DESIGN AND DEVELOPMENT OF TEMPERATURE ASSISTED GATE

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Abstract

The main purpose of the study was to innovate and assemble a Temperature Assisted Gate. The study was conducted to determine the functionality and performance level of the experimental set-up. A technical plan was created by the researchers with the help of the research adviser and followed the procedures in the assembly of the device. The researcher used an observation guide to gather data relevant to the functionality and performance of the Temperature Assisted Gate. The respondents of the study were 15 experts who are the instructors of electrical technology and engineering at BISU Main Campus. They were specifically chosen because of their expertise in the fields of automation and wiring installation, and they can give reliable remarks and ideas regarding the performance of the Temperature Assisted Gate. The collected data was analysed, interpreted, and concluded that the functionality and performance of the Temperature Assisted Gate are functional. On the other hand, the Temperature Assisted Gate is useful and can be used in the prevention of the continuous spread of viruses through social distancing. Consequently, the researchers recommended and encouraged students of electrical technology to do more research and innovation for the improvement of the Temperature Assisted Gate.

Keywords: Development, Temperature Gate, Assisted Gate.

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1. INTRODUCTION

In the war of mankind against diseases, specifically, infectious diseases that are deadly to humans are difficult to prevent and cure due to their characteristics. It can be transmitted from person to person, by insects or other animals, or via contaminated food or drink. Infectious diseases are a major cause of death all around the world. Scientists and innovators develop devices to detect and prevent disease symptoms, particularly viruses that are difficult to detect with the human eye. However, this is insufficient, since viruses may be altered.

A new virus known as Coronavirus disease (COVID-19) struck havoc on the world in 2019, killing more than a million people. It was declared a pandemic by the World Health Organization (WHO) on March 11, 2020. One can become infected by coming into close contact with someone who has already been afflicted with the virus. Coughs, sneezes, and even casual conversation can transmit the disease via droplets (WHO, 2020). The virus developed into Severe Acute Respiratory Syndrome (SARS-COV-2) and was difficult to cure until recently. To prevent the virus from spreading, health and safety precautions are being adopted, particularly in public areas. Because fever is one of the easiest symptoms to detect, every person who enters a facility is examined to determine if their temperature is normal. Temperature scanners of various types are being installed at all entrances to check everyone's temperature.

Temperature assisted gate is a technology that ensures people's safety by detecting their body temperature before allowing them to pass through the gate. When it detects the presence of a fever, it prohibits the person from passing through the gate. The benefit of utilizing temperature assisted gate is that it reduces human effort and inhibits virus transmission by maintaining social distance. It can also assist in ensuring the safety of front-line personnel who are risking their lives to prevent the virus from spreading. An automatic hand sanitizer will be linked to the gate as well. It is used to clean a person's hands before entering the gate in order to prevent the spread of infectious diseases. When the COVID 19 pandemic has passed, this gadget can still be useful. It can still help to prevent the spread of other viruses that cause fever.

This technology will be developed with the help of a research advisor, a research editor, a research statistician, students, and pertinent study researchers, all while adhering to scientific theories, laws, technology, and processes. According to experts, Temperature Assisted Gate, will aid the government in preventing and resolving global pandemic threats. It will also assist industry and education, especially electrical students, by increasing their knowledge and allowing them to develop with this technology.

2. METHODOLOGY

Design

The study will be using the experimental research design in conducting the study. To ascertain the performance of the Temperature Assisted Gate, the researchers will conduct several observations. All tools, supplies, and materials were gathered, tested, and put together for the assembly of the Thermal Gate Operated.

Environment and Participants

The study will be conducted particularly in Bohol Island State University- Main Campus, Tagbilaran City. The institution will be chosen as it offers technical programs like electrical technology, electronics technology, mechanical technology. Furthermore, the institution will also utilize teaching materials that involved practical hands on programming, interfacing, troubleshooting, and wiring installation of the Temperature Assisted Gate.

There will be fifteen (15) experts and respondents who were purposively chosen who will test and validate the level of performance and functionality of the Temperature Assisted Gate. These experts will be chosen because of their expertise in the field of automation and wiring installation who can give reliable remarks and ideas regarding the performance of the Temperature Assisted Gate.

Instrument

In gathering data, the researchers will prepare an observation guide to validate the performance and functionality of the Temperature Assisted Gate. The observation

guide described the minute details of specific parts of the Temperature Assisted Gate. It includes the specific components algorithms and how it worked.

