Iot Based Smart Reading Meter

Prof.S.G.Watve[1], Archana Kyadalwar[2], Nikita Jadhav[3], Madhuri Katkhade[4]
[1, 2, 3, 4] Dept of electronics and telecommunication engineering
[1, 2, 3, 4] PES's Modern college of engineering, Pun, India

Abstract- *The Existing domestic Energy meter reading systems universally exist many problems, such as difficulty in construction, too narrow bandwidth, poor real time, not two way communications quickly etc. To solve above problems, wireless technology for Automatic Meter Reading system is used.*

A proposed method provides the communication between the Electricity Board section and the consumer section using Internet of things (IOT). The customer's electricity consumption and bill information is calculated using LPC2148 microcontroller. The power fluctuations are monitored using the voltage sensor. Current sensor is fed to the microcontroller which indicates it to the Electricity Board. Depending on the power generation, the house hold devices are controlled automatically.

The proposed system design eliminates the human involvement in Electricity maintenance. The Buyer needs to pay for the usage of electricity on schedule, but in case he couldn't pay, the electricity transmission can be turned off autonomously from the distant server. The user can monitor the energy consumption in units from a web page.

Keywords- ARM7 (LPC2148) , Energy Meter, GSM, IOT, Relay Controller

I. INTRODUCTION

Electrical power has become very necessary to human survival and progress. With the rapid developments in the Wireless communication technology by the use of microcontrollers, there are many improvements in automating various industrial aspects for reducing manual efforts. The traditional manual meter reading was not suitable for longer operating purposes as it spends much human and material resource.

Now-a-days the number of electricity consumers are increasing in great extent. Presently maintenance of the power is also an important task as the human operator goes to the consumer's house and produces the bill as per the meter reading. If the consumer is not available, the billing process will be pending and human operator again needs to revisit. Going to each and every consumer's house and generating the bill is a laborious task and requires lot of time. If any consumer did not pay the bill, the operator needs to go to their houses to disconnect the power supply. These processes are time consuming and difficult to handle. Moreover, the manual operator cannot find the unauthorized connections or malpractices carried out by the consumer to reduce or stop the meter reading/power supply.

The purpose of this Automatic Meter Reading system is to remote monitor and control of the Domestic Energy meter. This system allows the Electricity Department to read the meter reading orderly without the person visiting each house. This can be attained by the use of ARM unit that continuously monitors and records the Energy Meter readings. This system also makes use of a GSM network for remote monitoring and control of Energy Meter. The ARM based system regularly records the readings and the live meter reading is sent to the Electricity department. This system also can be applicable to disconnect the power supply to the house in case of non-payment of electricity bills using Relay and reduces the need for meter readers to manually gather utility meter readings each month.

The system for Smart Reading Meter consists of lpc2148, GSM/GPRS and LCD. GSM/GPRS module is also connected through serial protocol.LPC2148 is connected to a energy meter. The unique meter ID and unit consumed are given to LPC2148. These readings are displayed on LCD and being sent to MSEB through GSM. We are accessing meter data like ID, Unit remotely without any Human interaction. Relay is used for indication.

The present system is used for meter reading using LPC2148. The system can be further modified to detect power theft between pole and individual subscribers by installing the units at each subscriber end.

II. EXISTING SYSTEM

In existing system either an electronic energy meter or an electro-mechanical meter were used for measuring the electricity usage. The service provider for energy still uses conventional methods for getting the energy consumed by individual customer. This method is very time consuming and un- economical and may lead to human error. 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. The recorded data need to be processed by MSEB and then determine the bill for each meter id.

The consumers are increasing rapidly and also burden on electricity offering divisions is sharply increasing. The consumers must be facilitated by giving them an ideal solution: - i.e. the concept of IOT (Internet of Things) meters and on the other hand MSEB can also be informed about electricity thefts using theft detection unit.

III. PROPOSED SYSTEM

Existing metering system for collecting the energy data is not convenient. So this paper presents design and development of IOT based smart reading meter.

This system continuously monitors energy data and upload collected data on web page. thus eliminates the labour requirement for controlling domestic energy meter.

Smart reading meter system gives the information of meter reading, power cut, total energy used, Bill information and tempering .This information is being received by Maharashtra State Electricity Board(MSEB) office with the help of Global system for mobile communication (GSM) network. This system increases meter reading accuracy and save huge amount of time. Smart reading meter system avoid power theft. It also provides increasing security of data.

