

Smart Energy Meter Using Android Application And Gsm Network *Diya Elizabeth Paul , Prof . Alpha Vijayan*

B Tech student , Mar Baselios Christian College of Engineering And Technology

Peermade , Idukki Dist,Kerala , pin : 685531 , India

diyaelizabethpaul@gmail.com

Head Of The Department , Department of Computer Science and Engineering

Mar Baselios Christian College of Engineering And Technology

Peermade , Idukki Dist,Kerala , pin : 685531 , India

alphavijayan@gmail.com

Abstract - This is implemented for the purpose of getting a fully automized electricity billing system. This is aim to measure and monitor the electricy consumed by consumers in a locality and transmitting the consumed power to the station as well as issuing the bill of consumed power automatically. It is also aims to find the malpractices in the meter. Using this system the Electricity Board can access all data regarding the consumed power in each home and in each station whenever required. From the data the Board can find out power theft also it is also offers a system to charge extra payment for the excess usage of power at peak time (6.00---10.00pm) .Online payment is also possible for our new system. GSM is using for automating the system. The consumed unit transmission, alerts and bill reception are achieved by the GSM module in the client side as set by the user. Server station is also served by a GSM module for transmission and reception of data .

Index Terms - Meter Reading, Digital Power Meter, Global System Mobile Modem, Short Messaging Service, Intelligent Power meter Automated, Online Electricity Bill, Android Controlled.

I INTRODUCTION

THE existing meter reading techniques in India was either an electronic energy meter or an electro-mechanical meter is fixed in the premise for measuring the usage. So the meters currently in use are only capable of recording kWh units. The kWh units used then still have to be recorded by meter readers monthly, on foot. The recorded data need to be

processed by a meter reading company. This system will require huge number of workers and long working time to achieve the complete area data collection and billing process. Human workers billing are prone to reading error as sometime the houses electric meter is placed where it isn't easily accessible. Labour billing job is sometime also restricted and slowed down by

bad weather. Paper billing has the tendency of losing in somewhere. The increased development of residential housing and industrial buildings in the developing country such as India require more human workers and longer working hours to complete the usage reading task. This increases the energy provider operation costs for meter reading.

The existing remote auto meter reading technology generally adopts the wired mode like low voltage power line, telephone line, etc to form communication network, but this type of networks has relative limits in transmission distance and transmission rate. As mobile communication technology develops, mobile terminals popularize, and the level of application increases, due to the realization of global roaming networking of GSM network, its GPRS has two very important data services calling and SMS. GSM is a digital mobile telephony system that digitizes and compresses data before sending it. The main advantage of the GSM is its widespread use throughout the world and the use of subscriber identity module (SIM) cards to send short message service (SMS) messages. Another new technology that smart meters are using is the Zig-Bee communication. Zig-Bee is a low-cost, low-power, wireless mesh networking standard. It is best suited for local coverage such as Home Area Networks (HANs). Zig-Bee is a key technology for the smart grid considering its automated controllability of appliances, ability to control devices, and lower installation and upgrade cost. Zig-Bee can offer meter-to-meter communication and remote monitoring ability of whole home conditions. In order to get efficient meter reading, reduce billing error and operation costs, Automatic Meter Reading (AMR) system play a main role to address the above mentioned problems. AMR is an effective mean of data collection that allow substantial saving through

the reduction of meter re-read, good data accuracy, allow frequent reading, improved billing and customer service, more timely energy profiles and usage trends updates, and better deployment of human resource.

Smart meters are embedded with different technologies and services. They are still evolving and many governments, organizations and companies are trying to establish different standards and policies. Although we can find many smart meters in market they are lack of protection, low in controllability and insignificant data transferring. Meanwhile they really do not promote the energy efficiency. This is due to the lack of data provided to the consumer in order to take good demand response to achieve high efficiency and reduce the cost of electricity.

The author designed and developed a simple smart meter prototype that using GSM. The meter takes advantage of the widespread use of the GSM network with its SMS capability.

II SYSTEM OVERVIEW

A. EXISTING SYSTEM

In the existing system, electricity meter reading for electricity usage and billing is done by human workers from home to home and building to buildings. This requires huge number of workers and long working time to achieve complete area data collection and billing. Human workers billing are prone to reading error as sometime the houses electric meter is placed where it isn't easily accessible. Labour billing job is sometime also restricted and slowed down by bad environmental condition. Paper billing has the tendency of losing in the post box. The increased development of residential housing and industrial buildings in the developing country such as for

example, India require more human workers and longer working hours to complete the usage reading task. This increases the energy provider operation costs for meter reading.

B . PROPOSED SYSTEM

The smart energy meter system consists of one Digital energy meter and an external circuit for collect the meter reading and communicate with the server, along with an external hardware circuit. Here a web portal and an android application is also developed. Meter readings are passed to the server through the GSM module connected to the energy meter. The external circuit also provides an option to cut the power supply to each consumers from anywhere in the world ,by the help of a relay control unit connected through the energy meter section. Relay control unit(RCU) is a vital part in WAMRS. It provides the useful functionality of remotely switching the power ON/OFF to the user. It consists of a protective relay, breaker control circuit & line breaker. Another feature is theft detection, which helps to detect unauthorized power consumption from home or commercial buildings. This theft detection was done by the help of buffer , this buffer is a part of the external hardware circuit . By operating this buffer the relay control unit start working . Any theft was detected with the help of GSM user get notifications also it provides an option of cut the power from anywhere in the world.

consumption from home or commercial buildings.

In another side, a web application is provided for energy providers. In this portal the administrator can add consumers with their related details , update the unit cost for energy, generate monthly bills, send notifications to consumer for overusage of energy ,bill payment details etc. The administrator can filter the

users who are not paid the bill after a fixed time duration and cut their power supply from his office, without visiting the user's location.

