of the covid-19 virus, namely by urging the public to implement the New Normal health protocol, namely new adaptation-based behavior habits to cultivate clean and healthy living behavior [2], Then there is a tool called a disinfectant booth, how to use this tool by spraying or rubbing on various inanimate objects that may be exposed to the virus [3][4]. There is also the usual use of antiseptic among the community. For now, many have used disinfectant booths in several public places, in order to stop the current spread of the Covid-19 virus, disinfectant spraying is still done manually and requires officers to operate it, in an effort to prevent each area from carrying out body temperature tests and spraying disinfectants. to people entering the area. The normal body temperature of adults ranges from 36.5 to 37.5 C [5]. However, the human body temperature can change throughout the day. Disinfectant spraying is still done manually and requires staff to operate it.

With these problems, a tool is needed so that a disinfectant liquid sprayer is needed that works automatically. This tool uses ultrasonic sensors as object detectors and Arduino Uno as controllers. The output uses a Relay module which is connected to a High Pressure Water Pump which sprays the disinfectant liquid through a mist sprayer.

II. METHODS

Tool design includes the design of the physical appearance that will be built as desired. This section consists of mechanical, electrical and software designs that are interconnected to carry out a step-by-step process according to the design.
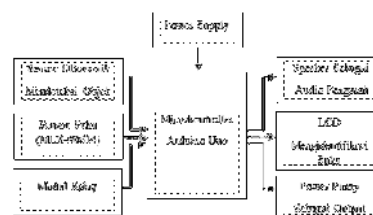

Fig.1 Block diagram of the designed system

The explanation of each system block diagram is as follows:

a. Power supply functions as a tool that is able to provide a supply of electric current to all components of the microcontroller.
b. Ultrasonic sensors detect the presence of objects.
c. The speaker plays an active role as a guide for each component designation.
d. The temperature sensor (MLX-90614) works to detect temperatures in the temperature range of -70°c to 382°c.
e. LCD (Liquid Crystal Display) helps as a calibration between the ultrasonic sensor and the temperature sensor in displaying the writing / temperature of the object.
f. The Relay Module works automatically after taking temperature measurements, then the Power Pump will directly work as an Output.

Software Design Stage The software design stage is carried out directly on the mechanical design and hardware tools that have been completed, in order to know firsthand the work of each component that will be controlled by the

microcontroller. The following is a flow diagram of the tool system that will be made
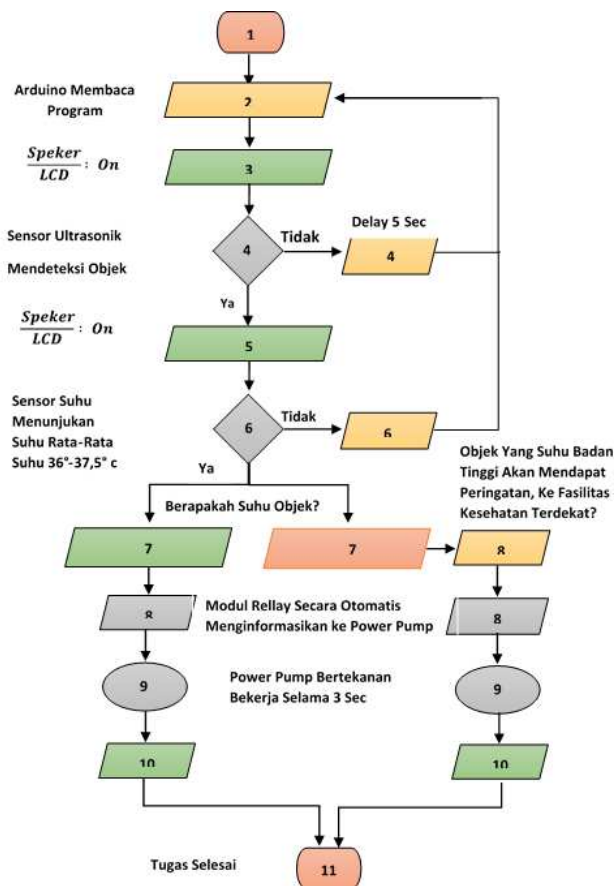

Fig.2 Flowchart of the designed system

For software design in the disinfectant booth, it can monitor the level of human body temperature and the effectiveness of the working system of this tool. in this design the system is automatic in life, if the disinfectant booth is very efficient in working and has features when it supports it compared to having to work manually.