3. RESULT AND DISCUSSION

This contains the presentation of data gathered by the researcher on Temperature Assisted Gate. The presentation of data is supported with tables which illustrated the responses of the study on the performance of the Temperature Assisted Gate. The gathered data had undergone thorough statistical treatment before these were interpreted.

Table 1 Testing the Functionality of Temperature Sensor with Ulrasonic Ranging Sensor

Device	Operation	Trials	Remarks
Temperature Sensor with Ultra Sonic Ranging Sensor	Detects Human body temperature with an operational distance of 0cm – 40cm.	1	Not Functional
		2	Not Functional
		3	Not Functional
	Detects human body temperature with an operational distance of 0cm – 5cm	1	Functional
		2	Functional
		3	Functional

Table 1 presents the functionality of the temperature sensor with the ultrasonic ranging sensor. In the first three trials, the result was not functional because the reading was inaccurate and did not detect anything when there were temperatures, this was due to the ultrasonic ranging sensor's operational distance of 0-40cm.

To correct the error, the researchers decreased the ultrasonic ranging sensor's operational distance from Ocm-40cm to 0cm-5cm to specify its detection and to ensure it only detects what is near the sensor. After troubleshooting, researchers tested again the functionality of the product. The trials yielded successful detection of temperature. As observe. The device functioned according to its criteria.

Table 2 Functionality of the Design and Developmet of Temperature Assisted Gate in terms of Output Devices

Devices	Operation	Remarks
Linear Actuator	Open door	Functional
	Close door	Functional
Buzzer	Beep once during opening and closing the gate.	Functional
	Beep simultaneously when the temperature sensor detects 37.6 degrees and above.	Functional
Light Indicators	Green light will illuminate during gate opening.	Functional
	Red light will illuminate during gate closing	Functional

Table 2 indicated the functionality of output devices of the Temperature Assisted Gate. The gate opened, the buzzer beeped once, and the green light illuminated, indicating the open door status, when the temperature sensor and ultrasonic ranging sensor detect normal human body temperature.

When the temperature and ultrasonic ranging sensor detected a temperature higher than normal for a human body, the gate remain closed and the red light illuminated, causing the buzzer to beep simultaneously. As a result, the researchers concluded that the temperature sensor, ultrasonic ranging sensor, linear actuator, buzzer, and light indicators of the Temperature Assisted Gate are fully functional.

Table 3 Performance of the Temperature Assisted Gate

Task	Observation
Automated Gate	Gate will automatically open detects normal body temperature.
	Gate will remain close when detects high body temperature.
Thermal Detector	When Detects 37.5 degrees and below the alarm will beep once indicating the gate will open.
	When detects 37.6 degrees and above the alarm will beep simultaneously and gate will remain close.

Table 3 discloses the performance of the Temperature Assisted Gate in terms of automated gate and thermal detector. The gate automatically opened when the thermal detector detects 37.5℃ or less, which is the normal human body temperature.

The gate remain closed where the thermal detector detected a temperature of 37.6℃ or greater, which is higher than the normal body temperature. As a result, the researchers concluded that the Temperature Assisted Gate's performance in terms of automated gate and thermal detector is very efficient which means the device works accurately.

4. CONCLUSION

The Design and Development of Temperature Assisted Gate: an innovative device was studied by the researcher. It was found to be a useful device. The device was tested according to its functionality and performance level. As a result, the researchers concluded that the Temperature Assisted Gate was entirely functional and could be used to block the spread of viruses indefinitely by preserving social distance.

Recommendations

Based on the findings, the following recommendations are given:

1. For future researchers, innovations and upgrades to the device will be developed as additional knowledge for electrical students at Bohol Island State University Main Campus
2. A related study may be conducted for the innovation and improvement of the device. Due to some limitations of the device, the panellist recommended to:

2.1 Include a backup power source, such as a solar panel, to allow the device to continue operating and become self-contained in the event of a total blackout in a specific region.

2.2 Install a motion sensor next to the moving door to detect if there are still people outside, causing the linear actuator to halt and ensuring the safety of passers-by.

2.3 Increase the linear actuator's speed to reduce the amount of time spent waiting for the gate to open.

2.4 Hand sanitizer should be included in the program to ensure that it is used upon entering the gate.

2.5 Increase the size of the buzzer so that it is visible to the public.

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