

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 8, Issue 1, January 2019

GSM Based Automatic Energy Meter Reading System with Instant Billing

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ABSTRACT: In this paper, we propose a system which measures the current consumption unit through IR sensor unit. The IR transmitter is placed in the rotating unit of the EB meter. The receiver photodiode is placed in a certain place which is used to find no of rotation. By getting the number of rotation we get the current consumption. After getting the current consumption the ARM processor will reduce the unit given for a specific user. The unit here is taken as a numeric value. If the unit is reduced to minimum value it will intimate the user through alarm and LCD unit. If the user wants to add more units for him, he has to send a message to EB section. From the EB section, the required value will be sent to the ARM controller through a GSM modem. From the obtained value the ARM will increment the unit in the memory. Thus recharge process is done quickly with less manual interactions. Our system may be applied in Industrial control, medical system and access controlled.

KEYWORDS: Digital Energy meter, GSM module, Communication, LCD

I. INTRODUCTION

Now a day energy meter reader goes to every premise and takes the reading manually then issues the bill. In manually reading human error possible and not provider reliable meter reading. An energy meter is a device which is used to measure the consumption of energy of any residence or other industrial establishment. In conventional metering system to measure electricity consumption the energy provider company hire persons who visit each house and record the meter reading manually. This is only a sluggish and laborious. In conventionally metering system people try to manipulate meter reading by adopting various corrupt practices such as current reversal or partial earth fault condition, bypass meter, magnetic interference etc. If any consumer did not pay the bill, the electricity worker needs to go to their houses to disconnect the power supply [1]. The wide proliferation of wireless communication propose and explore new possibilities for the next generation Automatic Meter Reading (AMR) whose goal is to help collect the meter measurement automatically and possibly send commands to the meters. Automation ranges from connecting to a meter through an RS-232 interface for transmitting the meter measurements all the way from the meter to the utility company via GSM network. [2]. Automated utility meters have many new features that help to reduce the cost of utilities to consumers and the cost of delivering utilities to the utility provider. The automated utility meter system provides bill directly to the consumers which is more suitable in the current scenario. Here a new method of prepaid/post-paid electronic energy metering is introduced in this paper which will automatically sense the used energy, records these readings continuously, then sends it to the billing point through the existing GSM network. Finally after processing the collected data bill is generated using a web based system software and is sent back to the customer as SMS (Short Messaging System). As it is web oriented once the data is updated, the registered users and authority can monitor and analyse the generated bill of any month by sitting anywhere in the world.

II. RELATED WORK

In [3], the authors proposed technique for remotely reading electricity meter readings using Short Message Service (SMS) has been illustrated. Existing Global System for Mobile communications (GSM) networks have been used for

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sending and receiving SMS. In [4], the authors proposed hybrid Automated Metering Reading (AMR) system which is a combination of ZigBee and GSM technology. In this proposed system ZigBee module is attached to the electric meter by using interface board and the data collector will be connected to the central computer by using GSM. In [5], the authors proposed “GSM Based Automatic Energy Meter System with Instant Billing”. System which measure the current consumption unit through IR sensor unit. The IR transmitter is placed in the rotating unit of the EB meter. The receiver photo diode is placed in a certain place which is used to find no of rotation. By getting the number of rotation we get the current consumption. These system may be applied in Industrial control, medical system and access control.

In [6], the authors proposed “GSM Based Automatic Energy Meter Reading System with Instant Billing” In this system the two wire power supply is connected to the energy metering IC through the analog front end of the MCP3905 energy meter evaluation board which provides average active power information via a pulse output which may be then used to be processed by a Micro Controller Unit (MCU). The GSM unit is interfaced to the micro controller via a MAX 232. User GSM modem transmits usage details to office modem. Every house/premise has a unique number (consumer number), which is given by the corresponding authority. In [7], the authors suggested “ARM Based Wireless Energy Meter Reading System along with power on/off circuit”. Basically system has 3 sections, Meter section, control unit section & mobile unit. Control unit is consisting of ARM 7 processor LPC2148, zigbee module, GSM module and 3 switches (STATUS switch, ON switch, OFF switch) Meter unit is a consisting of ARM 7 processor LPC2148, zigbee module, energy meter, relay.

