

SMART DECISION SYSTEM DALAM PEMAKAIAN ENERGI LISTRIK RUMAH TANGGA BERDASARKAN PERUBAHAN RESPON BEBAN BERBASIS IOT

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ABSTRACT

Household electricity consumption continues to rise alongside the growing number of customers and the increasing use of electronic appliances. Most existing Internet of Things (IoT)-based electrical energy monitoring systems remain limited to monitoring functions, without an automatic decision-making mechanism capable of responding to load changes. This study aims to design a Smart Decision System capable of monitoring, analyzing, and controlling household electrical energy usage based on real-time load response. The system integrates a PZEM-004T sensor to measure voltage, current, power, and energy, an ESP32 microcontroller as the central data-processing and decision-making unit, a relay module as the load-control actuator, and the Blynk application as an IoT-based monitoring interface. When the measured power exceeds a predefined threshold, the system automatically disconnects non-priority loads through the relay module (load shedding) and gradually reactivates them through an Automatic Load Recovery process once conditions return to normal. Test results show that the PZEM-004T sensor reads electrical parameters with good accuracy, with a voltage error ranging from 1.42%–1.64% and a power reading close to the theoretical value. The relay module successfully responded to ON/OFF commands, and monitoring data was successfully transmitted and displayed in real time through the Blynk application. Overall, the designed system successfully performed both monitoring and automatic load-control functions, helping households improve the efficiency of their electricity usage.

Kata kunci: *Smart Decision System, Internet of Things, PZEM-004T, ESP32, Load Shedding.*