The design of the tool in the design of this smart waste monitoring tool uses a disinfectant booth made of PVC pipe which is arranged in such a way that makes the cubicle look portable and efficient, mechanically the tool can still function automatically as well. This system will work if there is an object that is captured by the ultrasonic sensor and the temperature sensor will automatically measure it manually. after the sensor has worked, the relay will automatically run the work system from the electronic pump below.
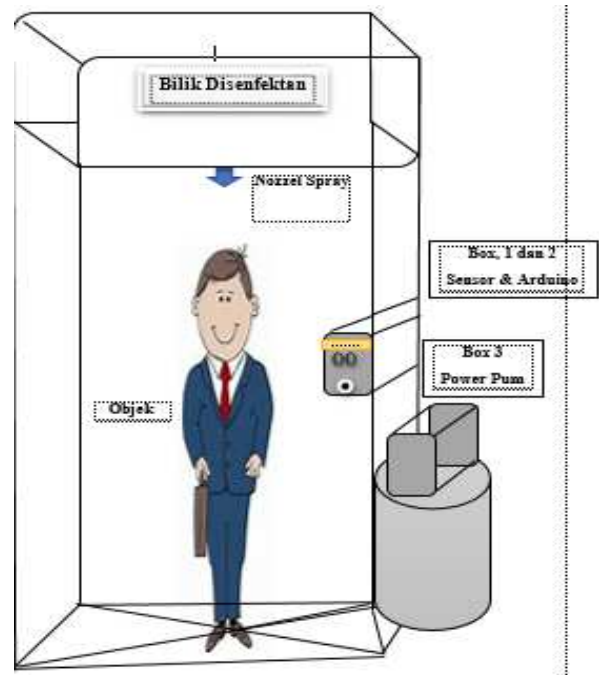

Fig.3 Disinfectant device design

III. RESULTS AND DISCUSSION

The collection and presentation of data is a very important part in making reports or research. Each type of report always uses data in presenting the facts or information contained in the report. Tool testing aims to determine whether this smart waste monitoring tool works efficiently.

Fig. 4 Disinfectant device trial

In the table below, look for tool errors in lab tests by taking data from automatic temperature measuring devices with conventional temperature measuring devices in stages by knowing the difference and error percentage.

Table I. Temperature measurement result with a distance of 1 cm

No	Jarak (cm)	Suhu Badan Pada Bilik Disinfektan (°C)	Suhu Badan Pada Termogan (°C)	Selisih (°C)	Persentase Eror (%)
1.		36,21	36,69	0,48	0,01
2.		36,85	37,0	0,15	0,004
3.		36,05	37,0	0,95	0,02
4.		36,53	36,8	0,27	0,007
5.	1	36,47	37,0	0,53	0,014
6.		36,47	37,0	0,53	0,014
7.		36,13	37,0	0,87	0,024
8.		36,77	37,0	0,23	0,006
9.		36,93	37,1	0,17	0,004
10.		36,91	37,1	0,19	0,005
Rata-rata		36,53	36,96	0,43	0,0108

Table II. Temperature measurement result with a distance of 2 cm

No	Jarak (cm)	Suhu Badan Pada Bilik Disinfektan (°C)	Suhu Badan Pada Termogan (°C)	Selisih (°C)	Persentase Eror (%)
1.		36,77	37,0	0,23	0,006
2.		36,87	37,1	0,23	0,006
3.		36,61	37,0	0,39	0,010
4.		36,49	37,0	0,51	0,013
5.	2	35,99	37,0	1,01	0,028
6.		36,53	37,1	0,57	0,015
7.		36,65	37,1	0,45	0,012
8.		36,79	37,1	0,31	0,008
9.		36,69	37,1	0,41	0,011
10.		36,47	37,0	0,53	0,014
Rata-rata		36,58	37,05	0,46	0,0123

