Smart Energy Meter

AashikaDPai*, AnushaKN*,NivedithaJC*, VaralakshmiS*,

Mrs. DeepthiRaj#

*Students, #Assistant Professor

Dept of Telecommunication Engineering, DSCE

2017-2018

Abstract - The technology of e-metering (Electronic Metering) has gone through rapid technological advancements and there is increased demand for a reliable and efficient Automatic Meter Reading (AMR) system. Electricity is one of the fundamental necessities of human beings, which is commonly used for domestic, industrial and agricultural purposes.

This report presents the design of a simple low cost wireless GSM energy meter for automating billing and managing the collected data globally. The proposed system replaces traditional meter reading methods and enables remote access of existing energy meter by the energy provider. A GSM based wireless communication module is integrated with electronic energy meter of each entity to have remote access over the usage of electricity. A PC with a GSM receiver at the other end, which contains the database acts as the billing point. Also, the energy provider can monitor the meter readings regularly without the person visiting each house by sending the information of the energy consumed to the user via SMS, and to the controlling Base station.

Keywords – Current sensor, Voltage sensor, GSMmodule, Microcontroller, LCD, Load.

I. INTRODUCTION

Electrical power has become indispensable to human survival and progress. Many advancements in the wireless communication technology has caused tremendous change in telecommunication system. Leaving aside the efforts made to meet the increasing demand of power, automation in the electrical distribution network is necessary to enhance societal standards of life. The present traditional meter reading system managed by humans is not efficient to meet the societal life of standard. The kWh units are still recorded monthly on foot by meter readers. though they are many issues associated with this process, the electricity board have got used to this manual process. Automatic meter reading system are on an increased demand which electronically collects meter readings and it has wide applications in industrial and commercial environments. Smart energy meters is a profit to both utility providers and utility consumers. Profit margin has extensively increased for utility providers and also maintenance cost has also been reduced.In this paper,an automatic meter reading system is developed where meter reader need not come to every consumers house to generate the bill, byusing micro controller and GSM, the power consumption of that particular month and corresponding amount will be sent through SMS to both consumers and controlling basestation. This system brings transparencybetween both consumers as well as the controlling base station.

II. EXISTING SYSTEM

The existing energy meter reading techniques working are conducted and analyzed to study a different energy measuring instruments available in India. In the existing system, either an electronic energy meter or an electro-mechanical meter is fixed in the premise for measuring the usage. The currently used meter has a capability of recording KWh units. The kWh units consumed by the user have to be recorded every month by the meter readers on foot. The processing of data is done by a meter reading company, firstly company has to link each recorded power usage datum to an account holder for processing the meter reading and then calculate the amount owned by the specific traffic in use.

III. LITERATURE SURVEY

[1] AdvanceLow Cost Electricity Billing Systems using GSM –- In the paper the author discusses about wireless meter for accurate billing system. Also technique for Prepaid and Post-paid scheme using SMS has been illustrated. GSM network is used for sending and receiving SMS. The major disadvantage of a post-paid system is that there is no control of usage from the consumer's side. There is a lot of wastage of power due to the consumers be short of training of electrical consumption in a well-organized way. Details of only Pre-Paid scratch-cards have been discussed for bill payment.

[2] Embedded Energy Meter- A New Concept To Measure The Energy Consumed By A Consumer And To Pay The Bill.In this paper the author discusses about the new concept, where the maximum energy consumed by the customer will be displayed in the energy meter. When the meter reading exceeds the maximum limit, automatically the meter readingwill be disconnected by the embedded system which is inserted in the meter itself. Energy measurement and payment of the bill can be performed using Bar Code Card. This bar code card can be used only for one time. For the second time, a new bar code card has to be purchased. For Smart Card also, it has to be recharged for reutilization.

[3] Wireless power meter monitoring with power theft detection and intimation system using GSM and ZigBee networks . The main agenda of this paper is to monitor the power consumed by an organisation like household consumers from a remote area.

Monitoring here refers to calculating the exact power consumed by the user at a particular time. This information of power consumption is communicated to the controlling substation to use it whenever needed by the person at substation. One of the major challenges in current scenarios that is Power theft, can be controlled with the help of Feedback (containing the details of power usage) sent by the user to distinguish between authorized and un-authorized users. The communication between user or household and substation can be in wired or wireless form. Though the proposed system is a bit complex as far as Distribution system is concerned , but is very useful as an Automated system for theft detection. This is considered as prescribed limit because, other than power theft , a track of all general power losses should be kept a track of.

