

Analysis of Accuracy of The Use of UNI-T UTi165K Thermal Camera to Safeguard The Spread Of Covid-19 In The New Normal Era at the Polmed Telecommunication Laboratory Based on IoT (Internet of Things)

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Abstract— One of the efforts that can be done is to detect the object of the spread of the virus, including at human body temperature. The use of a Thermal Camera in measuring human body temperature is felt to be the most effective because it can be done without touching the object being measured so that it can avoid physical contact that can actually transmit the Covid-19 virus. The development of Internet of Things (IoT) technology has recently been increasingly needed. IoT technology is generally developed as a solution to the need for improving remote monitoring via the internet. Telecommunication engineering laboratory of Medan State Polytechnic (Polmed) as a gathering place for students to carry out practicums really needs a system that can help prevent the development of the Covid-19 virus. In this study, a Covid-19 spread safety system in the new normal era at the Polmed telecommunication laboratory will be designed which uses a thermal camera to remotely measure the body temperature of students who will carry out practicum in the laboratory and the measurement results will be displayed in monitor screen. In designing this system, students will have their body temperature measured using the UNI-T UTi165K thermal camera with a measuring distance of 0.5 - 2 meters and those who can enter the laboratory room are students who have a body temperature of not more than 37.5 ° C. The system that is designed will also be equipped with an ichamber as a sterilization booth using a disinfectant that is sprayed automatically on students who are deemed fit to enter the laboratory and the automatic hand sanitizer will also be used in the laboratory room as an effort to prevent Covid-19 transmission. From the results of the discussion, it was found that the security system for the spread of Covid-19 in the new normal era at the Polmed telecommunication engineering laboratory based on IoT was successfully implemented and worked well. The UNI-T UTi165K thermal camera works well in detecting human body temperature from 0.5 to 2 meters. The average percentage of the UNI-T UTi165K thermal camera reading error for 0.5 m to 2 m is 0.352%. The UNI-T UTi165K thermal camera reading accuracy rate for 0.5 m to 2 m is 99.648%.

Keywords— Covid-19, Thermal Camera UNI-T UTi165K, Internet of Things (IoT), percentage of error, and level of accuracy

I. INTRODUCTION

This The spread of the Covid-19 virus, which continues to grow and is worrying to date, with its growing victims, has prompted the Indonesian Government to continue to take

measures to prevent the spread of the Corona virus. One of the preventive efforts carried out is social distancing, maintaining health, always washing hands, sterilizing by spraying disinfectants and measuring body temperature which are the entry points for the transmission of the Covid-19 virus. Many studies state that normal human body temperature ranges from 36 degrees to 37 degrees. But for the current situation related to the corona virus pandemic, a temperature of 37 degrees has become a temperature to watch out for.

Measurement of body temperature that is mostly carried out at this time is by means of a thermo gun which is very risky for physical contact and facilitates the transmission of the virus. Dr Sanny Suharli, Chairperson of the Indonesian Security Industry and Technology Association (ATISI) said that one thing that is no less important is to increase early detection efforts by using thermal cameras in public spaces. "The use of a thermal camera in public areas is more recommended than a firing thermometer, because it has less contact, better accuracy, and minimal human error," said Sanny in his statement.

Research related to the use of a thermal camera that has been done before are: research that discusses Body Temperature Monitoring Using AMG8833 Thermal Camera and Face Detection. The AMG8833 thermal camera is used to measure body temperature, while face detection using the Haarcascade Classifier is used to detect faces [1]. Identifying the corona virus on international arrival passengers aims to find out whether the passenger has the corona virus or not. The tool used is the Thermal Scanner Camera that can see directly the body temperature of the passenger. And there are several kits that have been made to check directly whether there is a corona virus in the human body by using the Rapid Test and PCR Test [2]. The development of a Thermal Camera Detector in the Kepuharjo Village, Kecamatan Karangploso shows that Covid-19 control can be done by checking the body temperature of each alternative road user automatically. 92% of all road users starting from 07.00 - 16.00 WIB have body temperature detected in the normal category and another 8% are not detected because the vehicle is traveling at high speed [3]. Research that analyzes the measurement results of the human body temperature sensor. The process of measuring human body temperature uses a microcontroller-based temperature sensor. After the results of temperature measurements using different temperature sensors are

obtained, the measurement results are analyzed and compared to obtain an effective and efficient temperature sensor. Based on the analysis, the results of measuring human body temperature using a thermal camera are an effective and efficient sensor [4].

