NVEO
Natural Volatiles &
Essential Oils

Automatic Electric Metering System Using Gsm

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Abstract— Smart energy management is a key research area and many strategies that enable control between household appliances and multi-power switching have been examined. However, a limitation of such strategies is that they enable automatic control of household appliances to avoid electricity interruptions and employ renewable energy sources to reduce electricity costs. For proper energy management to be realized, an algorithm needs to be developed that will control and enable the renewable power sources utilization and automatically limit heavy loads which are in use during peak hours. These include high-consumption stoves, water and space heaters should adhere to set limit. Therefore, cost-effectiveness of energy and avoidance of electricity interruptions is realized.

I.INTRODUCTION

Utility billing is yet unavoidable in the World as for concern post-paid energy meter. In Pakistan, utilities are using a conventional way of billing. A meter reader goes Home to home takes the meter reading and note down it, manually. These readings are brought to utility administration office. The criterion of utility billing is applied according to the utility service rules and regulations. The employee of the utility goes door to door again and gave the bill slips of the utility to the respective consumer.

Detailed load flow can be provided by smart energy meters to the consumers so they can manage their load effectively. Smart energy meter are used for Automatic Meter Reading (AMR) to increase the accuracy of meter reading. With the great developments in the field of Internet and technologies, everything has become digital. Internet has become an important part of our lives. A new technology has entered into this picture known as Internet of Things (IoT). Internet of Things is a network comprises of many electronic devices and sensors which are connected together to exchange some information over the web. Single and three- phase smart meters will be integrated with meter data management system for provision of real-time consumer energy consumption data to help the utility improve management of its grid network. The system will ensure improves accuracy in billing its customers. The utility's smart meter project will pave way for drafting and implementation of energy efficiency and demand response programmes. The advanced metering infrastructure system will help the energy company meet growing power demand due to its increasing customer base.

A smart meter is usually an electrical meter that records consumption of electric energy in intervals of an hour or less and communicates that information at least daily back to the utility for monitoring and billing purposes. Smart meters enable two-way communication between the meter and the central system. Unlike home energy monitors, smart meters can gather data for remote reporting. The term Smart meter often refers to an electricity meter, but it can increasingly also mean a device measuring natural gas or

water consumption. Smart energy meter is software based, power efficient device that accurately tracks energy consumption and performs computation. Meter readings can be transmitted to distributors/utilities over wireless media; thus, eliminating the need of manual meter reading collection process. The smart energy meter offers major benefits to both customers and companies in terms of efficiency, reliability, and cost saving.

Smart energy meters are devices that will sit on your home, monitor energy data from your electricity meter, and let you know how much energy you are using

– this put more control on your hands on how you spend your energy at home. Conventional electricity meters are normally hidden somewhere on a wall on the basement, and the only time you realize how much energy you've been spending is when thebill hit the door.

The new smart meters will provide Indian consumers with information regarding energy consumption that was not previously available with a traditional meter. This system will allow the easy disconnection of defaulted customers and power connections from a remote site. The new smart system is also able to instantly detect tampering with the power lines and sends signals to security personnel if necessary. Utility employees will also have the ability to change a customer's billing method from prepaid to post-paid in a matter of seconds, without having to physically visit the meter.

II.LITERATURE SURVEY

1. A linear programming approach to the design of integrated renewable energy systems for developing countries. "

Rama kumar, R., Shetty, P.S. and Ashenayi, K., 1986. IEEE Transactions on Energy Conversion, (4), pp.18-24.

Aim: Integrated renewable energy systems (IRES) which utilize different manifestations of solar energy to satisfy various energy needs are well suited for the remote rural areas of developing countries

Merit: The method is quite general and it minimizes an objective function of total annual cost, subject to a set of energy and power constraints.

Demerit: one of the issues limiting their greater penetration is done to its intermittent and seasonal availability for energy

2."Hybrid distributed stochastic addressing scheme for ZigBee/. IEEE 802.15. 4 wireless sensor networks. "Kim, H.S. and Yoon, J., 2011 Etri Journal, 33(5), pp.704-711.

Aim: This paper proposes hybrid distributed stochastic addressing

Merit: The simulation results reveal that HDSA has better addressing performance than distributed addressing and better routing performance than other on-demand routing methods.

Demerit:: The simulation results reveal that HDSA has better addressing performance than distributed addressing and better routing performance than other on-demand routing methods.

3."Demand response and smart grids—A survey. Renewable and Sustainable Energy" Siano, P., 2014. Reviews, 30, pp.461-478.

Aim: The smart grid is conceived of as an electric grid that can deliver electricity in a controlled, smart way from points of generation to active consumers.

Merit: Moreover, by improving the reliability of the power system and, in the long term, lowering peak demand, DR reduces overall plant and capital cost investments and postpones the need for network upgrades.

