Smart Power Monitoring Utility System Using Wireless Sensor Networks

A Project Report

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By

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To my family

ABSTRACT

The design and development of a Wireless Sensor Networks based Smart Grid for home utility system for power utility has been presented in this thesis. The system utilises wireless power monitoring devices and control units. The electronic wireless power monitoring devices have been designed to monitor electrical parameters such as voltage, current and power of the household appliances. The measured electrical parameters are transmitted to a central controller via the ZigBee node. The central coordinator has been configured around a laptop computer and receives all the transmitted data from different nodes. The computer stores the measured data and analyses them. The computer is also connected to internet and the website of the electrical power supply company is accessed. The real-time electricity tariff is available to the controller. Based on the tariff condition the controller can determine the off-peak and peak-electricity rate. The controller can decide to switch off the unimportant electrical loads at peak-tariff situation. This is implemented by sending the necessary command to the zigbee node connected to the appropriate load. The zigbee node can then switch off the load by sending an off-command to the triac which is used as the control device. The user has the options of controlling the electrical appliances in different modes. If the users would like to continue the load to be on during the peak-tariff condition, the option of a manual switch can be used to bypass the triac. The appropriate electrical loads can be monitored as well as controlled using the developed GUI available at the laptop. The complete information of the system is also available through a website and appropriate control action can be implemented through a secured access. The objective of the research is to lower the consumption of power during the peak-tariff condition and thereby saves electricity cost. A prototype has been designed, developed and extensively tested. This Thesis presents the current work, experimental results and concludes with possible future research opportunities.

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