ECE SENIOR DESIGN PROJECT 2005-2006

FINAL REPORT

Wireless Device for Power Consumption Measurement

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Abstract

Due to recent changes in Pennsylvania and other state laws, it is now possible for consumers to choose their utility providers. Electricity accounts for 50% or more of residential utilities budget and consumers need to be aware of the alternatives in reducing their energy costs [6] [7]. According to a recent article by Exelon Corporation, residential consumers can lower their energy costs when consuming most of the energy during off-peak hours [1]. Most consumers have already experienced that their appliances contribute to 50% or more on their energy bill each month. Therefore, providing consumers with the option to monitor their energy usage will ultimately assist them in reducing their costs.

It is the objective of this project to design and built a power monitoring device that will measure the actual power consumption of appliances in kWh, and provide the consumers with a consumption profile available on a PC. The power monitoring device will integrate three components: the power monitoring unit (PMU), the wireless communication unit (WCU) and the graphical user interface (GUI). The power monitoring unit connects in parallel with the appliance, measures the actual power consumed by the appliance, and converts the analog signals into digital data. It consists of an external circuitry that steps down the voltage and current signals. The external circuitry is attached to the power measuring integrated circuit (I.C.) that measures the power consumed and outputs digital pulses. The wireless communication unit consists of two XEMICS XM1201A transceiver modules, one connected to PMU and other connected to PC through NI6009 DAQ card. The GUI displays the processed data including the average power data in KWh and the operating cost.

The project includes a working PMU, functional wireless unit and GUI. During the testing phase of our product the one of the wireless transceiver was shorted and damaged. Due to the time constraints we will not be able to order the wireless transceiver in time to complete testing of the product and receive it before the final presentation. The power consumption project is within the actual budget proposed in the budget limits.

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