Demerit: Difficult to real industrial case studies and research projects

4."Secure low cost AMR system based on GPRS technology. International Journal of Computer Theory and Engineering" [18]Al-Omary, A., El-Medany, W. and Al-Irhayim, S., 2012., 4(1), p.35.

Aim: This paper presents the design and implementation of a secure low cost automatic meter reading (AMR) system that measures and transmits the total electrical energy consumption to main server using general packet radio service (GPRS) technology provided by GSM networks.

Merit: To make affordable AMR system a low cost off-the-shelf material

Demerit: To make affordable AMR system a high cost off-the-shelf materials are used.

5. "Integrated energy optimization with smart home energy management" [19] Asare-Bediako, B., Ribeiro, P.F. and Kling, W.L., 2012, October.

Aim: Optimization of energy use is a vital concept in providing solutions to many of the energy challenges in our world today. Large chemical, mechanical, pneumatic, hydraulic, and electrical systems require energy efficiency as one of the important aspects of operating systems.

Merit: It further highlights, via modelling and simulation the potentials of Smart Home Energy Management Solutions for future domestic applications.

Demerit: The drive to reduce this growing trend has stimulated many mechanisms such as the use of energy labels on domestic appliances.

III.EXISTING METHOD

These systems switching technique rely mainly on multiple renewable power sources to renew their energy need for extended operation. Thus, the integration of renewable

Distributed Energy Resources (DERs) is vital to reduce the overhead of the main electricity grid.

However, an efficient system should be in place to manage these DERs efficiently.

Drawbacks: Increased utilization of renewable energy sources.

Automated distribution load limiting mechanism.

IV.PROPOSED METHOD

This paper examines smart energy management systems for residential use that have been implemented and we propose a model that results in the management of energy consumption of household appliances during peak hours based on availability of renewable power sources.

Moreover, we propose a smart algorithm that will switch between the various power sources to improve the Distributed Energy Resource (DER) and increase the profit of DER.
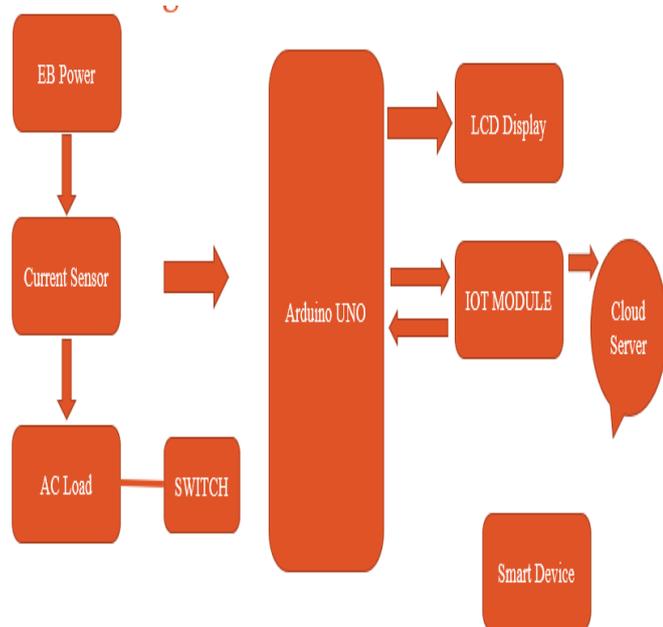
V.METHODOLOGY

Fig 1 . Block Diagram

There are verifiable changes when current smart energy management is compared with the old ones. There has been increased utilization of renewable energy sources and automated distribution load limiting mechanism.

In contemporary South Africa, there is lack of reliable intelligent energy management systems that integrate alternative green energy systems with the main traditional power supply, for instance Eskom. Factors like the time of day, season and load power should be taken into consideration when choosing the best source the load can cater for. It is also vital to arrange for intelligent switching off, of unnecessary loads during peak periods. For the management of electricity to be realized, misuse of energy during peak hours to be avoided and multi-power sources switching technique problem to be solved: a system is to be analyzed and investigated to replace the current Distribution Board (DB).

An intelligent switch board will enable the automatic switching off, of power for a certain period of time during the day. For instance, in a household running on solar power that cannot supply the whole house – the system can switch off the heavy loads that are not in use at the peak hour and supply the households with electricity until the renewable power source runs out. Thereafter, it can switch back to the traditional power source.

A number of embedded systems are known as multi-power sources switching technique embedded system. These systems switching technique rely mainly on multiple renewable power sources to renew their energy need for extended operation. Thus, the integration of renewable Distributed Energy Resources (DERs) is vital to reduce the overhead of the main electricity grid.

