Renewable Energy in Smart Buildings by Managing Green Charge

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Abstract:
Our project is designed to develop a system for managing renewable energy in smart buildings. Distribution generation (DG) make generation more efficient by reducing transmission and distribution losses and carbon emissions. It uses many small energy harvesting deployments at individual buildings to generate electricity. DG use net metering to offset costs and balance local supply and demand. In this paper, we explore an alternative approach that combines market based electricity pricing models with onsite renewable and modest energy storage. Efficiently manage the renewable energy and storage in order reduce the building's electric bill, so we propose a system architecture and algorithm is called Green Charge. We calculate Green Charge in simulation using a collection of real world data sets, and compare with an oracle that has perfect knowledge of future energy demand. In this project we show that Green Charge's saves nearly 20% of electric bill.

Key words: Wireless sensor network, ZIGBEE, Microcontroller, Voltage sensor, and Inverter.

I. INTRODUCTION

 Now a day's energy consumption is more, the different sectors of energy consumption are industry up to 30% and transportation 29% and buildings consumes 41%. The 70% of building energy used for the purpose of electricity. Due to environmental concerns nearly 47% of energy use in residential buildings is lost in transmission and distribution. Zigbee Section is that interface in this project, which will make the user to interact with the hardware so that user is able to initialize the hardware. Interface user can set a value or set threshold value which the user wants to be informed about that. Many utilities are transitioning from conventional fixed rate pricing modals, which charge a flat fee per Kilowatt- hour. In this project new market-based schemes are established ,for e,g., time of-use pricing, which more accurately reflect electricity's cost by raising and lowering prices during peak and off-peak periods respectively. In addition, this paper includes new material describing our use of communication protocols in implementing a green charge prototype. Finally our results show that Green Charge saves an additional 10-15% on electric bills.
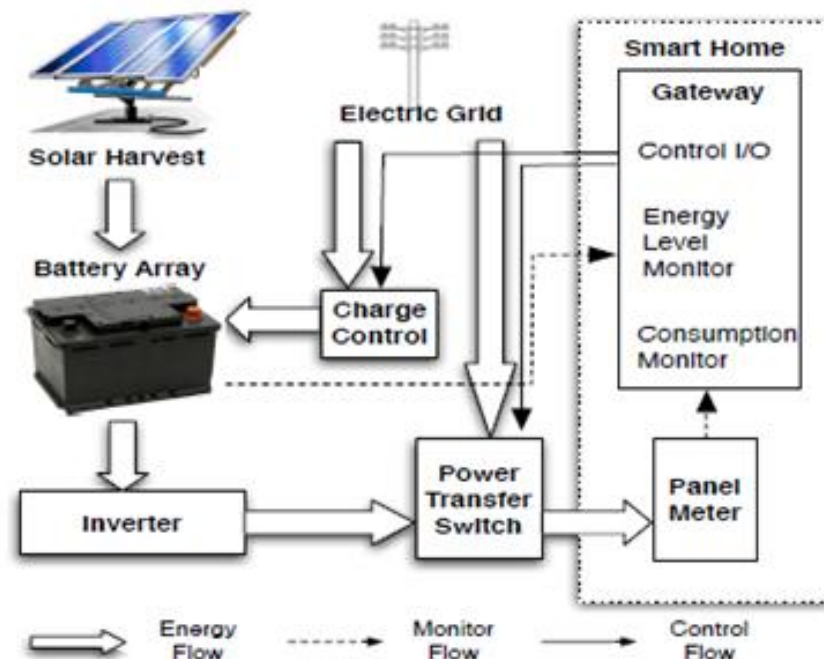
II. GREEN CHARGE ARCHITECTURE

Figure.1. Green charge architecture

Green charge architecture including its battery array and charges, which utilizes power transfer switch that is able to toggle the power source for the homes electrical panel between the grid and a inverter connected to a battery array. A smart gateway server continuously monitors, 1) electricity prices 2) household consumption 3) renewable generation 4) the battery's state of charge. The server solves an optimization problem based on the next day electricity prices before the start of each day, the home's expected consumption and generation pattern, and the battery array's capacity and state of charge, to determine when

