

NOVEL METHOD OF AUTOMATIC ENERGY METER READING AND ILLEGAL ELECTRICITY USAGE DETECTION USING GSM

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Abstract: Automatic Energy Meter is the modern approach replacing conventional method of measuring electricity. AEM widely reduces utilization of man power in electricity measurement especially in remote areas. AEM serves between the main electricity board and consumers by collecting the monthly usage of electricity and send it to the electricity board for billing by using GSM technology. With the use of additional microcontrollers like PIC, AEM meter alert the electricity board in case of any illegal usage of electricity. Thus the paper greatly deals with reducing the man power in remote areas and prevention of electricity theft in power lines.

keywords AEM- Automatic Energy meter, PIC- Peripheral Interface Controller, GSM -Global system monitoring.

I. INTRODUCTION

In present days amount of electricity generation is very much less because of rapid increase in daily demands. Lot of money is spending on generation and maintenance of electricity so now we are going for automatic energy meter which will greatly reduce the money and manual work. These energy meter are use to send the electricity usage data. It also notify the Electricity board in case of any power theft. Mostly these energy meters are embedded based. It collect, manipulate and transfer the data with the help of microcontrollers.

II. Existing methods

Automatic Energy meter reading system are Mainly classified into two types

- wire-based system
- wireless-based system

A. Wire-based system

wire based automatic energy based system uses Power line carrier (PLC) and it also uses the telephone network lines either optical or cable.

B. Wireless-based system

Now a day's wireless system uses Bluetooth, Zigbee for short distance transmission [5] and GPRS, GSM based for long

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distance data transfer [2][3]. Asymmetric Cryptography method is used for secured communication [4].

III. PROPOSED METHOD

The current method is wireless based and uses GSM technology for data transfer [1]. GSM technology has advantages over the other method due to high area coverage and low cost because the data is being transferred on standard SMS cost. If there any damage in energy meter seal the sensor will detect the damage and inform to electricity board about that the particular energy meter is at risk and there is a chance of power theft. This data is transferred to electricity board by GSM technology.

IV. GSM OVER VIEW

GSM method is the very uprising technology especially in remote areas and hills where the man power cannot be reachable. Now a day's number of GSM subscribers is greatly increased. According to Cellular Operator Association of India (COAI) the number of GSM subscribers as of September 2014 is 756.08 million. The following fig.1 shows the GSM user up to September 2014 [6].

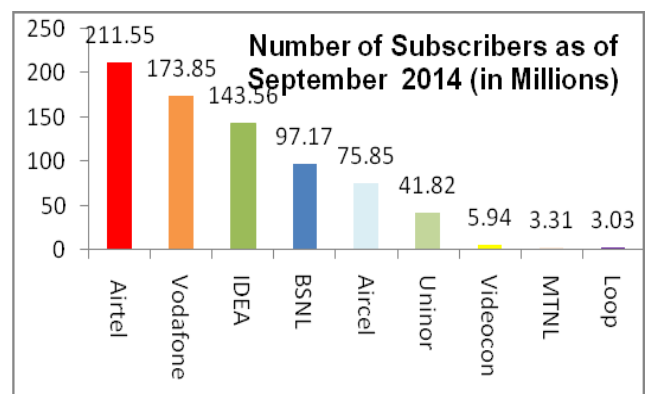


Fig 1: Number of Subscribers of September 2014 (in Millions)

V. DESIGN OF AUTOMATIC ENERGY METER AND ILLEGAL POWER THEFT

Automatic Energy Meter design has a microprocessor which is the core of the system. It consist of a GSM modem which is use to send the data to the electricity board. It send the electricity usage data for every month to the electricity board. In case of any illegal broken of seal of AEM for electrical theft or any other damage in AME the smart sensor will sense and transmit the condition of AME to main server of electricity board on the server side the electricity board officer will receive the data through GSM receiver and

manipulate the data about the monthly electricity usage and send the electricity consumption bill through SMS. If there any electricity theft by broking the seal of AEM or any damage to the energy meter it will be notify by the AME to the server so that electricity board officer will came to know the theft or any damage and he/she will take the necessary steps.

