IoT Based Optimal Power Management System For Smart Grid

[1]P. Vimal, [2]S.Veerasigamani, [3]R.Srihari, [4]C.S.Satheesh, [5]S.Saravanan
[1,2,3] U.G.Scholar, [4] Assistant Professor,[5] Professor
Department of Electrical and Electronics Engineering,Muthayammal Engineering College, Tamilnadu, India

Abstract: An automated smart shopping system is formed by introducing the concept of IoT to connect all items in the grocery shop. In this system, an inexpensive RFID tag is embedded within each product. When sthe product is placedinto a smart cart, the product detail is automatically read by the cart equipped with an RFID reader. Hence, billing is made from the shopping cart itself preventing customers from waiting in a long queue at checkout. Also, expirydate of the product is displayed, and the damagedproducts can be identified with respect to its weight. Thus, expired, and damaged products willnot be considered for bill calculation. In additionto that, smart shelving is added to this system by introducing RFID readers that can monitor stock, perhaps updating a central server. Thus, inventory management becomes easier. Finally, the checkout points can validate the purchase made by a client. A prototype of a smart shopping system is also presented in this paper. These IoT have now being involved in creating smartshopping trolleys, as customers often face many problems and inconveniences while shopping in super markets which includes over time- consuming, less information on the product details, lack of a pre-defined list of items, and difficulty in random purchase The payment is processed by mobile banking or cash payment andthe cart system will verify the product and payment process will be completed.

KEYWORDS :Internet of Things (IoT), Smart Grid, Renewable Energy, Energy Management System (EMS), Demand Response, Energy Efficiency.

I.INTRODUCTION

During the last few decades, the primary energy generation source is non- renewable energy resources, such as coal, natural gas, and oil. Nonetheless, the non-renewable energy sources are becoming costly over time and are difficult tofulfill the load demand of a large population. Similarly, the non-renewable energy resourcesare not eco-friendly, which indicates that the energy generation process produced high carbon emission. Therefore, many eco-friendlyorganizations have emphasized using renewable energy sources (RES), such as solar, wind, tidal, biomass, etc. RES are eco-friendly and are used for producing cheaper energy with less transmission cost. Furthermore, RES is also used to contribute to the main grid to meet the grid load demand. The evolution in renewable energy resources opens the door for distributed Peer-to- Peer (P2P) energy trading, such as home and buildings. The P2P energy trading is also referredto as trading between consumer and prosumer. The peers can trade energy with each other without the intervention of any traditional energydistributors, such as grid. The smart grid innovation, such as Distributed Energy Resources (DER) and micro grids, has to change energy generation and consumption in two aspects. Firstly, the addition of a prosumer as a grid participant helps with energy contribution to maingrid storage and provides grid decentralization. Second, the modification in utility to service providers from the power retailer, which aims to provide (renting) transmission line to the prosumer. The shifting of the traditional grid to the smart grid requires a trusted energy platform, mathematical model, distributed operations, and control algorithms to facilitate stable grid functions, prosumer interaction, and business model based on intensive.

II.EXISTING SYSTEM

The existing system is implemented with integrated control schemes, which are INC basedcontrol scheme for estimating the maximum energy from the PV generator and adaptive control scheme to generate the switching pulses of utility connected VSC. After estimating the peak energy from the PV array, VSC converts this DC power in to the AC power by providing control in unbalanced. For estimation ofswitching sequences of the grid tied VSC, unit vectors are used. For slow response, a control scheme is utilized at an only fixed step size. By pressing buttons on the dashboard, a command is sent to the Node MCU, which has been coded using arduino IDE to receive commands from the dashboard and to transmit HIGH or LOW logic to the relay of selectedappliance as per the user's requirement. Since weused the normally open configuration of relay module, therefore when it receives a HIGH signal, the 120-240V switch closes and allows current to flow from the C terminal to the NO terminal and thus the respective appliance turns on. Similarly, LOW signal deactivates the relay and stops the current. Current, thereby switching off the desired appliance In addition to this, a record of switching of appliances is also maintained by logging the data into a Google spreadsheet along with the

switching date and time the optimal utilization ofelectrical energy is a prime objective of the smartgrid because of two main reasons.

