Preface

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The 3rd International Conference on Food and Agriculture (ICoFA)

Introduction of ICoFA 2020

We are honoured to present this collection of articles from the 3rd International Conference on Food and Agriculture (ICoFA), organized by Politeknik Negeri Jember (State Polytechnic of Jember). The conference was held in Jember, Indonesia, from 7 to 8 November 2020 and conducted virtually due to the pandemic of COVID-19. This annual event was intended to provide scientific forum and discussion of applied research on food and agriculture.

The theme of “Development and improvement of sustainable agricultural practices toward environmental and global well-beings”. There was 180 presenters and participants with 162 article submissions encompassing the topics of Agriculture Engineering and Biotechnology, Organic Agriculture, Agroindustry and Agribusiness, Animal Nutrition, Animal Production, Veterinary Science, Food Science and Technology, Food Safety, Food Security and Sovereignty, IT for Agriculture, and Renewable and Novel Energy Sources.

All submitted articles were reviewed and selected based on its scope as well as quality, and there are 105 articles that are selected for IOP Conference Series: Earth and Environmental Science. The list of committee members and reviewers are available in the pdf file.

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Development of personal integrated sterilization machine for new normal phase preparation of the 2019-nCoV outbreak

by Budi Hariono

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Development of personal integrated sterilization machine for new normal phase preparation of the 2019-nCoV outbreak

Development of personal integrated sterilization machine for new normal phase preparation of the 2019- nCoV outbreak

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Abstract. The disease outbreak caused by the 2019-nCoV virus is growing so rapidly that the WHO has categorized this outbreak as a pandemic. In Indonesia, as of March 24, 2020, there were 686 patients who tested positive for the 2019-nCoV virus with 55 deaths. This has made the government extend the disaster period of the Coronavirus outbreak until the end of May 2020. Various efforts have been made by the Indonesian government, such as: opening emergency hospitals, implementing social distancing, and preventing viruses by spraying massive disinfectants. Disinfectant spraying is carried out using the help of a fire engine or using a spray device. Spraying of disinfectant is carried out on public roads and public spaces. Indonesia is starting to prepare for the new normal phase in the midst of the coronavirus pandemic which continues to infect millions of people in the world. The government has instructed that this new phase of normality can be well prepared. For the readiness of the new normal corona, the Ministry of Health and the Task Force for the Acceleration of Handling Covid-19 have compiled health protocols such as washing hands, maintaining distance, coughing, and sneezing ethics, and wearing masks. Based on the problem, an integrated sterilizer machine was developed. It can be used for workers during the New Normal phase. The machine is equipped with an automatic handwashing device, an automatic temperature gauge, and a UV booth for sterilizing goods carried by workers at Politeknik Negeri Jember.

1. Introduction

December 2019 saw an outbreak of pneumonia of a previously unknown etiology in Wuhan, China. A new coronavirus was identified as the virus that causes it, which was later named 2019-nCoV by the World Health Organization (WHO). January 25, 2020, a total of 1975 cases have been confirmed nationally with another 2684 cases suspected to be caused by 2019-nCoV I Covid-19 [9]. On January 31, the first 2 cases of a novel coronavirus in the UK, [10] the first 2 cases in Russia, [11], and the first cases in Sweden and in Spain were reported. Canada reports the 4th case. The case in Indonesia itself was first discovered on March 1, 2020, while currently, the cases found in Indonesia have reached 893 [12]. Looking at the cases that have emerged, WHO equates preventionIsuppression of the number of

sufferers with Middle-East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS), human-to-human transmission occurs through droplets, contact, and fomites (sources of infection from inanimate objects) [1].

Fomites or sources of inanimate object transmission are one of the 2019-nCoV transmission media, so this research aims to present a solution in the form of using robots for sterilization. The hope of this research is to ensure that the environment does not fall into the Fomites category. Research on the use of robots to deal with hazardous environments was carried out, among others, by [2] [3] [4] [5] [6]. While the type of robot used in this research is a type of robot with a differentiated drive, such as research conducted by [7] [8]. It's just that the front of the robot uses Omni wheels so that maneuvers can be done more flexibly.

The developed robot can be operated manually using a joystick. The robot is connected to the operator's PC (Ground Station) using a 900MHz telemetry module. The robot is also equipped with an FPV Camera so that room images can also be accessed on the PC screen at the Ground Station. Based on the odometry system with a rotary encoder sensor mounted on the bottom of the robot, the robot can also be operated semi-automatically to perform sterilization evenly and sequentially in the room. So it is hoped that the sterilization process will be even and comprehensive, in the end, the spread through the 2019-nCoV fomites can be suppressed.

