

ABSTRACT

The primary issue in household electricity consumption is wasted standby power and voltage disturbances that can damage electronic devices. This research aims to design and implement a smart meter prototype based on fuzzy logic capable of detecting and cutting off power to devices in standby mode while providing protection against voltage disturbances such as undervoltage, sag, swell, and overvoltage. The smart meter is integrated with the Internet of Things (IoT) using the Wemos D1 Mini Pro microcontroller and PZEM-004T sensor to monitor electrical parameters in real-time via website.

The research method Involves designing hardware consisting of a PZEM-004T sensor and relay, as well as developing software based on Sugeno fuzzy logic to determine device conditions based on measured voltage and power values. Measurement data is sent to a Firebase database for remote monitoring. The decision-making process uses Sugeno fuzzy logic with six outputs: Sag, Undervoltage, Normal, Standby, Swell, and Overvoltage, represented by LED indicators and buzzers.

The success parameter of this research is if the device can measure voltage and power in real-time and make decisions according to the established fuzzy rules.

Keywords: *Fuzzy Logic, IoT, Smart Meter, Standby Power, Voltage Disturbance*