[4]SMS-based Reconfigurable Automatic Meter Reading System -In the below discussed paper, Automatic Meter Reader where GSM is used medium for communication. This paper mainly displays important features of the project accomplished at Niroo Research Institute (NRI).connection with each of the meters in the network and reads its data. But when this kind of AMR is used for domestic meters, the central computer may establish connection with a local data collector, which will be wired to several other meters and collects their data. There are two major problems faced with AMR for Domestic meters:

(1) Establishing the connection with the network and reading data takes several minutes; in case of large number of meters, the central computer is vulnerable to miss collection of some meters' data.

(2) If a connection fails in between, the central computer has to re-establish the connection. Nothing about bill payment has been discussed.

IV. PROPOSED METHOD

TRANSMITTER BLOCK DIAGRAM
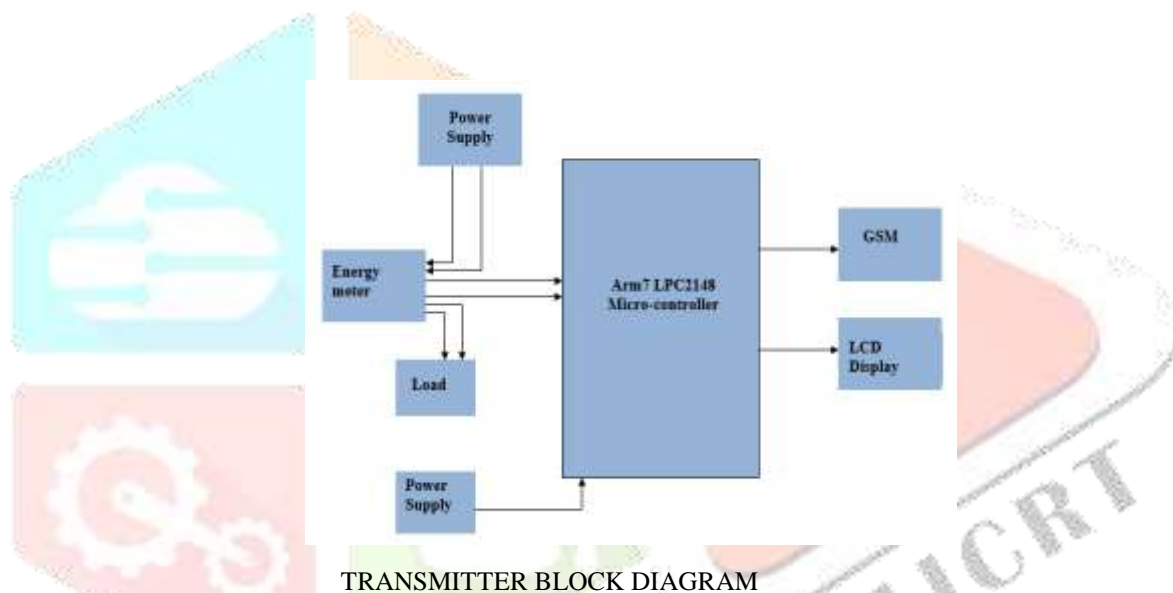
Step1: Energy meter (static phase-1 energy meter) is connected to the power supply

Step2: Load is being connected to the energy meter.

Step3: Analog inputs from the load is converted to digital in the micro controller.

Step4: Microcontroller ARM LPC2148 calculates the power consumed exactly by the user at a given time.

Step5: Energy utilized and the corresponding amount will be communicated to the controlling base station as well as the consumers using GSM module

Step6: An SMS containing monthly bill, user ID, number of units consumed along with the due date is sent to the respective user using GSM module.

Step7: An SMS containing monthly bill, user ID, number of units consumed along with the due date with the phone number of the consumer is sent to the controlling base station using GSM module. In the LCD, user ID with the amount is displayed.

Fig : Consumed power displaying on LCD
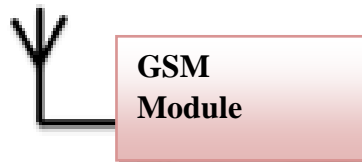
RECEIVER END OF BASE STATION

Step1: In the user receiver section, monthly bill, user ID, number of units consumed along with the due date is received via SMS.

