STATE OF CHARGE AND STATE OF HEALTH ESTIMATION IN MOBILE-BASED BATTERY CONDITION MONITORING SYSTEM

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ABSTRACT

The advancement of digital technology has heightened the demand for real-time battery condition monitoring, particularly in electric vehicles and renewable energy systems. Currently, battery condition monitoring is predominantly conducted manually, requiring individual inspections of batteries, which is both time-consuming and inefficient. Consequently, this study presents a mobile-based battery monitoring system designed to detect voltage, current, and temperature and calculate the State of Charge (SoC) and State of Health (SoH). This system employs a 0–25V voltage sensor, an ACS712 current sensor, and a DHT22 temperature sensor, all controlled by a Wemos D1 R32 microcontroller. Data is transmitted via MQTT and WebSocket, stored using a REST API, and displayed through a Flutter application. Additionally, the system is equipped with push notifications for early warnings. Test results indicated an average success rate of 85.8%. The connections to WiFi and MQTT functioned effectively; however, voltage and current readings require further optimization. All application features operated as intended, including notifications. This system has been successfully implemented as an accurate and efficient real-time solution for monitoring battery conditions, assisting users in preventing potential damage.

Keywords: Battery Monitoring, Websocket, MQTT, Flutter, Notification

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