However, an efficient system should be in place to manage these DERs efficiently. Presently, there are various solar power systems with a configurable device to control the power flow in the system. According to, this has proven benefits not only to the

consumer, but also to the power utilities. There is no automatic control algorithm to control the multi-power supply in the household based on the real time conditions of the DER. Therefore, the DER will

develop an automated distributed algorithm that can switch between the supplied power of the grid and the renewable energy sources to the household based on time. The proposed system reduces energy consumption and provides alternative use of renewable energy to cut cost and prevent load shedding.

This is achieved through the introduction of an automated distribution board with a switching unit that does an automatic switching for the power supplied in the house.
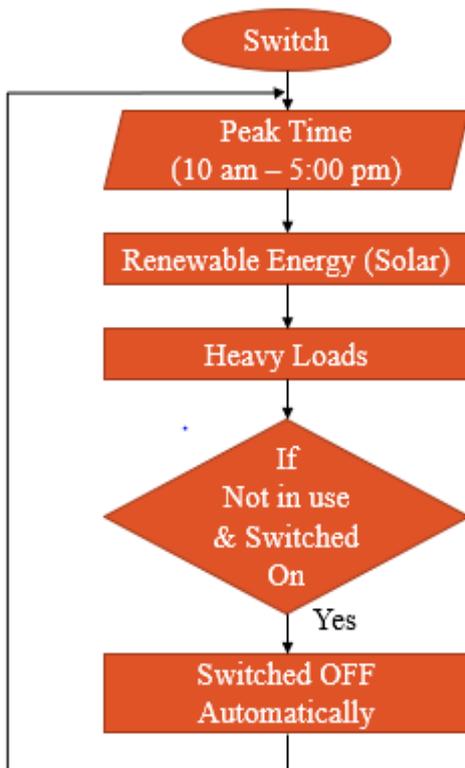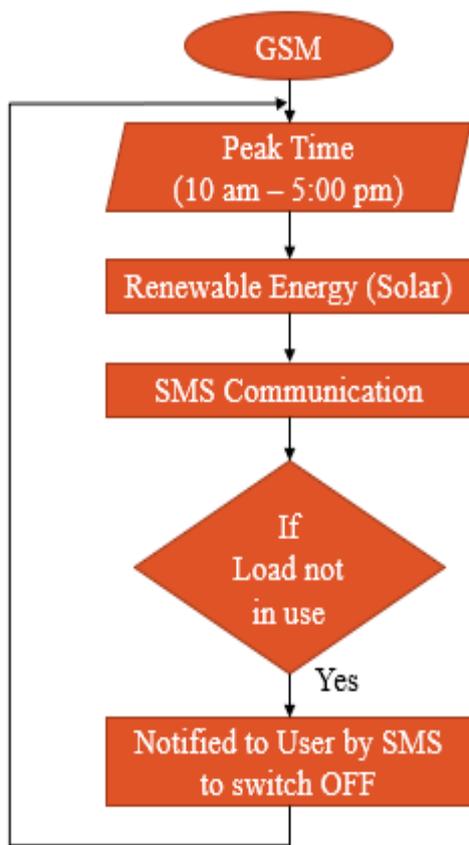

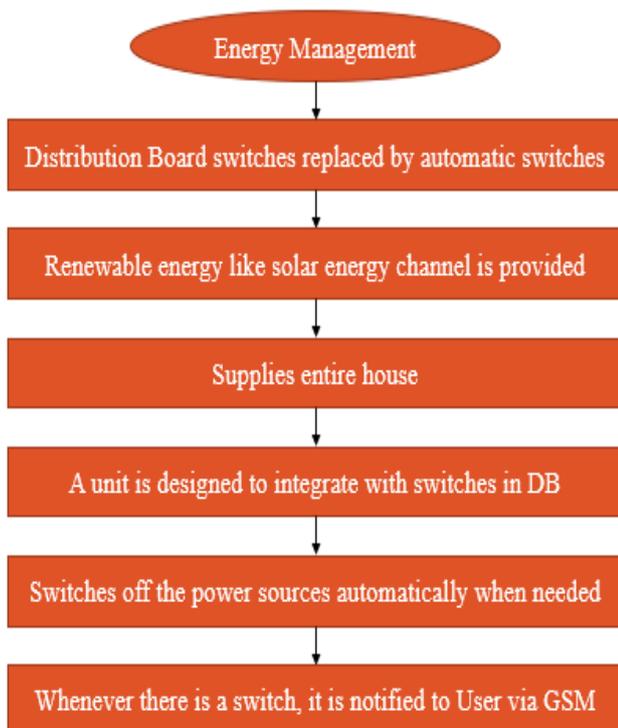**Fig 2. Level 1 DFD**

Fig 3. Level 2 DFD

Fig 4. Level 3 DFD

Explanations:

• The switches will be operated automatically during peak hours (between 10 am and 5 pm).