2. Related Work

The development of technology in the field of electronic instrumentation continues to be developed to help humans visualize existing analog quantities into digital quantities. One of the developments in electronic instrumentation is to use a control system to provide supervision to a system [9]. The convenience of this control system is widely used in the health sector, research laboratories, and also for industry, especially the food industry, which prioritizes the hygiene of production machines and cleaning equipment. Currently, to prevent the equipment contaminated with bacteria, the tool is stored in the UV box so that its hygiene is maintained, but if the UV lamp is off, it cannot be known quickly because the UV box is light-tight or not transparent, while the on-off UV lamp greatly affects the hygiene of the tool and results in the product will be contaminated with bacteria. When the UV lamp is turned off, it is certain that microbes will quickly grow in sterilized equipment, this is very dangerous. One of the studies that made use of UV lamps was a study conducted by Arisanti (2004)[10], namely, The Effectiveness of Sterilization Using Ultraviolet (UV) Light on Decreasing the Number of Air Germs in the IBS Operating Room at the Tugurejo Hospital Semarang. Several sterilization boxes have been sold commercially in the market, but the light-tight sterilization boxes that are widely needed in the industry are not equipped with a control system at a relatively expensive price. [11]

3. System Design

3.1. Hardware Design

The device is designed in the form of a cupboard with a length of 160cm and a height of 80cm to wash hands. 2 automatic taps are installed in the hand washing area, each of which functions to pump water and soap. The automatic faucet works using a proximity sensor so that the user can just bring his hand closer to activate the pump. There is a water level sensor that is used to detect the water capacity in the reservoir. On the right side of the sink, a box measuring 80cm x 80cm x 80cm is made. The design of the handwashing device is shown in Figure 1.

In the box installed 3 units of 9 watt UV lamps. The use of UV lamps is used to sterilize items such as bags, cellphones, helmets, etc. UV sterilizer box door is equipped with a proximity sensor to open the door connected to a servo motor. The entire operation of the handwashing device is touchless. This aims to reduce the risk of exposure to viruses from droplet contact. All sensors and actuators are connected to the ATMega328 microcontroller. For the power supply of the handwashing device, it uses PLN 220VAC electricity. Figure 2 is an illustration of the system block diagram used in the tool.

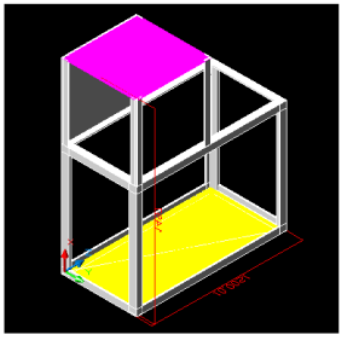

Figure 1. Hardware design

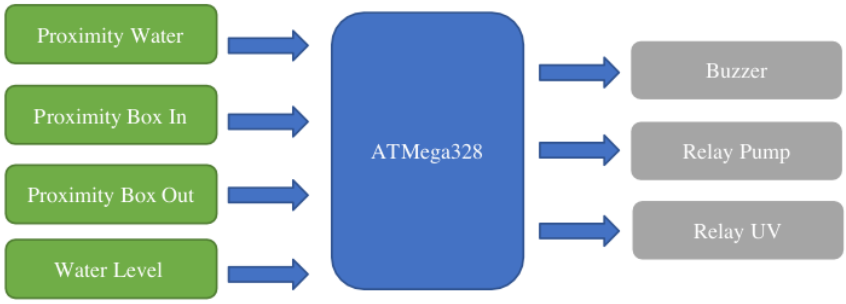

Figure 2. Diagram block system

3.2. 3.2 Software Design

The device is designed using 1 controller. The controller uses an ATMega328 chip programmed using the Arduino programming language. If the proximity sensor on the water pump is blocked, the water pump will be active so that clean water will come out. Conversely, if the proximity sensor on the soap dispenser is blocked, the soap pump will be active. If the proximity sensor on the door side of the sterilization box detects an obstacle, the servo motor will activate so that the door opens. Next, the controller will wait for the object to be put into the UV sterilizer box. If the sensor inside the box detects an object, the door will close automatically. The controller will activate the UV lamp in a few seconds.

After the object is sterilized using a UV lamp, the door will open. In this position, objects can be removed by the user. After the sensor detects that the object has been taken, the door will close again. The pump motor and the UV sterilizer work partially, so the user can use one or both of the features alternately. Figure 3 is a system block diagram of the device is made.

