

Smart Energy Meter System

Vinod Kumar Meena¹, P. Dash² and Dr Vivek Kumar³

¹EEE, BRCM CET, Bhiwani, Haryana, India
vinodkumarjeph1995@gmail.com

²Asst. Prof, EEE, BRCM CET, Bhiwani, Haryana, India
pdash@brcm.edu.in

³HOD, EEE, BRCM CET, Bhiwani, Haryana, India
hodeee@brcm.edu.in

Abstract

In recent period, the efficacy and the effectiveness are facing struggling in electricity bill in replete scale. Therefore bear the cost metering system is becoming popular for ensuring the amount of bill in advance. This project outcome an approach to automate the electricity billing system, a PIC Microcontroller based control element and co-ordinates all the activities like reading the credit from the card through the card reading technique, calculating and updating the net credit, showing the credit on the LCD display. The Alarm or buzzer introduces in the system is used to give the signal in the consume unit make it to final 5 units. As soon as the load unit makes it to 0 units, the relay set up, which is conjoined between the AC main and load get shut off.

Keywords: *Smart System, Energy Meter, Automatic Interference.*

1. Introduction

The inclination of the period has always been in approval of that technology which finally becomes worthwhile as well as classic one. The regular meter reading is done by the human, this require a large number of employment and long working hour to make the round area data reading and billing. Due to the augment in the development of residential and commercial building the meter reading task rise which requires large number of human operator. In order to make accurate meter reading, decrease billing errors and operation cost, automatic meter reading system plays a major role. In present time the human operator goes to the consumer's house, takes the photography of meter reading and creates the bill. If the consumer is not

present, the process of billing will be pending and the human operator again goes to consumer's house. Going to each and every consumer's house it takes lots of time and wastage of money. It becomes very difficult in raining time. If any consumer did not pay the bill the operator needs to go to their houses to cut the power supply so this has to be avoided and controlled automatically. In postpaid system there is no supervision on electricity by consumer. There is lots of wastage of electricity in the consumer's side due to lack of controlling of electric consumption in an efficient way. In power consumption alert system, a circuit is designed by them which help the consumer in looking after of the energy consumption. To make the consumer aware and knowledgeable to rectify the excess power consumption, this type of system will help and inform the consumer about their daily and monthly rate through SMS. This type system gives the notification message to the consumer via SMS.

GSM based energy meter is used to screening and inform the consumer of their energy usage but the hardware of GSM system is very complex to understand.

2. System Description

The plan of the prepaid metering scheme is based on "use later pay first". The different written works are considered which helped in designing an advance system for observing and giving the information to the consumers.

2.1 Disadvantages of Existing System

a) Automatic Interference

The regular meter reading is done by the human, this require a large number of employment and long working hour to make the round area to collect data reading and billing.

b) Electricity usage is not Observing

In existing system only monthly bill comes to consumers and the consumer is not get aware about their daily usage of power consumption.

c) No allocation for Energy Stealing

In preceding meter, if electricity gets theft by the people, owner not gets alert and information about the stealing of their electricity from meter and owner get suffered from this without any information or alert.

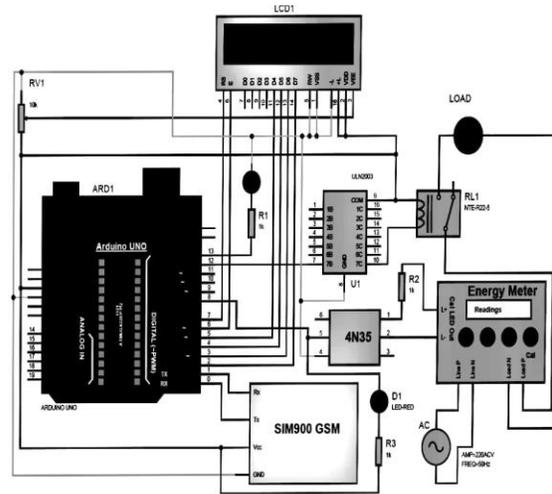


Figure 1: Block Diagram

2.2 Proposed System

In this system, all the disadvantages of existing system are overcome. Advance Energy Meter based on microcontroller is constructed to give voice alert and display and monitoring the electricity usage. Voice can be in many languages so that it is easy to understand for ordinary people. It is more suitable to physically disabled persons.

3. Proposed Architecture

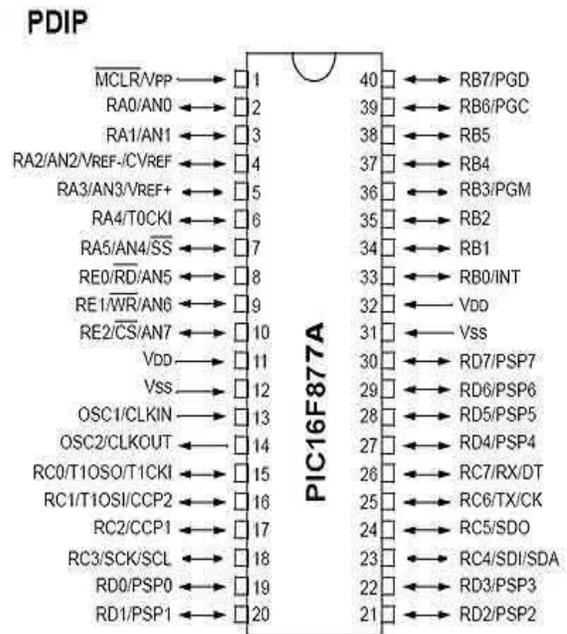


Figure 2: PIN Configuration of Microcontroller

Global System for Mobile Communication

The Global System for Mobile Communication is a digital mobile system that is broadly used in the world. The Global System for Mobile

Communication uses a variation of time division multiple access (TDMA) and is the most broadly used of the three digital wireless telephony technologies (TDMA, GSM, and CDMA). The Global System for Mobile Communication digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either the 850 MHz or 1750 MHz frequency width.

