ABSTRACT

This study aims to analyze the performance of the Light Dependent Resistor (LDR) sensor on a motorcycle high beam system based on the Internet of Things (IoT). This system is designed to detect light intensity from the surrounding environment, especially from the direction of other vehicles, so that the high beam can turn on or dim automatically to reduce potential glare. The hardware used includes an LDR sensor, a NodeMCU ESP8266 microcontroller, an OLED display, and a connection to the Telegram application via the MQTT protocol. Calibration is carried out by comparing the ADC value with the lux value from a standard measuring instrument (lux meter) and produces a linear relationship with a high level of accuracy. System testing is carried out at speeds of 10–70 km/h. The results show that at a speed of 10 km/h, the lux value reaches 69.26 lm/m²; at 20 km/h, the value increases to 278.63 lm/m²; and at 30 km/h, the system records 378.77 lm/m². Meanwhile, at a speed of 40 km/h, the value decreased to 50.71 lm/m², and at speeds of 50 km/h and 60 km/h, no light intensity was detected (0.00 lm/m²). At a speed of 70 km/h, the system again detected light with a value of 73.16 lm/m². The system proved responsive and accurate in detecting lighting and sending data in real-time via Telegram. These results indicate that the LDR sensor is effectively applied in vehicle lighting automation systems to improve driver safety, especially at night.

Keywords: *LDR, ESP8266, IoT, lux meter, Telegram, MQTT, vehicle speed, sensor calibration*