The entire operation of the system will do from control unit by proper selection of the switches. When the switch 1 is selected then the system reads the energy meter reading in terms of number of units wirelessly through zigbee modules & then electrical bill is measured for corresponding number of units consumed by the energy meter & sends the information regarding the electrical bill will be sent to consumer mobile through GSM module message consisting of information regarding electrical bill & the deadline for the payment of the bill. When the consumer fails to pay the electrical bill in time then the power supply to energy meter will disconnect wirelessly by proper selection of switch & then the status of the energy meter sent to the consumer. In [8], the authors suggested “Automatic Meter Reading and Theft Control System by Using GSM”. In this paper he concluded that GSM technology used to transmit the meter reading to the customer and government with the required cost. This process will happen for 60 days once transmission between customer and government. Then the energy theft controlled by IR sensor, magnetic reed switch and some other technique with high security.

III. SYSTEM DESIGN

Our project consist of the hardware components that contain the following units. Is power supply unit, Microcontroller Unit, sensor unit, communication unit, display unit, Alerting unit, Driver unit, Software unit as depicted They are shown in figure 1, 2, 3 that are given in the bottom.

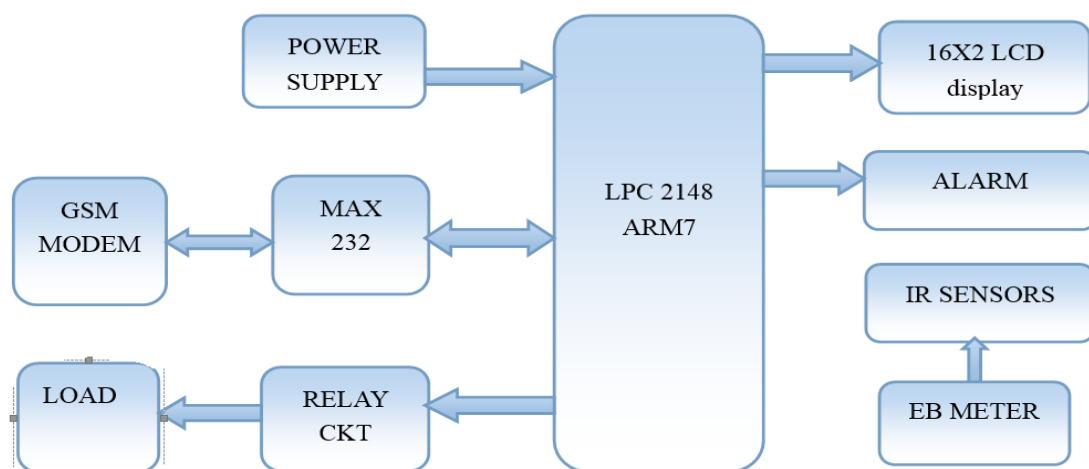


Figure 1. Home section block diagram

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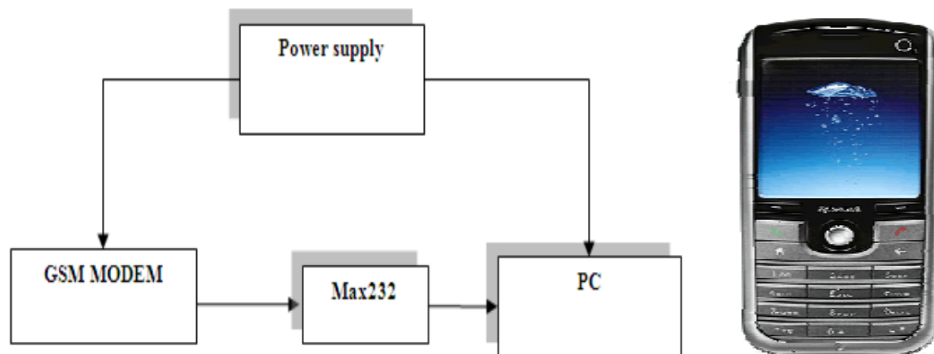


Figure 2. EB section block diagram Figure 3. Mobile section block diagram

In the micro controller unit we are going to use ARMLPC2148 microcontroller which is used to sense the values from the sensors and will transfer to the monitoring section regarding the situation. In the sensing part Analog to Digital conversion is done internally in the controller. The controller will get the location detail of the node using GPS receiver. The controller also converts the data to serial communication for wireless data communication through GSM/GPRS modem.

Sensor unit: The sensor unit consists of IR LED and IR Receiver. The LED is placed in the moving unit in the meter. The receiver gets the IR signal for the whole rotation of the moving unit which has the LED.

Communication unit (GSM Modem): It is a communication technology in which it is used to transmit the message from the monitoring section to the control section. Whenever there are any abnormalities in the sensors or for certain period of time, the microcontroller is used to transmit the data to the monitoring section.

