

Internet-based New Energy Control of Home Appliances



Overview

Empowering smart homes by IoT-driven hybrid renewable energyTo overcome these shortcomings, this work presents an IoT-based hybrid renewable energy integra.

Key Takeaways

IoT-based home energy management systems enable remote monitoring, control, and optimization of household appliances, reducing energy waste and improving efficiency.Overview of Internet-Based Energy Control

Internet-based energy control leverages IoT (Internet of Things) technologies to connect home appliances, sensors, and controllers to the internet, allowing users to monitor and manage energy consumption remotely via smartphones, computers, or cloud platforms (). These systems collect real-time data on electricity usage, operating durations, and appliance status, enabling intelligent decision-making and automation to reduce energy waste ().

Key Components

- **Smart Controllers and Relays:** Devices like ESP8266 or Node MCU microcontrollers manage appliances by switching them on or off based on user-defined schedules or sensor inputs ().
- **Sensors:** Voltage, current, and power sensors track energy consumption of individual appliances, providing granular data for analysis ().

- **Cloud Servers and IoT Platforms:** Cloud-based servers, often using MQTT protocols, act as intermediaries between users and appliances, enabling remote control and data visualization ().

- **Human-Machine Interfaces (HMI):** Mobile apps or desktop dashboards allow users to monitor energy usage, control devices, and receive alerts for overloads or abnormal consumption ().

Functionalities

- **Remote Monitoring and Control:** Users can turn appliances on or off from anywhere, set schedules, and automate operations based on occupancy or energy pricing ().

- **Energy Optimization:** Systems analyze usage patterns to identify high-energy-consuming devices and suggest or automatically implement energy-saving measures ().

- **Integration with Renewable Energy:** Smart home energy management can coordinate solar panels, batteries, and EV charging to maximize efficiency and reduce utility costs ().

- **Automation and AI:** Advanced systems use AI to optimize HVAC, lighting, and appliance usage in real-time, improving comfort while minimizing energy consumption ().

Benefits

- **Energy Savings:** IoT-based systems can reduce residential energy consumption by 15–30% compared to conventional setups ().

- **Convenience and Safety:** Automated control reduces human error, prevents energy waste, and enhances home safety through overload detection and alerts ().

- **Data-Driven Insights:** Detailed energy usage reports help homeowners make informed decisions and track progress toward sustainability goals ().

- **Scalability and Flexibility:** Systems can be expanded to include new appliances, renewable energy sources, or additional sensors without major infrastructure changes ().

Implementation Considerations

- **Communication Protocols:** Wi-Fi, Zigbee, and MQTT are commonly used for reliable and low-latency communication between devices and cloud servers ().

- **Security and Privacy:** Protecting user data and preventing unauthorized access is critical, as IoT devices are connected to the internet ().

- **User Acceptance:** Ease of use, intuitive interfaces, and clear benefits are essential for widespread adoption (). Internet-based energy control of home appliances represents a transformative approach to smart home management, combining real-time monitoring, automation, and AI-driven optimization to enhance energy efficiency, convenience, and sustainability.

Article Content

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(PDF) Remote Control of Home Appliances Using Mobile Phone: A ...

We used object-oriented methodology to model the home appliances. The end-user can monitor and control his home

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Dynamic appliance scheduling and energy management in smart

For example, rule-based systems cannot respond to dynamic energy prices and user preferences, resulting in inefficient

Intelligent home energy management using Internet of Things platform ...

Nowadays, there is considerable attention towards the idea of smart home energy management. Users in smart homes

Design and Implementation of Web Based Home Electrical Appliance ...

The purpose of this research is to control home electrical appliances while also monitor the electricity consumption

Towards next generation Internet of Energy system ...

The phrase "Edge-based Internet of Energy" refers to the use of edge computing concepts for energy management and

Internet of Things Applications as Energy Internet in Smart ...

A new concept called "Energy Internet" has been recently introduced to deal with these challenges. Energy Internet

Wireless electric appliance control for smart buildings using indoor ...

This research presented an integration of IoT infrastructure and BIM-based virtual environment to enable a novel

IOT BASED HOUSEHOLD ELECTRICITY ENERGY MONITORING AND CONTROL

Therefore, this paper focuses on the design and implementation of an IoT based household electricity energy

Smart Home: Definition, How It Works, Pros and Cons

A smart home is equipped with internet-connected devices that allow the home's security features, appliances, climate

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This article discusses how to use the Internet of Things to improve the efficiency of smart homes, and focuses on how

A review of IoT-enabled smart energy hub systems ...

IoT-enabled devices, such as smart thermostats and appliances, can be controlled remotely to adjust their energy

What is a smart home? Everything you need to know

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