ABSTRACT

Traffic accidents in Indonesia, especially involving motorcycle riders, are a growing issue every year. This is primarily due to human error, such as fatigue and drowsiness while driving. Asking a friend to monitor the rider's condition to ensure they remain awake and alert is a common solution to prevent drowsy driving. However, this solution is not always effective, as there are situations where the rider may be required to drive alone. This study aims to design an Internet of Things (IoT)-based system to detect fatigue in motorcycle riders in real-time, utilizing the MAX30102 sensor, flex sensor, and ESP32 as the central controller. The results of the study show that the MAX30102 sensor successfully detects heart rate and oxygen saturation, while the flex sensor successfully detects changes in the rider's head angle. The data is then displayed through Blynk. The test results show that both the MAX30102 and flex sensors have high accuracy, with 98.73% accuracy for heart rate measurement, 99.28% for oxygen saturation, and 99.95% for head angle detection. This system effectively provides early warnings by detecting conditions such as fatigue (bpm<60, SpO2≤95, flex>20°), drowsiness (bpm>60, SpO2≤95, flex<20°), and a combination of fatigue and drowsiness (bpm<60, SpO2≤95, flex<20°), using voice notifications via a speaker, buzzer, and displaying data on the Blynk application.

Keywords: *Blynk, Flex Sensor, MAX30102, NodeMCU ESP32*