

## **ABSTRACT**

*Heart disease is still the number one cause of death worldwide. Most often attacks the productive age group. Data from the World Health Organization (WHO) states that more than 17 million people in the world die from heart and blood vessel disease. Medical experts have used various methods for heart rate measurement such as Stethoscope, Electrocardiogram (ECG) and Phonocardiogram (PCG) but these are often limited to clinical use and are relatively expensive. Therefore, this research aims to design a telegram-based heart rate and oxygen saturation monitoring system using the NodeMCU ESP8266 microcontroller, MAX30102 sensor and Arduino IDE software to program the tool. This system will make it easier to monitor heart rate and oxygen saturation because it can be monitored remotely via the Telegram application. This research utilizes the Photoplethysmography (PPG) Reflectance mode to collect data by placing the fingertip on the sensor. The test was carried out 10 times in resting conditions and after exercise, then comparing the measurement results of the tool made with an oximeter measurement tool to determine the error level and accuracy of the tool designed. Telegram sending testing is carried out by calculating the difference between sending time and receiving time on the Telegram bot. Based on the research results, the accuracy of heart rate and SpO2 in resting conditions was 97.80% and 99.49%, then the accuracy of heart rate and SpO2 in conditions after exercise was 98.16% and 99.28%, then the heart error value rate and SpO2 in resting conditions were 2.20% and 0.51%, and also heart rate and SpO2 error values in post-exercise conditions were 1.84% and 0.72%. Test results for sending telegrams obtained an average delay of 127ms.*

**Keywords:** *Heart Rate, Oxygen Saturation, NodeMCU ESP8622, MAX30102 Sensor, Telegram Bot*