

ABSTRACT

Hypoxia is a dangerous condition that occurs due to low oxygen levels in the blood, which can disrupt the functions of vital organs such as the brain and heart. Early detection of hypoxia symptoms is crucial to prevent serious complications. This study aims to design and implement a real-time hypoxia symptom detection system based on the Internet of Things (IoT), utilizing the MAX30100 sensor to measure oxygen levels (SpO₂) and heart rate. The data obtained is sent via the ESP8266 microcontroller to the Blynk application, allowing users to monitor their health condition directly through their smartphones. This system was also tested using Wireshark to ensure network performance, including delay, jitter, and packet loss analysis. The test results showed that the system is capable of detecting changes in oxygen levels and heart rate with high accuracy and transmitting data in real-time with low delay. This system is expected to help users monitor their bodily conditions independently and provides early warnings for hypoxia symptoms.

Hypoxia is a dangerous condition caused by low oxygen levels in the blood, which can disrupt the functions of vital organs such as the brain and heart. Early detection of hypoxia symptoms is crucial to prevent serious complications. This study aims to design and implement a real-time Internet of Things (IoT)-based hypoxia detection system by utilizing the MAX30100 sensor to measure blood oxygen levels (SpO₂) and heart rate. The data obtained is transmitted via the ESP8266 microcontroller to the Blynk application, allowing users to monitor their health conditions directly through a smartphone. The system was also tested using Wireshark to ensure network performance, including delay, jitter, and packet loss analysis. The test results show that the system is capable of detecting changes in oxygen levels and heart rate with high accuracy and transmitting data in real-time with low delay. This system is expected to assist users in independently monitoring their physical condition and providing early warnings of hypoxia symptoms. The test results indicate that the system can detect oxygen levels and heart rate with high accuracy, with an average error of 4,5% for heart rate (BPM) measurements and 2,5% for blood oxygen saturation (SpO₂) measurements.

Keywords: Hypoxia, IoT, ESP8266, MAX30100, Blynk, Heart Rate, Oxygen Saturatio