A Survey Paper on Prepaid Electricity Distribution System

[1]SHRADDHA YADAV , [2]PRATEEKSHAPANDEY

[1,2]Department Of Computer Science And Engineering
Chhatrapati Shivaji Institute of Technology Durg, Chhattisgarh

ABSTRACT

The electricity energy saving scheme is used in business, agriculture, domestic and general purpose. The problem occurs in postpaid scheme is, there is no control of use of electricity from the consumer side and the problem of collection of meter reading and also in generating the bill. In this project technique used for prepaid scheme using smart meter included the embedded system and GSM for sending and receiving the SMS through GSM network. Smart meter is a meter which is attached with the existing meter in embedded system which helps the consumer to send a SMS for their day to day power consumption. The aim of this project is to control the consumption of electricity in consumer side. Establish a communication network between the consumer and service provider using GSM. Service provider verify the meter id and card number and accept the request and recharge the meter. The aim of this project is to minimize the queue at the electricity billing counters and to retrieve the electricity automatically. The project also aims at proposing a system that will reduce the loss of power and revenue due to power theft and other illegal activities. The automated billing system will keep doing of real time consumption and will leave little scope for disagreement on consumption and billing. The project also addresses about various debugging tools such as Keil μ4 Vision. Smart meter enable two-way communication between the meter and the central system. Smart meters are also believed to be a less costly alternative to traditional time of uses meter and are intended to be used on a wide scale with all customer classes.

Keywords-GSM, microcontroller, scratch card, serial communication, software tool like kill4 .

1.INTRODUCTION

Today electricity has very basic need to human. The present system of electricity consumption billing is erroneous and also time taken. On these days a problem is going for theft of electricity and there is no control scheme to apply on theft of electricity. The present meter reading system requires a person to read and record the energy consumption and submit the bill to the electricity billing department. A wide variety of disadvantage to suffer from manual reading is the requirement of large number of meter readers. This project provides the facility of measuring the consumption of electricity and continuously monitoring the unit of consumption of electricity by the meter and includes security theft of electricity. A smart meter is required to establish two way communications between the meter and the electricity provider. Smart meter is software embedded programming based meter, accurately tracks energy consumption and perform computation. This system saves a lot of time and power for electricity department. Implementation of this project will be useful for better energy managing and controlling.

Under the conventional method of paying for electricity bills (the post-pay scheme), a household pays for its electricity consumption once a month after they consume the electricity. This is quite different from the payment procedure for other consumption goods, such as groceries or gasoline, in which payment occurs prior to the consumption of the goods. One might wonder how would people's consumption for groceries or gasoline change if they pay for them once a month post consumption and/or only find out how much they have consumed when they pay for the monthly bills?
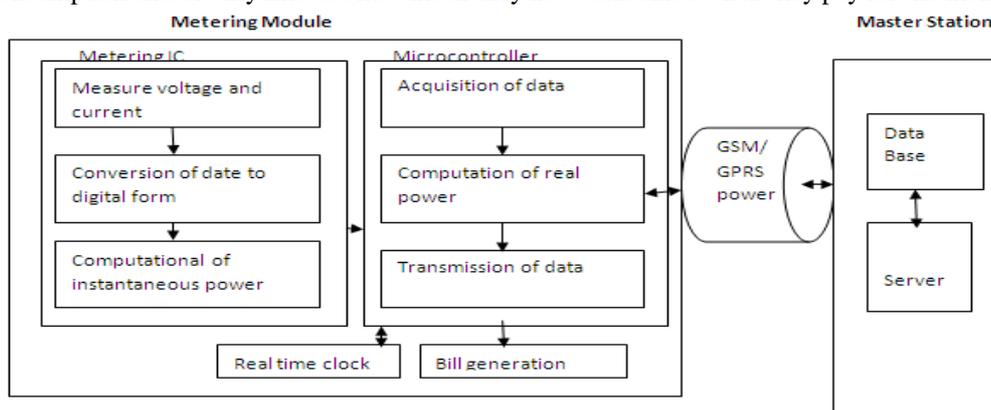

Figure 1: block diagram of prepaid electricity billing scheme

International Journal of Application or Innovation in Engineering & Management (IJAIEM)
Web Site: www.ijaiem.org Email: editor@ijaiem.org
Volume 4, Issue 12, December 2015   **ISSN 2319 - 4847**

2.RELATED WORK

A paper proposed by Yadav,B.R. et. al(2015), one as for customer mobile and another for electricity department. says that to create an efficient metering system, that benefits both the service provider and consumer and more importantly, to conserve the crucial power, the innovative idea of Smart Energy Meter Based, Prepaid Electricity Distribution System was conceived. The system consists of an Energy Meter, ARM7 microcontroller board and GSM modules. Energy meter, EEprom, keypad, LCD display and gsm modules are connected to microcontroller.