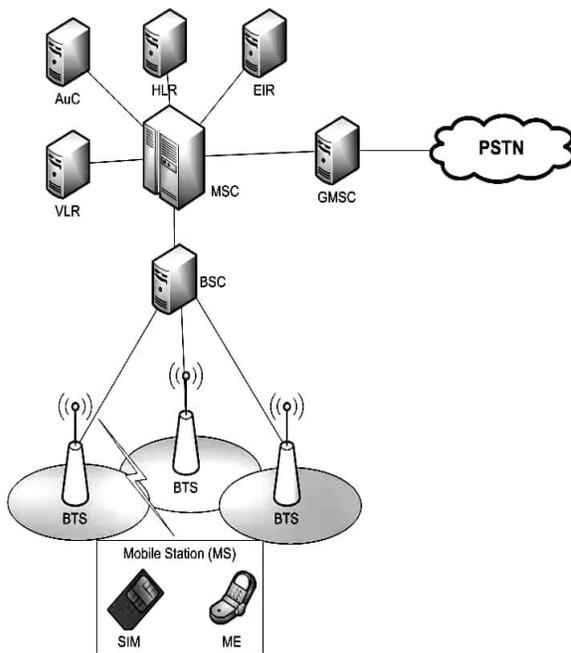


Figure 3: GSM Module Network

4. Working of Talking Energy Meter Based on Microcontroller

To manufacture a controlling method to control the advanced energy meter automatically. If the consumer did not pay the bill, the connection of electricity cut down automatically.

A PIC Microcontroller based control element and co-ordinates all the activities like reading the credit from the card through the card reading technique, calculating and updating the net

credit, showing the credit on the LCD display. The blueprint presents a Global System for Mobile Communication (GSM) technology to observe the power consumption and controlling of the energy meter. This system reduce the labour and save different types of wastage of money like fuel etc. the consumer did not pay the bill on time, the user is informed through SMS system using GSM system. If still user does not pay the bill then after the electricity connection will be disconnected by the remote server. Here a PIC Microcontroller based control element and co-ordinates all the activities like reading the credit from the card through the card reading technique, calculating and updating the net credit, showing the credit on the LCD display.

It shows the billing information on LCD. The developed technique provides efficient screening of energy meter reading, power control technique, avoid the billing errors and decrease the repairing cost.

A relay is made a connection with a microcontroller and a load which is used to cut down the power supply. If anyone tries to loot the electricity, voice element is used to give the information when consumption of units surpasses the limit of units by user. As soon as the limit surpasses, the voice alert appear and a message get send on registered mobile number.

5. Components Used

5.1 Hardware Requirements

- a) Energy Meter
- b) Microcontroller
- d) GSM Module
- e) Relay
- f) Lcd
- g) Voltage Regulator IC 7805
- h) IR sensor
- i) Voice module
- j) Power supply
- k) Diodes
- l) Resistance
- m) Wires as per requirement
- n) Transformer etc.

5.2 Software Requirement

- a) Arduino IDE

6. Result

The system “Design an Advance Energy Meter system based on Microcontroller” is design such that whenever the usage of energy surpasses the limitation value which user sets, it declares an information message which was already predetermined in the voice module circuit. The message of daily or monthly billing status is also sends on user’s phone number which is referred to program.

7. Conclusion

The Advance Energy Meter based on Microcontroller is used to inform the user whenever the usage of energy surpasses the limit which user sets by using dome switch; it declares a voice message which is already predetermined in the voice module system. This helps in consumption of electricity and also keeps the electricity bill under control. Not only it comforts the consumer, but also it comforts the government as it is also able to reducing the power consumption and eventually can reduce the unusual electricity usage. By using this energy meter, customer can control their energy consumption. In this system, the use of GSM and voice module delivers number of advantages over the structure that have been beforehand used.

References

- [1] Aswini, N. Nisari, Nivetha, B. Vaishnavi, “Power Consumption Alert System,” International Research Journal of Engineering and Technology, vol.04, no. 03, Mar-2017.
- [2] K. Ashna and S. N. George, “GSM based Automatic Energy Meter Reading System with Instant Billing,” in Automation, Computing, Communication, Control and Compressed Sensing (iMac4s), 2013

- International Multi Conference IEEE, 2013, pp.65-72.
- [3] M. Moghavvemi, S. Tan, and S. Wong, “A Reliable and Economically Feasible Automatic Meter Reading System using Power Line Distribution Network,” International Journal Of Engineering-Materials and Energy Research Center, vol.18, no.3, pp.301-318, 2005.
- [4] Mandeep Singh, Ritula Thakur, Dr. S. Chatterji, “Design of GSM Based Talking Energy Meter,” International Journal of Innovations in Engineering and Technology (IJJET), vol.3, Issue 4 April 2014.
- [5] Md. Wasi-ur-Rahman, Mohammad Tanvir Rahman, Tareq Hasan Khan and S.M. LutfulKabir, “Design of an Intelligent SMS based Remote Metering System,” International Conference on Information and Automation (IEEE), vol.978-1, pp.4244-3608, 2009.
- [6] S. Shahidi, M. A. Gaffar and K. M. Salim, “Design and Implementation of Digital Energy Meter with Data Sending Capability using GSM Network,” Advances in Electrical Engineering (ICAEE) 2013 International Conference, Dhaka, 2013, pp.203-206.