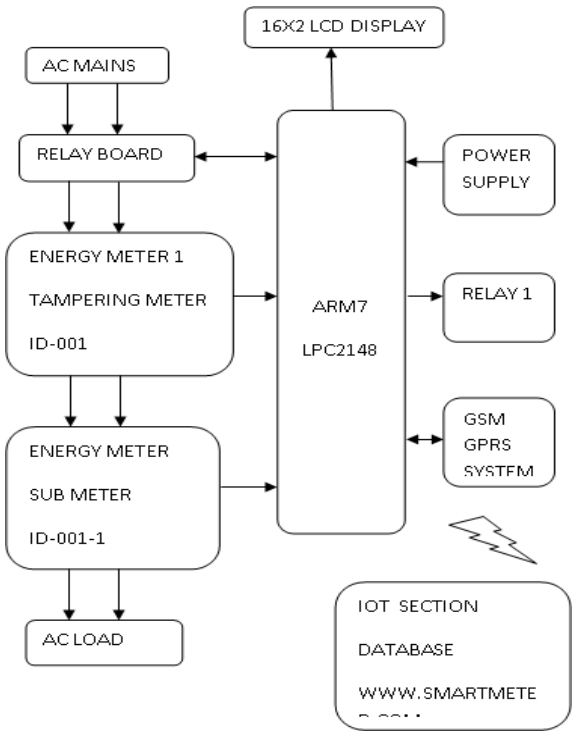


Fig.1: Block Diagram

1. Power Supply:

Linear Regulated Power Supply is used to provide the desired output voltage and output current without getting affected by the fluctuations in ac mains supply. It basically step downs the ac voltage as per the requirement to desired dc voltage. This project uses three power supplies, one is regulated 5V for LCD, 12V for GSM and other one is 3.3V for microcontroller. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/12V step down transformer.

2. ARM7(LPC2148):

An ARM7 (Advanced RISC Machines) processor is based on the RISC (Reduced Instruction Set computer). The ARM7 processor is von-Neumann architecture with a single bus for both data and instructions. The pipe-line concept is used to enhance ARM7 performance. It has load/store architecture where data-processing operations only operate on resistor contents, not directly on memory content. Also, it has orthogonal instruction set where all instruction types can use all addressing modes.

ARM processor is used devices including efficiently for light, portable & battery- smart-phones, laptops, tablet powered and notepad computers), and other embedded system

3. GSM (Global System for Mobile communication):

The GSM is used to send the SMS to the customer as well as government authorized person for the verification. The GSM module is used to exchange the information between respective individuals. It is a second generation of Cellular network. This ex- changes the information which is required for user authentication as well as for other details.

4. GPRS (General Packet Radio Service):

General Packet Radio Services (GPRS) is a packet-based wireless communication service that promises data rates from 56 up to 114 Kbps and continuous connection to the Internet for mobile phone and computer users. The higher data rates allow users to take part in video conferences and interact with multimedia Web sites and similar applications using mobile handheld devices as well as notebook computers. GPRS is based on Global System for Mobile (GSM) communication and complements existing services such

circuit-switched cellular phone connections and the Short Message Service (SMS)

5. Relay:

`

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate as a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

6. LCD:

LCD's are classified as passive type as they do not emit any light. LCD's deviates light in a controlled manner and are low power consumption displays. Liquid crystals have properties that are in those of conventional liquid and solid crystals. LCD (Liquid Crystal Display) is used in all the electronics projects to display the status of the process. A 16x2 alphanumeric LCD is most widely used module of LCD. There are several others type of LCD available in market.