Table III. Temperature measurement result with a distance of 3 cm

No	Jarak (cm)	Suhu Badan Pada Bilik Disinfektan (°C)	Suhu Badan Pada Termogan (°C)	Selisih (°C)	Persentase Eror (%)
1.		35,99	37,0	1,01	2,10
2.		36,11	36,9	0,79	5,26
3.		35,99	37,0	1,01	1,06
4.		35,51	36,9	1,39	5,14
5.	3	35,37	37,0	1,63	3,07
6.		35,65	37,0	1,35	2,54
7.		35,33	37,0	1,67	1,91
8.		35,31	37,0	1,69	7,34
9.		35,47	36,9	1,43	8,41
10.		35,05	36,9	1,85	9,73
Rata-rata		35,57	36,96	1,38	4,656

In the table above, the value of measuring body temperature is 10 times the experiment was carried out with 3 different distance variants, between 1cm to 3cm and compared with the results of measurements using conventional measuring instruments (Thermo gun), the

highest average value is found in distance measurements. 3 cm with a value of 1.38 C. While the lowest difference value is the result of 1cm distance measurement with the average value obtained is 0.43 C

In testing the ultrasonic sensor, the test was carried out by making comparisons and conclusions by controlling at each predetermined distance with the distance listed in the disinfectant booth. This measurement data is in accordance with the following table:

Table IV. Accuracy of reding on the ultrasonic sensor system

No	Jarak Pada (Cm)	Jarak benda yang terdeteksi pada Bilik Disinfektan (cm)	Selisih (%)	Persentase Eror (%)
1.	10	9,8	0,002	0,0002
2.	20	20,1	0,003	0,00015
3.	30	29,4	0,60	0,02
4.	40	39,2	0,80	0,02
5.	50	48,5	1,50	0,03
6.	60	59,2	1,40	0,14
7.	70	71,1	1,10	0,02
8.	80	83,4	3,40	0,04
9.	90	88,5	1,50	0,02
10.	100	98,5	1,70	0,02

In this test, the author analyzes whether the reader system that is made is running well or not and what are the shortcomings of the designed tool. The following are some of the data observed by the author in some of his experiments as follows:

Table V. Observation the instrument system in the disinfectant booth

No	Percobaan	Berfungsi	Tidak	Keterangan
1	Percobaan 1	Baik	-	
2	Percobaan 2	Baik	-	
3	Percobaan 3	Baik	-	
4	Percobaan 4	Baik	-	
5	Percobaan 5	Baik	-	
6	Percobaan 6	Baik	-	
7	Percobaan 7	-	tidak	Sistem tidak terbaca di karenakan pembacaan terlalu cepat.
8	Percobaan 8	Baik	-	
9	Percobaan 9	Baik	-	
10	Percobaan 10	Baik	-	
Total		9	1	$\frac{9}{10} ?? 100\% = 90\%$

From the data in the table above, namely testing the accuracy of temperature readings, data can be obtained, namely the occurrence of a temperature equation at a distance of 1 cm. This shows that if the palm of the hand is attached very close to the sensor, the accuracy value is higher and the error percentage is smaller. However, in the test table the accuracy of the readings is different because it is influenced by a considerable distance. The data obtained is that disputes occur at a distance of 3 cm, namely the percentage error value reaches 9.73% at a distance of 3 cm.

The percentage of sensor accuracy in temperature readings from the average number of temperature tests with a distance of 1 cm

Temperature difference: 36.53-36.96 = 0.43%

Percentage of temperature difference : 0.43/36.96 x 100% = 1.16%

Percentage of error accuracy : 36.53/36.96 x 100% = 98.8%

Percentage of sensor accuracy in temperature readings from the average number of temperature tests with a distance of 3 cm

Temperature difference: 35.57-36.96 = 1.39%

Percentage of temperature difference : 1.39/36.96 x 100% = 3.7%

Percentage of error accuracy : 35.57/36.96 x 100% = 96.2%

IV. CONCLUSION

After conducting experiments to determine the accuracy of the sensors and system performance of the Arduino Uno in running the system, the desired results were obtained. The sensor detects the temperature in the disinfectant booth and the Arduino is able to run the program properly. Although there are still some that still need improvement.

According to the data that has been obtained when testing the system, namely the difference in temperature sensor readings at a distance calibrated with another temperature measuring instrument (Thermo gun), it is known that the MLX 90614 sensor has the same accuracy within 1cm, which is 98.8% with a difference of 1.16%. and accuracy within 3 cm is 96.2% with a difference of 3.7%.

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