Step2: In the base station receiver end, monthly bill, user ID, number of units consumed along with the phone number of the consumer with the due date is received via SMS. Here along with the data, consumer phone number is also sent to the base station so that if any communication to happen authorized people can contact the consumer.
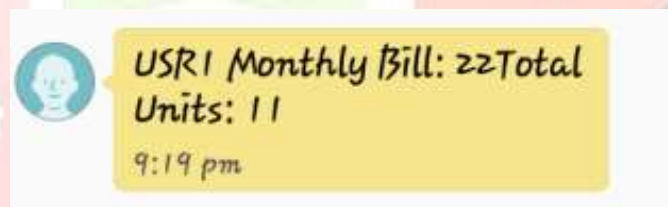

Fig: Message received at the receivers end

Step3: Here another important to observe is, revision of charges is happening without any human intervention i.e. no person need to visit each and every house for updating the revised charges whenever charges are revised one person has to send a message from base stationusing GSM to the microcontroller which will be placed at the consumer place. Then microcontroller monitors

the updated data and generates a bill.

Fig : Overall Hard ware setup

Fig : Displaying Revision of charges

Fig.: Updation of revision of charges

V. CONCLUSION

The progress in technology about electrical distribution network is a non-stop process. New things and new technology are being invented. Automatic Meter Reading is a challenging step for the Provincial Electricity Authority to take as it brings benefits to both customers and the organization itself and at the same time it is not easy to implement even though many AMR systems have been successfully implemented and proven worldwide. There are few important issues to be considered which include where, when and how the technology will be deployed. Finding one best solution may be very difficult as the technology changes every day and it requires large amount of investment. Power Line Communication may be the least expensive AMR alternative but it requires a modification to a meter and it is cumbersome with a distribution system that has many transformers and electricity phases and that may cause a reading data to lose. In this paper, an SMS based Wireless metering system hasbeen proposed. In this paper, an automatic meter reading system based on SMS which includes the power consumption and corresponding amount will be sent to the respective consumers and the controlling base station Different firmware and hardware unit of the meter is described .This project reduces the manual effort and also saves time consumption, also maximizes profit for the base station working in electrical distribution network. The use of GSM in this system has many advantages. Data transmission is charged at standard SMS rates, thus the charges are not based on the duration of data transmission. Revision of charges which is done yearly once will be done by authorized person at the base station only, which also reduces manual efforts. In this wireless meter reading system is designed to continuously monitor the meter reading. It avoids the human intervention, provides efficient meter reading, and reduces the maintenance cost.

VI. FUTURE SCOPE

For further extension of project,

➢   Work can be done at the receiver end , where the information about power consumption and corresponding amount will automatically get updated in the server.
➢   Along with SMS, E-Mail services can also be provided to consumers.
➢   Data transmission mode can also be changed, like instead of using GSM for transmission, Wi-Fi or Li-Fi can be used.

VII. REFERENCE

[1] R.B Hiware," Advance low cost electricity billing system using GSM" International Journal of Advanced Engineering Technology Dec 2013.

[2] Subhashis Maitra," Embedded Energy Meter- A New Concept to Measure the Energy Consumed by A Consumer and To Pay The Bill" Kalyani Government Engineering College, Kalyani, Nadia, West Bengal, India, e-mail: subhashis07@yahoo.co.in. 978-1-4244-1762-9/08/$25.00 ©2008 IEEE.

[3] G. L. Prashanthi1, K. V. Prasad2," Wireless power meter monitoring with power theft detection and intimation system using GSM and Zigbee networks" IOSR Journal of Electronics and Communication Engineering (IOSR-JECE) e-ISSN: 2278-2834,p-ISSN: 2278-8735.Volume 9, Issue 6, Ver. I (Nov - Dec 2014), PP 04-08 www.iosrjournals.org.

[4] Ali Abdollahi, "SMS-based Reconfigurable Automatic Meter Reading System" 16th IEEE International Conference on Control Applications Part of IEEE Multi-conference on Systems and Control Singapore, 1-3 October 2016.

[5] Ashna.k and Sudhish N George,"GSM Based Automatic Energy Meter Reading System with Instant Billing" This project was supported and financed by National Institute of Technology, Calicut, IEEE 2013.

[6] V.Preethi and G. Harish, "design and implementation of smart energy meter" Department of ECE, Vignan's Lara Institute of Technology and Science Vadlamudi, Guntur, A.P.

[7]"Automated wireless meter reading system for controlling power consumption", Myilsamy K, Kongu engineering college, Erode, April 2015.

[8] "Energy Theft Detection and Controlling System Model using Wireless Communication Media",M.M. Mohamed Mufassirin, A. L. Hanees and M.S. Shafana, Department of Mathematical Sciences, Faculty of Applied Sciences, SoutEastern University of Sri Lanka, Sammanthurai, Sri Lanka.

.