Research that design a prototype was conducted which collaborated with computer vision, Location based Services (LBS), and body temperature sensors placed on the smart camera. The prototype will then be analyzed regarding the feasibility and impact that can be caused by the implementation of the prototype in the community. The prototype is expected to be used by the government to monitor community activities quickly so that the spread of COVID-19 can be controlled properly [5].

This research aims to create a prototype of the Covid-19 Spread Safeguard System in the New Normal Era at the Telecommunication Laboratory of the Medan State Polytechnic (Polmed) based on IoT (Internet of Things). In addition, this research also analyzes the accuracy level of using the UNI-T UTi165K Thermal Camera on the Covid-19 Spread Safeguard System in the New Normal Era at the Polmed Telecommunication Laboratory based on IoT.

II. METHOD

A. Research Stages

First, The research stages that will be carried out in this research include:

- Design of a Covid-19 Spread Safety System in the New Normal Era at the Polmed telecommunication laboratory based on IoT, which includes designing hardware (hardware) and software (software).
- Realization of the creation of a Covid-19 Spread Safety System in the New Normal Era at the Polmed telecommunication laboratory based on IoT.
- Testing of the Covid-19 Spread Safety System in the New Normal Era at the Polmed telecommunication laboratory based on IoT.
- Retrieval of reading data on the Thermal Camera UNI-T UTi165K for the Covid-19 Spread Security System in the New Normal Era at the Polmed telecommunication laboratory based on IoT.
- Comparison of reading data on the UNI-T UTi165K Thermal Camera used in the Covid-19 Spread Safety System with reference data from the measurement results of a thermometer measuring instrument.
- Determining the level of accuracy of the data from the UNI-T UTi165K Thermal Camera readings used in the Covid-19 Spread Safety System.

B. Measurement and Observation Parameters

The parameters observed in this study were the readings of the Thermal Camera UNI-T UTi165K. The UNI-T UTi165K Thermal Camera reading distance to the position of individual objects starts from 0.5 m to 2 meters. The data analysis performed was to measure the accuracy of the UNI-T UTi165K Thermal Camera readings. The level of accuracy of the system is obtained by calculating the percentage error of the thermal camera measurement against the thermometer

measurement. The percentage of reading error is calculated using the equation:

$$\% \text{ error} = \frac{|x-y|}{x} \times 100\% \quad (1)$$

x = Thermometer measurement results

y = Thermal camera measurement results

While the accuracy of the thermal camera measurement is calculated using a formula :

$$\text{accuracy level of the system} = 100\% - \% \text{error} \quad (2)$$

III. RESULT

A. Implementation

The Implementation of the Covid-19 Spread Safeguard System in the New Normal Era at the Polmed Telecommunication Engineering Laboratory based on IoT can be seen in Fig. 1.