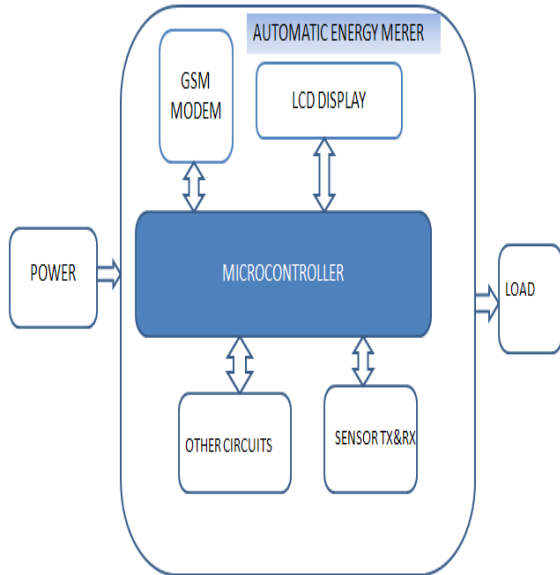


Fig 2:Automatic energy meter block diagram

A. Microcontroller

The ARM architecture has evolved through several major revisions to a point where it supports implementations across a wide spectrum of performance points, with over a billion parts per annum being produced. The latest version (ARMv7) has seen the diversity formally recognized in a set of architecture profiles, the profiles used to tailor the architecture to different market requirements. A key factor is that the application level is consistent across all profiles, and the bulk of the variation is at the system level. The introduction of Thumb-2 technology in ARMv6T2 provided a balance to the ARM and Thumb instruction sets, and the opportunity for the ARM architecture to be extended into new markets, in particular the microcontroller marketplace. To take maximum advantage of this opportunity a Thumb-only profile with a new programmers’ model (a system level consideration) has been introduced as a unique profile, complementing ARM’s strengths in the high performance and real-time embedded markets.

B. IR sensor
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The IR Sensor-Single is a general purpose proximity sensor. Here we use it for collision detection. The module consist of a IR emitter and IR receiver pair. The high precision IR receiver always detects a IR signal. According to energy meter we are fixing the IR sensor in the screw portion of energy meter and then the IR sensor sense the theft in energy meter. Whenever there is a power cut the 12V rechargeable battery give power to the IR sensor automatically. So during power or power cut the theft circuit is helpful to detect the theft in power supply.

C.GSM Modem

GSM Modem was designed with a moderate level of service security. Communications between the subscriber and the base station can be encrypted. The development of UMTS introduces an optional(USIM), that uses a longer authentication key to give greater security, as well as mutually authenticating the network and the user, whereas GSM only authenticates the user to the network. IR sensor sense the theft in energy meter. After sensing the theft message send to the controller and government electricity board by help of GSM. The digital energy connected to the controller and GSM for transmitting the energy meter reading to the government electricity board.

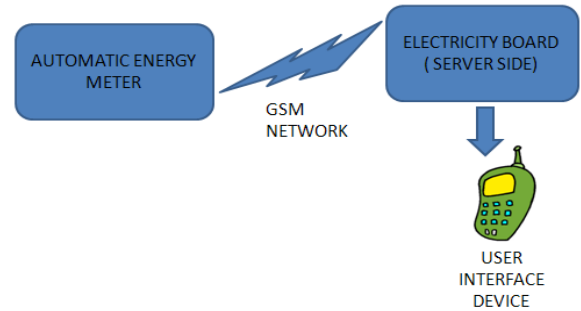


Fig 3:overview of proposed system

D.LCD display

The LCD screen is more energy efficient and can be disposed of more safely than a CRT. Its low electrical power consumption enables it to be used in battery-powered electronic equipment. It is an electronically modulated optical device made up of any number of segments filled with liquid crystals and arrayed in front of a light source (backlight) or reflector to produce images in color or monochrome. It is used to display the reading and RTC time, date information.

VI .CONCLUSION

This automatic energy meter technology based on GSM technology has many advantage over others methods. The problem in this method arise because of missing SMS so that user may lead to be in trouble of nonpayment of electricity bill.

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