

AUTOMATED PRIORITY ELECTRICAL LOAD MANAGEMENT SYSTEM CONSIDERING BATTERY CAPACITY BASED ON IOT

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ABSTRACT

The demand for electricity in the household sector continues to increase, while the electricity supply from the state utility (PLN) still heavily depends on non-renewable energy sources. To address this issue, solar energy offers an environmentally friendly alternative. However, household solar power systems still face challenges in energy management, especially when battery capacity decreases. This study aims to design an Internet of Things (IoT)-based electrical load management system capable of automatically prioritizing loads based on battery capacity. The system uses an INA219 sensor to measure voltage, current, and power in real time, and an ESP32 microcontroller to control loads via relays. Data is transmitted using the MQTT protocol to the IoT MQTT Panel application, allowing users to monitor and control the system remotely. Test results show that the system can disconnect low priority loads when the battery is nearly depleted, while ensuring that essential loads remain active. The system also includes a manual mode for direct user control. This solution enhances the efficiency of solar energy usage and supports reduced dependency on non-renewable energy sources.

Keywords: Solar Power System, IoT, ESP32, Load Priority, INA219 Sensor, MQTT.