Display unit (LCD): The display unit is mainly achieved by the 16X2 LCD. Liquid crystal display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals (LCs). LCs do not emit light directly. The monitored data from the patient is viewed in the display.

PC: PC is connected with the MAX232 to the microcontroller. The data received by the GPRS modem is given to the microcontroller. Through the microcontroller the data will be transmitted to the PC and the data will be monitored in PC in hyper terminal.

Alerting Unit: Buzzer will produce the beep sound to alert the user when the power theft occurs.

Driver unit: Here the relay driver is used to drive the load. Relay is an electromechanical switch which acts as an interface between the microcontroller and the load.

Software Unit: Software is used to compile the coding of the desired application for the corresponding embedded system.

KEIL uvision4: This is the embedded C compiler which is compatible for the ARM microcontroller to compile the code. Keil Software makes C compilers, macro assemblers, real-time kernels, debuggers, simulators, integrated environments, and evaluation boards for the 8051, 251, ARM, and XC16x/C16x/ST10 microcontroller families.

IV. DESIGN OF THE SYSTEM

Existing Meter Reading Systems: Meter Reading and Billing are among the most time consuming functions performed by municipalities and energy distribution companies. It should be clear that such methods are very time consuming and does not satisfy the consumer and service provider, in addition to the large number of errors incorporated in the reading process.

Automatic meter reading system: So AMER system necessary because speed, accuracy, and cost effectiveness are the strongest features in this system. The results from the system is the system should have a display which shows the following information on screen when dead line is come which set in programming,

ADVANTAGES

- System helps to maintain the data properly.
- This system is very accurate, simple and low power consumption.
- Which is used for the real time applications.
- Provider side is easy to manipulate for bill generation and other such task.

APPLICATION

- Electricity departments.
- Industrial Energy remote monitoring.

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- Household Energy meter monitoring.
- Railway electrical systems.

V. CONCLUSION

In this paper, various electronic meters have been developed and are still being developed. However the use of GSM in this particular system provides numerous advantages over methods that have been previously used. Data transmission is charged at standard SMS rates, thus the charges are not based on the duration of data transmission. The cost efficient transmission of readings ensures that power consumption values can be transmitted more frequently to a remote station. The implications of being able to transmit readings more often are that energy utilities will be able to generate timely bills, better understand energy demand patterns, manage meter failures more efficiently and manage fraud better.

REFERENCES

- [1] BirajdarPravin P., Dr.ShaikhMeeravali, "Hitech Energy Meter withAutomation Load Control Using Arm 7 TDMI LPC 2148 IJARIIIEvol- Issue-3 2015.
- [2] S.Arun, Dr.SidappaNaidu"Design and Implementation of AutomaticMeter Reading System Using GSM, ZIGBEE through GPRS"IJARCSSEVolume 2, Issue 5, May 2012.
- [3] Bharath, P.; Ananth, N.; Vijetha, S.; Prakash, K.V.J.; Wireless Automated Digital Energy Meter in Sustainable Energy Technologies, ICSET 2008.
- [4] Chih-Hung Wu; Shun-Chien Chang; Yu-Wei Huang; —Design of a wireless ARM-based automatic meter reading and control system in Power Engineering Society General Meeting, 2004. IEEE.
- [5] E. Moni Silviya, K.MeenaVinodhini, Salai Thillai Thilagam.J."GSM Based Automatic Energy Meter System with Instant Billing"IJAREEIE Vol. 3, Special Issue 3, April 2014.
- [6] Ashna.k, Sudhish N George "GSM Based Automatic Energy MeterReading System with Instant Billing" IEEE (2013)
- [7] V. V. Rajesh Parvathala, T Venkateswa rareddy, N V G Prasad"Arm Based Wireless Energy Meter Reading System ALONG withPOWER on/off CIRCUIT"JEAT Volume-2, Issue-2, December2012.
- [8] P.RakeshMalhotra, Dr.R.Seethalakshmi"Automatic Meter Readingand Theft Control System by Using GSM" IJET Vol 5 No 2 Apr, May2013, China.

BIOGRAPHY



Suresh Kavuri completed his B.Tech from JNTUH University and M.E in VLSI Design from Sathyabhama University, Chennai. He has attended an international conferences on Methodologies & National Conferences and participated many workshops in India. He has 8 years of teaching experience. He guided many PG &UG students in his teaching career. His research area includes in VLSI and Digital electronics. He has given many Guest lectures in various Engineering colleges.



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