

DESIGN AND IMPLEMENTATION OF A REAL-TIME IOT-BASED HEART RATE AND BLOOD OXYGEN SATURATION (SPO₂) MONITORING SYSTEM USING THE MAX30102 PULSE OXIMETER SENSOR

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ABSTRACT

Monitoring heart rate and oxygen saturation (SpO₂) during physical activity is important for maintaining health, particularly for members of the Student Sports Activity Unit (UKM) who are at risk of cardiovascular disorders due to high-intensity training. This study aims to design and develop an Internet of Things (IoT)-based heart rate and SpO₂ monitoring system using the MAX30102 oximeter sensor. The system was developed using an ESP32-C3 Super Mini as the microcontroller, a MAX30102 sensor, an OLED Display as a local display medium, and a Laravel-based website with a MySQL database as the monitoring platform. Sensor data are processed and classified into Safe, Warning, or Danger conditions, then transmitted via a Wi-Fi network using a REST API and displayed on the website in real time. The test results show that the system is capable of measuring heart rate and SpO₂ values, displaying the measurement results on the OLED Display and website, and storing the data in the database. Based on the comparison test with manual measurements, the system achieved a heart rate measurement accuracy of 88.39%. These results indicate that the system can be used as a real-time heart rate and SpO₂ monitoring platform for members of the Student Sports Activity Unit and can support the monitoring of users' physical conditions.

Keyword : Internet of Things (IoT), Heart Rate, Blood Oxygen Saturation (SpO₂), MAX30102, ESP32-C3 Super Mini, Monitoring Website.