"Smart System for Electric Energy Monitoring and Management"

Project Report

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ABSTRACT

A smart grid is a fully automated power network, in which each user and network node can be monitored in real time and has the capacity for two-way flow of information. It uses digital technology to save energy, reduce cost and increase transparency. Our method implements a smart grid using the IEEE 802.15.4 compliant CC2538 motes that communicate via the 6LoWPAN protocol. 6LoWPAN employs the IPv6 protocol in low power wireless networks, providing global connectivity to sensor networks directly through the internet. The users are allowed to monitor and control the power usage of devices through the internet using CoAP, an application layer protocol. Each node in the wireless network reads energy usage of connected appliances and wirelessly transmits it to a gateway that makes this data available through the internet in real time. A user interface has been designed with various graphs plotted using this data so that users can easily understand their electricity usage patterns and adapt their usage to reduce energy consumption and costs. They are also provided with a bill to understand how much electricity has been consumed and how much they have been charged for it at any given point of time without having to wait for monthly statements. Users can also remotely actuate devices to actively control power use of certain appliances, besides having the flexibility to switch between the main grid and a PV based grid.