V. HARDWARE SYSTEM DESIGN

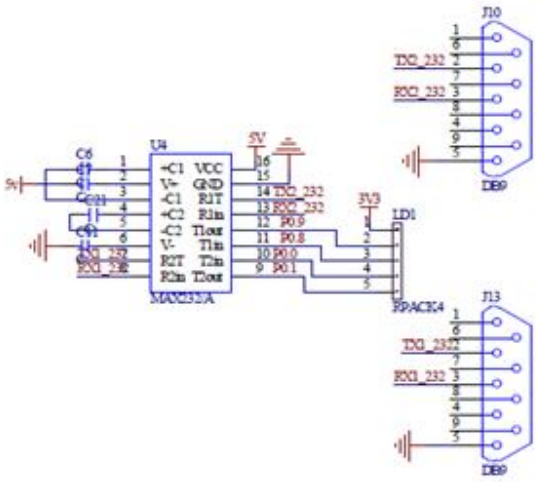


Fig.2: Serial Communication Design

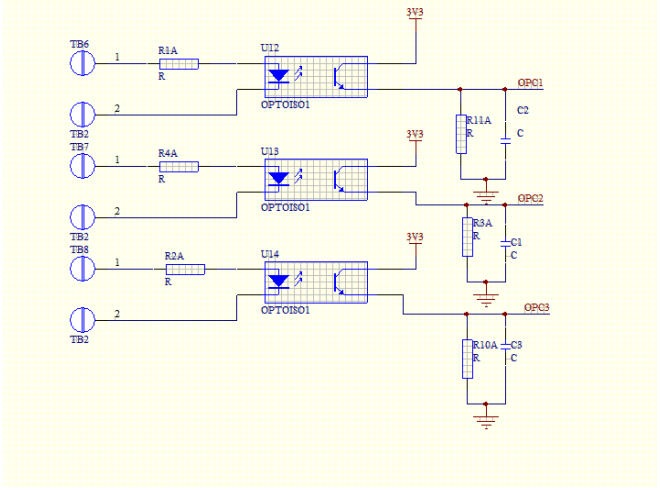


Fig.3: Opto-Coupler Design

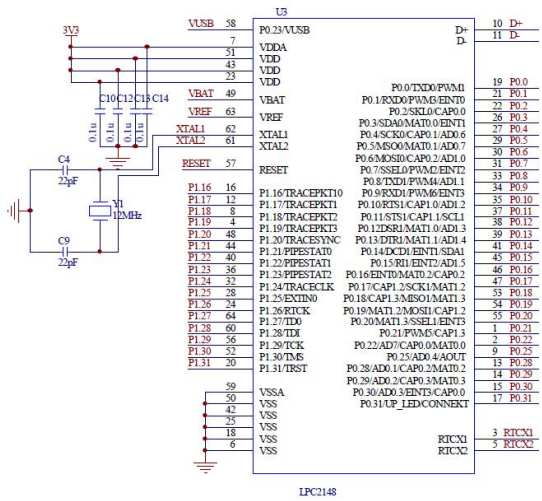


Fig.4 : Microcontroller Design

V. ADVANTAGES:

1. Working as a two-way communication with each meter.
2. More accurate and complete reads.
3. Theft of service detection and prevention.
4. Display energy parameters of Smart Metering Unit.
5. Fully automatic meter reading system.

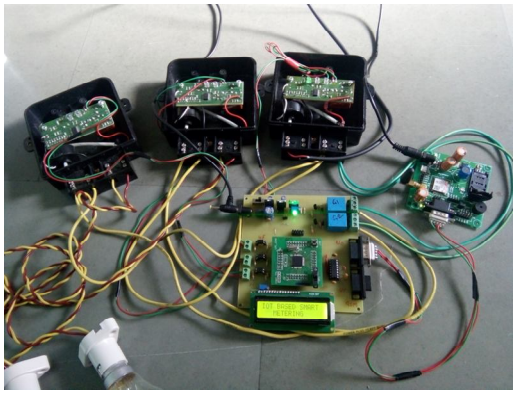
VI. APPLICATION

1. Society:
   - End use energy management and saving.
   - Connect and disconnect load remotely.
   - Fraud Detection.
   - Settlement and billing.
2. Industries:
   - Security.

- Energy Saving.

3. Hospitals
4. Colleges
5. Malls

VII. RESULT



IOT Based Smart Metering

Sr No	ID	Unit	Bill	Status	Tampering	Note	Pay
1	789456123	000.30	002.70	Live	No	ok	Pay
2	753159842	000.10	000.90	Live	No	ok	Pay
3	862842357	000.10	000.90	Live	No	ok	Pay

VII. CONCLUSION

GSM based energy meter is easy to installation and beneficial for both energy provider and consumer. AMR is not only solve the problem of manual meter reading but also provide additional feature such as power disconnect due to outstanding dues, power reconnect after pay dues, power cut alert, tempering alert. AMR also gives the information of total load used in a house on request at any time. This system is secure and reliable because it can be accessed only by an authorized person.

In the present work wireless meter reading system is designed to continuously monitor the meter reading and to shut down the power supply remotely whenever the consumer fails to pay the bill. It avoids the human intervention, provides efficient meter reading, avoid the billing error and reduce the maintenance cost. It displays the corresponding information on LCD for user notification.

REFERENCES

[1] AmitBiranje,Dr.Mrs.S.S.Lokhande"Wireless ARM – Based Automatic Meter Reading and Control System(WAMRCS)",2015 IEEE.

[2] Champ Prapasawad,KittitachPornprasitpol and WanchalermPora,"Development of An Automatic Meter Reading System Based on ZigBee PRO Smart PowerProfileIEEE802.15.4Standard",2012.

[3] O.HomaKesav , B. Abdul Rahim " Automated wireless meter reading system for monitoring and Controlling power consumption " IJRTE Volume-1, Issue-2, June 2012

[4] P.RakeshMalhotra,Dr.R.Seethalakshmi"Automatic Meter Reading and Theft Control System by Using GSM" IJET Vol 5 No 2 Apr-May 2013

[5] M.Leelavathi, K.Aswini ,Smart energy meter with reading indication using GSM.

[6] Prof. Dr.k.p. Satheyamoorthy,Dept. of EEE ,Smart energy meter load control.

[7] Ashna.k PG Scholar, Electronics & Communication. Dept. "GSM Based Automatic Energy Meter Reading"IEEE. 2013.