IOT-BASED HEART RATE AND BLOOD OXYGEN MONITORING SYSTEM USING NODEMCU ESP8266

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ABSTRACT

Health monitoring, particularly heart rate and blood oxygen levels, is crucial for early detection of medical conditions. However, commercially available monitoring devices are often expensive, making them unaffordable for many. This research proposes a solution in the form of an Internet of Things (IoT)-based health monitoring system using the NodeMCU ESP8266 as the main microcontroller. This system is equipped with heart rate and blood oxygen sensors capable of taking real-time measurements and transmitting data via WiFi to the Node-Red and Blynk platforms for remote monitoring. Test results show that the IoT-based oximeter sensor has an average error rate of around 2–3%, slightly higher than traditional medical devices with an error of around 1–2%. However, this is still within the tolerance limits of SpO_2 measurements and is suitable for non-clinical monitoring. The low cost and high reliability make this system a practical alternative for use by individuals and small healthcare facilities. This development is expected to increase the accessibility of health monitoring for the general public.

Keywords: IoT, NodeMCU ESP8266, Heart Rate, Oxygen Level, Health Monitoring.