to switch the home's power source between the grid and the battery array. The simplest way to measure the energy consumption and generation is to wrap current transducers (CT) around wires in the buildings electrical panel. CT's use the Hall Effect for measuring the voltage and current, CT's must be installed in the panels. To overcome wireless interference and prevent running an Ethernet cable into the panel, green charge uses a power line based communication protocol to transmit readings to the server.
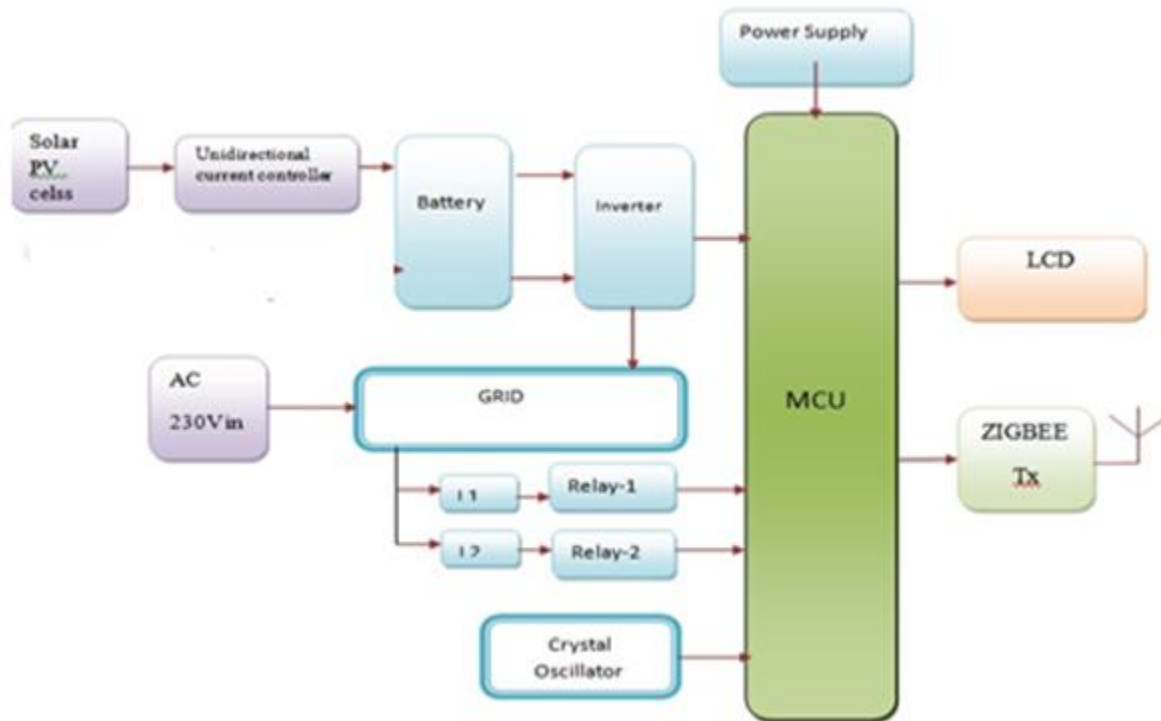
III. BLOCK DIAGRAM

Figure.2. Block Diagram of Smart home energy management system.

Server Section:

Figure.3. Monitoring Section.

IV. WORKING/OPERATION

In this project we used wireless technology to overcome demerits of radio system for transfer the data to user. For this purpose voltage sensor and to control the different loads. It is shown in fig.2. Easy identification to transfer the data to user through Zigbee module. Smart home energy management system including renewable energy based on Zigbee. These energy sources we are connecting to the grid via battery and inverter, Paralelly the battery output is connected to micro controller unit and this microcontroller is connected to LCD for displaying

which source is available and also for displaying the battery voltage. Whenever the load is connected some units will be consumed, these units will be calculated and displayed on the LCD by using controller and the total transmitter section information is transmitted to receiver section and displayed on the Pc through a wireless communication by using Zigbee technology.

HARDWARE COMPONENTS:
1)   Zigbee module: The microcontroller output is not compatible with the Zigbee module. To make it compatible we require the DB9 connector and the MAX 232 connector. This will enable the microcontroller to send a message to a predefined when action is performed.
2)   Microcontroller: Microcontrollers are used in automatically controlled products and devices, such as automobile engine control systems, remote controls, office machines, appliances and power tools.
3)   Power supply: The circuit needs the 12V DC supply. But in our home 230V AC supply is available. So it has converted it to 12V DC and 5V DC by rectifier circuit by regulator IC 7812 and 7805 respectively.

4) Current sensors: A current sensor is a device that detects and converts current to an easily measured output voltage.

SOFTWARE TOOLS:
1) KEIL IDE: The micro vision IDE combines project management, build facilities, source code editing and program debugging in a single powerful environment. It is easy to use and accelerates your embedded software development.
2) Flash programmer: Flash programming software package includes two programming applications. The first is interact programmer, which features a variety of commands that can be used to query and modify the memory that is resident in the target.
3) Protieus software: It is the best simulation software in the world for various designs with electronics and microcontroller.

V. ADVANTAGES

❖ Home appliances using wireless sensor network with HIFI Technology.
❖ The renewable energy sources created by this method is cost effective when compared to the existing system.

VI. APPLICATIONS

❖ Industrial applications
❖ Home application

VII. CONCLUSION

In this project, we examine how to lower electricity bills using Green Charge by storing low cost energy for use during high cost periods. Finally we analyze the green charge costs, the expected rise in electricity prices and decrease in solar panel prices may make Green Charge return on investment.

VIII. REFERENCES

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