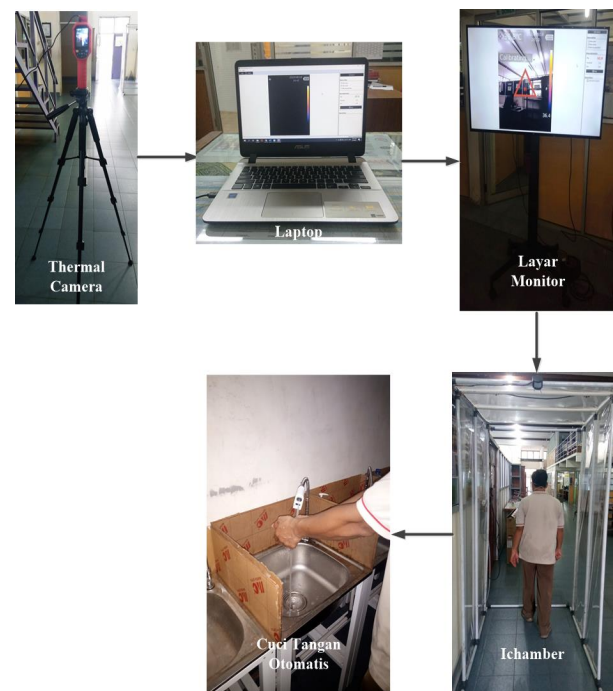


Fig. 1. Implementation of the Covid-19 Spread Safety System in the New Normal Era at the Polmed Telecommunication Laboratory based on IoT.

The system starts by initializing the devices connected to the system. The UNI-T UTi165K Thermal Camera used will detect the body temperature of students in front of the Thermal Camera. Thermal camera connected to computer and monitor screen. If the detected student body temperature is less than 37.5 °C, the computer will order the entrance gate to open and then the student will enter the sterilization room (ichamber). After being sprayed with disinfectant in the sterilization room (ichamber) for 20 seconds then students are invited to wash their hands on an Automatic Hand Sanitizer. However, if the results of the student body temperature measurement shown by the UNI-T UTi165K thermal camera are above or equal to 37.5 °C, the computer will sound an alarm and order the exit gate to open, which means that students are not allowed to enter the laboratory and are allowed to leave the laboratory

because indicated having fever.parameters observed in this study were the readings of the Thermal Camera UNI-T UTi165K. The UNI-T UTi165K Thermal Camera reading distance to the position of individual objects starts from 0.5 m to 2 meters. The data analysis performed was to Before you begin to format your paper, first write and save the content as a separate text file.

B. Test Result

The UNI-T UTi165K Thermal Camera Test aims to determine the ability of the Thermal Camera to read human body temperature at a distance of 0.5 meters - 2 meters. Tests are carried out on the same individual object at different distances. The results of the UNI-T UTi165K Thermal Camera test are shown in table 1.

TABLE I. TEST RESULTS OF THE UNI-T UTi165K THERMAL CAMERA

Object Sample	Thermo meter measurement results (oC)	Thermal Camera Measurement Results (oC)			
		Distance of 0,5 m	Distance of 1 m	Distance of 1,5 m	Distance of 2 m
Sample 1	36,2	36,3	36,1	36,5	36,3
Sample 2	36,0	36,1	36,2	36,1	36,1
Sample 3	36,0	36,1	36,4	36,2	36,2
Sample 4	36,3	36,2	36,1	26,2	36,3
Sample 5	36,4	36,3	36,3	36,2	36,4
Sample 6	36,5	36,5	36,4	36,3	36,4
Sample 7	36,6	36,5	36,4	36,5	36,5
Sample 8	36,3	36,1	36,2	36,1	36,3
Sample 9	36,2	36,0	36,1	36,1	36,3
Sample 10	36,6	36,5	36,4	36,5	36,6

C. Discussion

From the test results of the UNI-T UTi165K thermal camera in table 1, the percentage error of the thermal camera measurement against the thermometer can be calculated using equation (1). The percentage of error in reading the thermal camera is calculated at a distance of 0.5 m to 2 m and the results can be seen in Fig. 3, 4, 5, and 6.

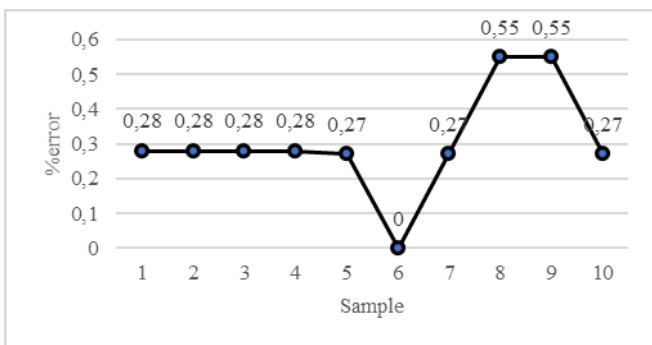


Fig. 2. Error Percentage of Thermal Camera Measurement Error at a Distance of 0.5 m.