Hiware,R.B.,et.al. (2013) says that the system consists of wireless meter and the server. The wireless meter placed in homes, company and the buildings which have exchange the information using the GSM network through SMS. Both the prepaid and post paid system implemented. The PIC is an 8 bit Reduced Instruction set computer Microcontroller. It is one of the most popular microcontrollers for its high performance and low cost

Smart meter enable two way communication between the meter and the central system S, Ezhilarsu.,et.al.(2015).In this paper use of advanced technology such as digital metering has become extremely necessary to achieve greater efficiency, theft reduction to reduce AT&C looses and to improve

revenue collection. In this approach meter can be automatically over GSM module and data can be transmitted over the particular customer through SMS. The P89C5RD2xx contain non volatile 64KB flash program memory that is both parallel programmable and serial in- system and In-Application programmable

If the available credit is exhausted then the electricity supply is cutoff by a relay. Readings made by human operators are prone to errors. This project addresses the above mentioned problems. Jubi,k.,& john, M.(2013) The development of GSM infrastructure in past two decades made meter reading system wireless. The use of Prepaid Energy meter is still controversial. The prepaid card is recharged for a certain amount and can be fed as input to the Microcontroller AT89S52.

Rezaul,M., et.al.(2015) say that   develop the EDU, we are using Microcontroller Atmega32. The Atmega32 is programmed such that power supply will be switched off by using relay when the recharged amount gets used up. Here, microcontroller based system is designed and the readings can be continuously recorded. Energy Metering IC ADE7755 and LCD display is used to display the balance amount.

3. COMPARING MICROPROCESSORS AND MICROCONTROLLERS

- Microprocessor is a single chip CPU, microcontroller contains, a CPU and much of the remaining circuitry of a complete microcomputer system in a single chip.
- Microcontroller includes RAM, ROM, serial and parallel interface, timer, interrupt schedule circuitry (in addition to CPU) in a single chip. –RAM is smaller than that of even an ordinary microcomputer, but enough for its applications. –Interrupt system is an important feature, as microcontrollers have to respond to control oriented devices in real time. E.g., opening of microwave oven's door cause an interrupt to stop the operation.
- Microprocessors are most commonly used as the CPU in microcomputer systems.
- Microprocessor instruction sets are processing intensive, implying powerful addressing modes with instructions catering to large volumes of data. Their instructions operate on nibbles, bytes, etc. Microcontrollers have instruction sets catering to the control of inputs and outputs. Their instructions operate also on a single bit.[8]

4. GSM MODEM AND ITS COMMANDS

A GSM modem is a wireless modem that works with a wireless network a wireless modem behaves like a dialup modem. The main difference between them is that a dialup modem send and receives data through radio waves. Like a GSM mobile phone a GSM modem require a SIM card from a wireless carrier in order to operate
There are two types of AT commands:-

1. Basic commands are AT commands that do not start with "+". For example, D (Dial), A (Answer), H (Hook control), and O (Return to online data state) are basic commands.
2. Extended commands are AT commands that start with "+". All GSM AT commands are extended commands. For example, +CMGS (Send SMS message), +CMGL (List SMS messages), and +CMGR (Read SMS messages) are extended commands.[7]

- AT (Attention Command)
- AT+CMGL (List message)
- AT+CMGF (Selecting messaging mode)
- AT+CMGS (Send message)
- AT +CMGR (Read message)
- AT+CMGD (Delete message)

5.All Previous Technology used in Prepaid billing scheme

In this scheme system consists of an Energy Meter, ARM7 microcontroller board and GSM modules. Energy meter, EEprom, keypad, LC display.GSM modules is connected to microcontroller. The user has to purchase a scratch card

and enter its serial number into the system using keypad and LCD display. Energy meter, EEprom, keypad, LCD display and GSM modules are connected to microcontroller[1]

Is provide on Meter module consist of a microcontroller, metering IC ,LCD(liquid crystal display, EEPROM, relay. GSM module and keypad.PIC microcontroller is used as main unit. The metering module (ADE7757) is used .the ADE 7757 is mixed signal single phase metering IC. When the power fail occurs that all reading is stored in EEPROM so that when power is back on, the meter can start from its last stage. the GSM Modem is interface with tha microcontroller serial port for sending and receiving SMS. Using AT command protocol.GSM Modem and the processing unit are linked by means of RS-232 communication protocol.[5]

This approach Smart meter enable two-way communication between the meter and the central system. Its used on 8 bit P89C51RD2 xx microcontroller and embedded –C programming language in keil µVision 4 IDE. MAX-232Serial Communication.[3]

In this technology microcontroller AT89S52 acts as the primary controller the primary collector collects information from energy meter as well as from the smart card. The energy meter reading is compared with the smart card information by the microcontroller depending upon the result, the microcontroller will active the buzzer if the credit is low cost and the controller will trigger the relay if the credit goes very low. the LCD is interface to microcontroller using parallel port connection.GSM modem is serially connected which is the major communication module between user and meter.[2]

