

Empowering Smart Household Energy Management with the Internet of Things

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This study addresses the escalating issue of energy consumption in homes and industries by investigating the impact of a novel system; “*Electracker*”. Designed for whole-system and individual appliance needs, it passively monitors energy consumption through current (ACS712) and voltage (ZMPT101B) sensors using an ESP32 as a microcontroller to read the data and then wirelessly send the measured data to monitor the results using novel web and mobile applications. Data from these sensors empowers users to gain valuable insights into electricity usage patterns, enabling targeted optimization and control. Notably, the unit integrates seamlessly into the distribution box while managing power consumption by identifying high-energy appliances. “*Electracker*” uses a user-friendly mobile app, to deliver real-time data visualizations and comprehensive reports, empowering users to make informed decisions. These insights facilitate optimized usage patterns, scheduled consumption based on peak energy prices, and even integration with automation systems for dynamic control. Additionally, remote control functionality enhances convenience and safety by allowing users to switch devices on or off from anywhere, anytime. By empowering users to actively manage their energy consumption, the unit has the potential to significantly reduce energy waste and costs. This translates to financial savings for users while contributing to a more sustainable future by minimizing the environmental impact. By embodying the potential of IoT technology to revolutionize energy management, this positions itself as a powerful tool for smart homes and industries seeking to take control of their energy consumption and contribute to a greener future.

Keywords: *IoT; Smart energy management; Smart control; Energy tracking*