III.PROPOSED SYSTEM

The micro grid power management system is undergoing a significant and drastic overhaul.The integration of existing electrical infrastructure with an information and communication networkis an inherent and significant need for micro gridclassification and operation in this case. A micro grid's communication infrastructure is made up of several hierarchical communication networks. Micro grid applications can frequently be found in numerous aspects of energy consumption. Because it provides a spontaneous communicational network, the Internet of Things plays a fundamental and crucial role in Micro grid infrastructure. This paper covers the deployment of a comprehensive energy management system for micro grid communication infrastructurebased on the Internet of Things (IOT).

This paper discusses micro grid operations and controls using the Internet of Things (IOT) architecture. Micro grids make use of IOT- enabled technologies, in conjunction with power grid equipment, which are enabling local networks to provide additional services on top of the essential supply of electricity to local networks that operate in parallel with or independently of the regional grid.

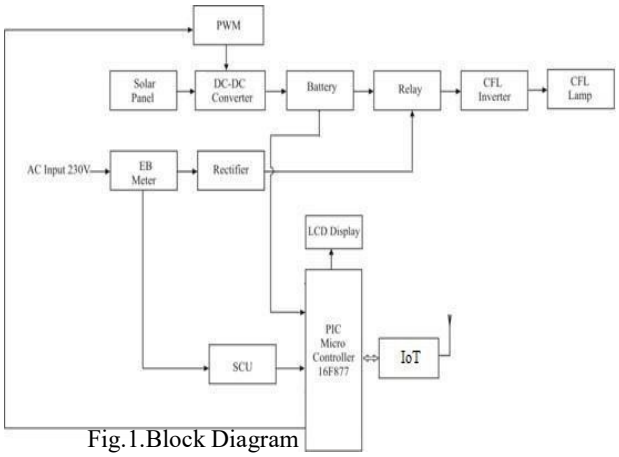

Fig.1.Block Diagram

IV. SIMULATION

MODE 1: Now run the proteus simulation, and if everything goes well, press run bottom and the proteus software will run.

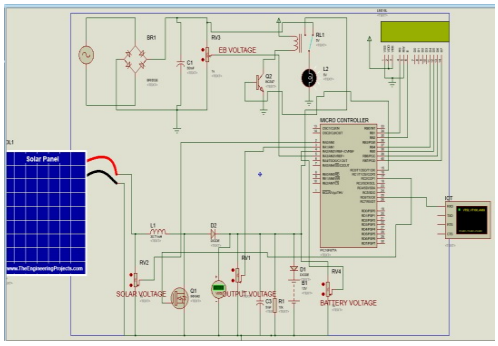

Fig.2.Simulation Output

The inputs giving a two types /solar power & EB power, EB power is OFF condition solar power ON stage the condition to power supply in grid. A smart grid is an advanced electricity network that uses digital communications technology to monitor and manage the flow of electricity from power plants to homes and businesses. To ensure the efficient operation of a smart grid, an optimal power management system is essential.An optimal power management system for a smart grid involves the integration of various technologies such as renewable energy sources, energy storage systems, demand response programs, and advanced control systems. The objective of such a system is to manage the supply and demand of electricity in real-time, while minimizing costs, maximizing energy efficiency, and reducing carbon emissions. One key feature of an optimal power management system is the ability to forecast energy demand accurately. This is achieved through the use of advanced analytics and machine learning algorithms that can analyze large amounts of data from various sources, such a weather forecasts, historical energy usage patterns, and other relevant data points. By accurately predicting energy demand, the power management system can optimize the generation and distribution of electricity, leading to increased efficiency and reduced costs.

Fig.3.Hardware Output

Another important aspect of an optimal power management system is the integration of renewable energy sources, such as solar and wind power, into the grid. These sources of energy can be highly variable, depending on weather conditions and other factors, so it is essential to have an advanced control system in place

that canmanage the output from these sources and ensurethat they are integrated smoothly into the grid.

V.CONCLUSION

An expanded outcome for IoT-based microgrids will aid us in the use of electronic power energy in the near future. Micro grids with IoT will distribute renewable energy resources in each grid in a way that is both compatible and comprehensive. Many different improvement techniques and intelligent improvementalgorithms will be required in the area unit, each with its own set of benefits and drawbacks. If wecan use IoT to operate micro grids, the adaptability will be greatly improved. In the near future, the procedure will require more improvements. Because this procedure is entirelyreliant on wireless commands, the cost of connecting gear will be significantly reduced. Micro grids will also be more appealing to peopleall around the world.

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