In this system the EDU(Energy Understanding Device), we are using Microcontroller Atmega32. The Atmega32 is programmed such that power supply will be switched off by using relay when the recharged amount gets used up The GSM communication module is used to send a message to the consumer about the units of power consumed and their balance. Energy Metering IC ADE7755 and LCD display is used to display the balance amount.[4]

6. Steps ares prepaid electricity billing scheme process
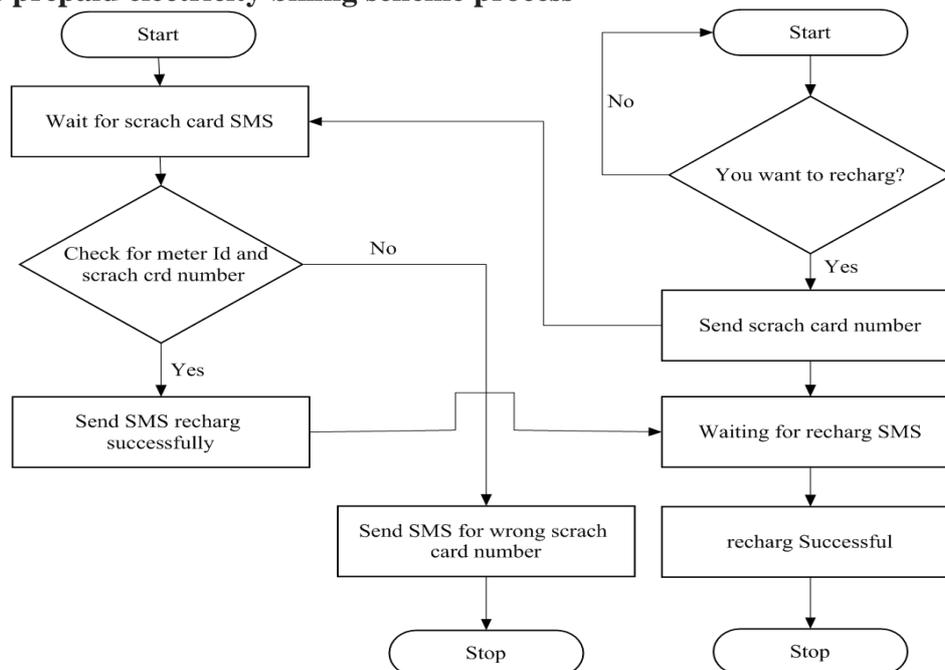
Figure2: Prepaid billing scheme

7. CONCLUSION

The design of Smart Energy Meter using GSM technology facilitate the users to pay for the electricity before its consumption. An arrangement is also made to intimate the user with the help of GSM communication module when their credit in their balance goes low. This system has been proposed as an innovative solution to the problem of affordability in utilities system. Since a microcontroller based system is being designed, the readings can be continuously recorded. This reduces human labor and at the same time increases the efficiency in calculation of bills for used electricity. This Smart energy understanding device will create awareness on unnecessary wastage of power and will eventually reduce wastage of power. This module will reduce the burden of energy providing by establishing the connection easily and no theft of power will take place. Customers want processed data and they want the usage of energy data to be easy and user friendly whereas this project aims at a low cost and trouble free system. This system provides elaborate consumer profiling which helps demand and consumption control of resources and thus reduces the human operator meter reading operation cost.

REFRANCES

[1]. Yadav,B.R.,& Sharma,J.V.(2015) Smart Electricity Meter, Prepaid Electricity Distribution System:International Journal of Engineering Development and Research,Volume 3,Issue 2.

[2]. Jubi,K.,& John,M.(2013) Prepaid Energy Meter with GSM Technology:American International Journal of Research in Science,Technology,Engineering & Mathematics,13-271

[3]. Ezhilarasu.S.,& Rijju,K.,& Venkatesh,k.,&Varatharaj,M.(2013) An Enhancement of Prepaid Energy Meter Using Smart Card And GSM Module Techniques:International Journal of Research in Electronies,Volume-02 Issue.

[4]. Islam,M.R.& Mamun,H.L .(2015) Energy Understanding Device (EUD): An Innovative Energy Metering and Monitoring Solution:Perspective Bangladesh: Journal of Modern Science and Technology: Vol. 3. No. 1, Pp.47-63

[5]. Hiware,R.B.,& Bhasker,P.,& Bombole,U.,& Kumar,N.Advance.(2013) Low Cost Electricity Billing System using GSM:International Journal of Advanced Engineering Technology,vol.-4,Oct-Des.,/51-53

[6]. http://www.codeproject.com/Articles/85636/Introduction-to-AT-commands-and-its-uses

[7]. http://www.newagepublishers.com/samplechapter/001599.pdf