An android application is also developed for consumers, consumers can login in this application using a consumer id and password provided by the administrator. Here provided the options for customers to pay the bill , cut the current etc .

III IMPLEMENTATION

An external circuit is connected to the energy meter for of modifying the current system architecture. Here using PIC16F877A microcontroller as the major part of the external circuit. Other components used in this session are Global System for Mobile (GSM), relay control unit (RCU), LCD display, and a buzzer. A pulse is generated from the energy meter after every unit of consumption. This pulse is given as an input to the energy meter module, based on this pulse, a count is incremented and displayed on the LCD display as units consumed. This count is also transferred to the mobile application and to energy provider server through the GSM module that connected to the external circuit. The communication between the server, mobile application and the energy meter is done through the GSM module by Short Message Service(SMS). If the command for reading current consumption arrived at the GSM module, the current value of the unit is send to a fixed mobile number which will be registered with the meter. We can also cut the power supply by sending SMS to the GSM module connected with the energy meter from the same registered number . After receiving the message for disconnect the power, reconnecting also done with the help of the same module. This circuit also provides alerts about over usage, energy theft. Over usage is calculated by comparing the usage in a fixed

time period and theft detection is done by monitoring the usage after the Theft check button is pressed.

Here an android application is developed for consumers, so that they can login to it using a consumer id and password provided by the administrator. The Consumer can request the meter readings by simply pressing a button in the android application. The bill amount to be paid for power consumption is automatically generated in the App. The consumer is provided with the facility to remote disconnect and reconnect to mains. Another feature is that; the consumer can make the online payment of electricity bill through the App. With the help of a GSM module, notifications about over usage at peak time and detection of any malpractices are also provided in the android App. The consumer can register complaints and can also cut the power supply for unwanted time. The users get warnings or notifications to the consumer about consumption, payment date etc.

Energy provider side is a web portal where the administrator can add users, update cost per unit, filter unpaid users, cut the power supply. The administrator assigns a user id and pass-word for the user for accessing the mobile application. The readings from the energy meter will be updated in the energy provider server with the help of GSM module. After generating bills, the admin can see the users with payment status. If they are not paid, then the administrator can disconnect the power supply to the corresponding user by sending Messages to the energy meter.

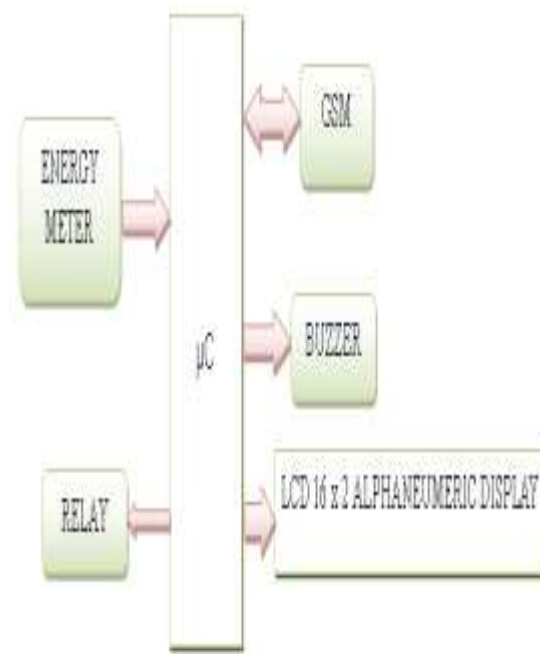


Fig : Basic Block Diagram



Fig : Energy Meter Module



Fig : Android Application Display Format

IV SYSTEM TEST APPROACH

Here use a normal SIM mobile number and a GSM modem for the demonstration of smart energy meter. This smart energy meter is powered up from a socket outlet and 100W light bulbs are used to monitor the user's power consumption load and the meter capture the reading. A time period of 5 minute is set as the over usage cut off time. Tested the power meter reading, power disconnecting and reconnecting by the android application and payment gateway is tested by creating a local server and connect the mobile with the server and connect the mobile with the server through a wireless network.

V ADVANTAGES AND FUTURE SCOPE

The system designed reduces the efforts of manual data collection of energy meter. Also, data which is received at service provider side is easy to manipulate for bill generation and other such tasks. With this system we can collect the reading as well as control the supply to the user. With addition of software at service provider side, the customer can be informed of current meter reading, bill for current cycle, status of the line and other parameters to the customer with message.

The technology used in energy meter is expand to the power distribution transformers. So that we can cut the power supply from anywhere in case of any emergency or maintenance, find areas with power distribution failure.

VI CONCLUSION

This smart energy meter system takes the advantage of existing GSM network that have full coverage of all housing and industrial area all over the country which lead to low implementation cost, and it is simple to install. The provides reliable, effective and efficient automatic meter reading, online billing, and notification through the use of GSM network and android application, thus reduce human effort in meter reading and this method is very economical and time saving.

ACKNOWLEDGMENT

The authors gratefully acknowledge the contribution of Prof. Alpha Vijayan for their effort, time and work on this project which made this publication possible.

REFERENCES

- [1] GSM BASED AUTOMATIC METER READING SYSTEM USING ARM CONTROLLER BHARAT KULKARNI ASSOCIATE PROFESSOR, P.V.P.I.T. BUDHGAON.

[2] LI KAICHENG, LIU JIANFENG, YUE CONGYUAN, ZHANG MING, "REMOTE POWER MANAGEMENT AND METER READING SYSTEM BASED ON ARM MICROPROCESSOR" CPEM .

[3] CAI RUIDAN XU SHAOYUN . THE APPLICATION OF GSMLGPRS COMMUNICATION IN THE DISTRIBUTION AUTOMATION SYSTEM ELECTRONIC DESIGN & APPLICATION.