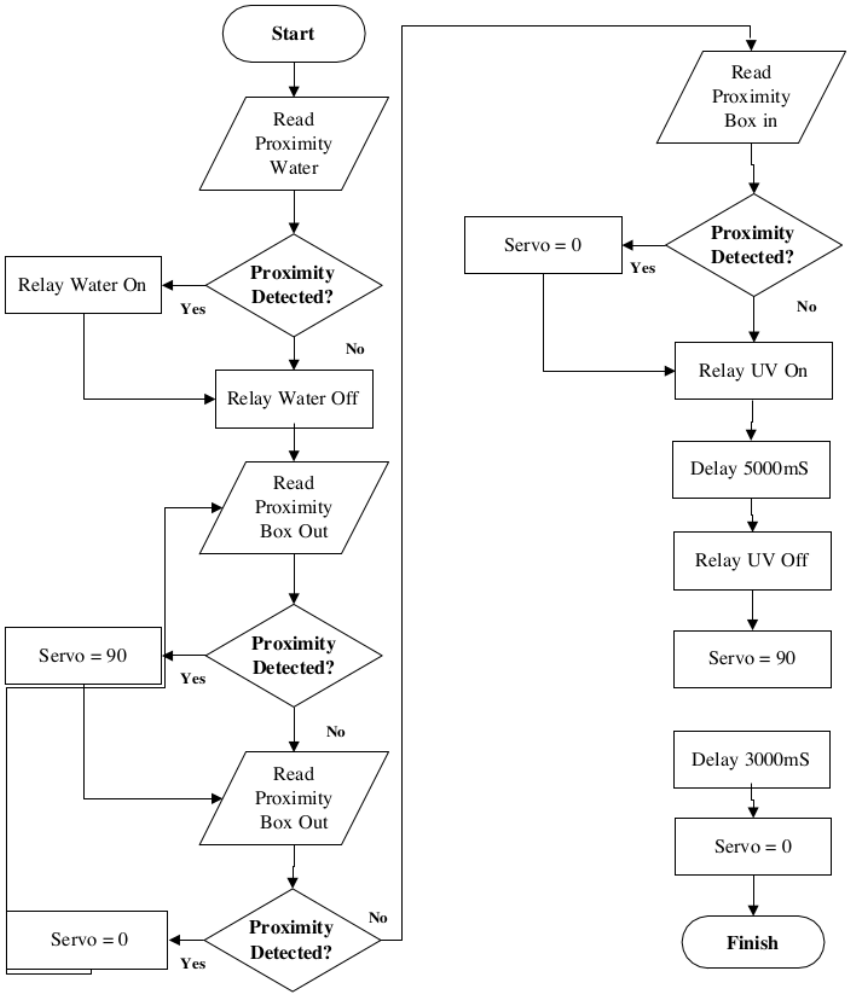

Figure 3. Flowchart System

4. Result and Discussion

4.1. System Realization

The work of the tool is shown in Figure 4. The frame for the device is made using iron and a combination of plywood covered with paper. The sensor placement configuration looks like the description in Figure 4. A water storage reservoir is placed on the inside of the table. The buzzer will sound when the water level is about to run out. The device is also equipped with a drain tank, so that the tool can be used

portable in various locations. The pin mapping used on the ATMega328 microcontroller chip is shown in table 1. The whole system uses only one controller.

Figure 4. Sterilization Unit

Table 1. Pin Mapping

ATMega328 Pin	Sensor
2	Proximity water
3	Proximity Box Out
4	Proximity Box In
5	Water Level Sensor
6	Relay UV
7	Relay Water Pump
8	Servo
13	Buzzer

4.2. Testing result

Testing is done by experimenting with the work functions of various features on the device. Figure 5 is a test of the work function of the water pump. Figure 6 is a test of the work function of soap. Figure 7 is a test function of the water level sensor. If the water level sensor detects that the water is running out, the water and soap pump motor will not work.

Figure 5. Water Pump test

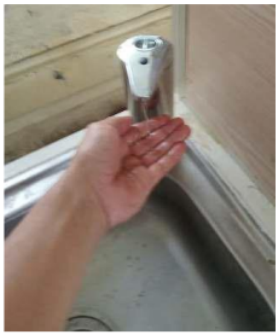

Figure 6 Soap pump test

Figure 7 Water level test

Furthermore, the UV sterilization box function test was performed. Figure 8 is the position when the door opens automatically. Red mark is the position where the object is placed. Figure 9 is the box condition when the UV lamp is on. From the whole testing process, the system has worked well.

Figure 8 Door open automatically

Figure 9 UV lamp on

5. Conclusion

The development of the Covid-19 pandemic has slowed things down. The imposition of social restrictions means that some activities cannot be carried out directly. The Ministry of Health has also implemented a health protocol for intense hand washing. In this study, a handwashing and UV sterilizer device was created which worked well. This device can be used to help reduce the risk of exposure to the Covid-19 virus.

6. Acknowledgment

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