• During this period, if there are heavy loads that are not in use but are switched on, they can be switched off automatically.

• Through the model of this distribution board, a channel will be provided for alternative use of renewable energy like solar energy.

• It should be able to supply the entire house during the peak hours.

• In the worst case where the renewable energy cannot supply the entire house, the DB will switch off the loads not required during those hours to provide sufficient power for the required ones.

• For a user to have a proper communication between his/her household electricity and appliances while away, the integration of mobile communication (GSM technology) will be adopted.

• The use for GSM technology for Short Message Service (SMS) is direct and appropriate for this system which notifies the user which appliances are switched off at peak hours.

• Smart energy management system which is based on both an automated distributed load limiting mechanism and multi-power sources switching technique can reduce load shedding.

• In the distribution board, the switches inside will be replaced with automated switches.

• This is to help consumers to install renewable energy sources.

• Then there will be a unit designed to integrate with the switches in the DB.

• This unit will be designed using microcontroller and GSM technology that will help with the switching off, of the power sources automatically.

• Whenever there is a switch between the power sources, the GSM wireless communication system will report to the user based on what power the household is running on.

• This switch will take place based on research that most people are not in their houses between 10 am and 5 pm and also there should be sufficient energy from the renewable energy source to supply the household when the switch-over takes place.

VI.ALGORITHM

In this project A Smart Energy Management System for Residential Use Smart Algorithm is used.

VII.EXPERIMENTAL ANALYSIS

Implementation includes all those activities that take place to convert from the old system to the new. The old system consists of manual operations, which is operated in a very different manner from the proposed new system. A proper implementation is essential to provide a reliable system to meet the requirements of the organizations. An improper installation may affect the success of the computerized system.
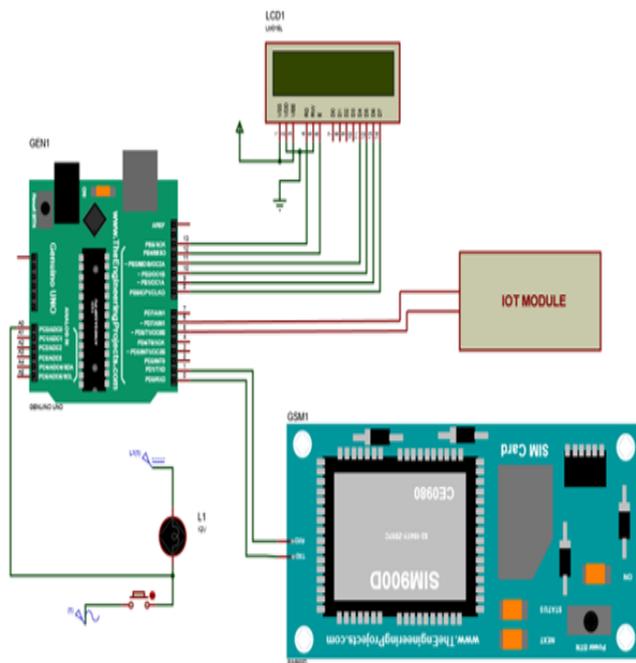
Fig 5. Circuit Simulation

Implementation Methods

There are several methods for handling the implementation and the consequent conversion from the old to the new computerized system.

The most secure method for conversion from the old system to the new system is to run the old and new system in parallel.

In this approach, a person may operate in the manual older processing system as well as start operating the new computerized system. This method offers high security, because even if there is a flaw in the computerized system, we can depend upon the manual system. However, the cost for maintaining two systems in parallel is very high. This outweighs its benefits.

Another commonly method is a direct cut over from the existing manual system to the computerized system.

The change may be within a week or within a day. There are no parallel activities. However, there is no remedy in case of a problem

This paper proposes automatic reporting system to reduce human involvement.

An intelligent operation is necessary today in order to serve mankind and avoid tedious work.

VIII.CONCLUSION

In conclusion, the proposed smart energy management system will help conserve energy and improve the efficiency of power sources for residential houses.

With the demand for energy becoming more and more, systems to utilise energy efficiently and optimise existing sources are vital.

This is achieved by integrating renewable energy sources in the provision of power to households.

In future smart energy management system will help conserve energy and improve the efficiency of

power sources for residential houses.

Further, this will result in reduced electricity cost through the management of energy consumption of household appliances in use during peak hours based on the availability of renewable power sources. With the demand for energy becoming more and more,

systems to utilise energy efficiently and optimise existing sources are vital.

IX.FUTURE ENHANCEMENTS

Internet of things of emerging technology introduced to monitor the smart energy meter.

X.REFERENCES

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