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# Design and Implementation of Building Energy Monitoring and Management System based on Wireless Sensor Networks

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## Abstract:

Wireless sensor networks (WSNs) play a key role in extending the smart grid implementation towards residential premises and energy management applications. Efficient supply and demand balance, and consequently reducing the electricity expenses and carbon emissions, is an immediate benefit of implementing smart grids. In this paper, design and implementation of an energy management system (EMS) for efficient load management are proposed. The EMS reduces the consumption of the consumers at the peak load hours and thus reduces the carbon emissions of the household. The proposed system consists of two main parts. The first part is an Energy Management Unit (EMU) which has a graphical user interface for runtime monitoring and control. The second part is sensor nodes which measure the power consumption of the different loads and transfer it to the EMU via multi-hop network. The EMU is implemented using NI LABVIEW software and XBee-PRO ZigBee module to communicate with sensor nodes. Hardware model is implemented using Arduino Uno microcontroller, XBee-PRO ZigBee module and the ACS712 current sensor. The EMS is applied to building of Electrical Engineering Department at Assiut University as a case study

## Published In:

10th IEEE International Conference on Computer Engineering and Systems (ICCES 2015) , NULL , NULL