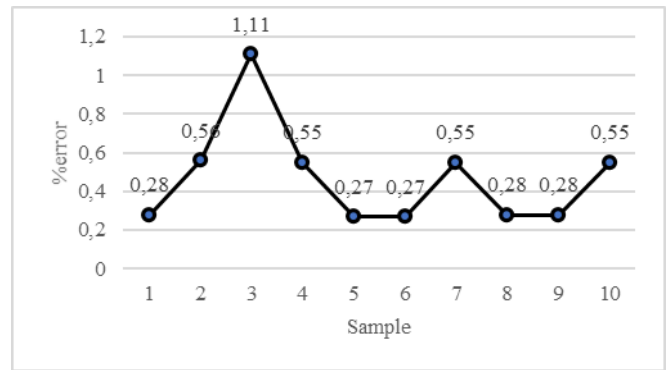


Fig. 3. Error Percentage of Thermal Camera Measurement Error at a Distance of 1 m.

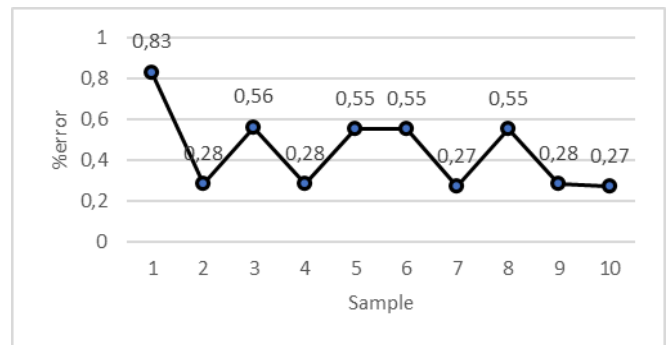


Fig. 4. Error Percentage of Thermal Camera Measurement Error at a Distance of 1.5 m

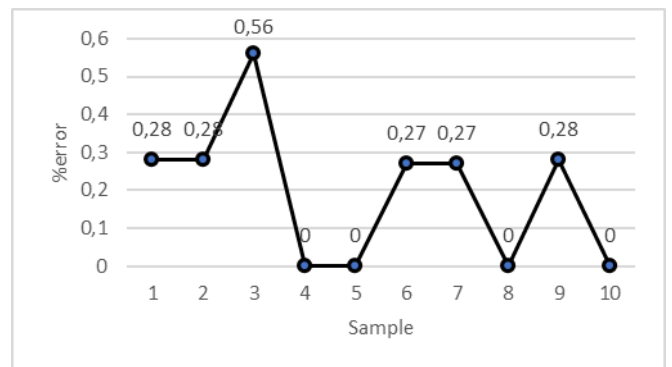


Fig. 5. Error Percentage of Thermal Camera Measurement Error at a Distance of 2 m.

From the calculation results, it is found that the average error percentage at a distance of 0.5 m is 0.303%. The average error percentage at a distance of 1 m is 0.47%. The average error percentage over a distance of 1.5 m is 0.442%. The average error percentage over a distance of 2 m is 0.194%. The average percentage of thermal camera reading errors for a distance of 0.5 m to 2 m as a whole is 0.352%. The accuracy rate of reading the thermal camera for a distance of 0.5 m to 2 m is calculated using equation (2) and is obtained at 99.648%.

IV. CONCLUSION

The Safety System for the Spread of Covid-19 in the New Normal Era at Polmed Telecommunication Laboratory based on IoT was successfully implemented and worked well. The UNI-T UTi165K Thermal Camera works well in detecting human body temperature at a distance of 0.5 to 2 meters. The UNI-T UTi165K Thermal Camera reading error average percentage for a distance of 0.5 m to 2 m is 0.352%: The accuracy rate of reading the UNI-T UTi165K Thermal Camera for a distance of 0.5 m to 2 m is 99.648%.

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