ENERGYMETER TAMPER ALERT AND PREPAID ELECTRICITY SYSTEM

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Abstract: The main objective of this project is to send a message in the event of energy meter being tampered. As electricity consumption is increasing, so it is the attempt for tampering the energy meter. Identifying a tampered meter is only possible when the electricity board's authority manually checks it, which is a time consuming and costly method. This proposed system is a possible solution to detect meter tampering. Energy meter is integrated with the system in such a way that if anybody opens the cover of the meter, an IR sensing arrangement sends a command to the microcontroller (8051 family). Microcontroller then senses a change in the logical input from IR sensor and gives command to the GSM modem to send an SMS to the designated mobile phone number stored in the controller's memory. This information also gets displayed on an LCD. The idea of Prepaid energy meter using an AT89S52 microcontroller has been introduced. This concept provides a cost efficient manner of electricity billing. The present energy billing systems are discrete, inaccurate, costly and slow. They are also time and labour consuming. The major drawback of traditional billing system is power and energy theft.

Index Terms- Internet of things; Monitoring; prototype;sensors.

1.INTRODUCTION

The main objective of this project is to send a message in the event of energy meter being tampered. As electricity consumption is increasing, so it is the attempt for tampering the energy meter. Identifying a tampered meter is only possible when the electricity board's authority manually checks it, which is a time consuming and costly method. This proposed system is a possible solution to detect meter tampering. Energy meter is integrated with the system in such a way that if anybody opens the cover of the meter, an IR sensing arrangement sends a command to the microcontroller (8051 family). Microcontroller then senses a change in the logical input from IR sensor and gives command to the GSM modem to send an SMS to the designated mobile phone number stored in the controller's memory. This information also gets displayed on an LCD. The idea of Prepaid energy meter using an AT89S52 microcontroller has been introduced. This concept provides a cost efficient manner of electricity billing. The present energy billing systems are discrete, inaccurate, costly and slow. They are also time and labour consuming. The major drawback of traditional billing system is power and energy theft.

. 2. LITERATURE SURVEY

[1]G. L. Prashanthi, K. V. Prasad had proposed with GSM modules helps company to monitor the amount of usage bythis specified costumer and generate bill periodically and send it to costumer via SMS, thus saving lot labor work, timeand cost of labour.It saves time as well as help to maximize profit margin for utility company working in electrical distribution network.

[2]S.Anusha, M.Madhavi,R.Hemalatha had done the project model to reduces the manual manipulation work and theft. Use of GSM in our system provides a numerous advantages of wireless network system. The metering IC ensures the accurate and reliable measurement of power consumed.Cost wise low when compared to other energy meter without automatic meter reading and theft control.

[3]Kalaivani. R, Gowthami. M, Savitha.S, Mohanvel.S had done the system, in which service provider can collect the bill any time with a single message. The data collection and manipulation task becomes fast and easier. Any modification can be made to the code in less time. Changes in rate or unit calculation can be done very effectively. The project model reduces the manual manipulation work and theft. Use of GSM in our system provide the numerous advantages of wireless network. Hence we are trying to manipulate cost wise low when compared to other energy meter without automatic meter reading and theft control.

[4] a new approach towards Nontechnical loss (NTL) detection in power utilities using artificial intelligence based technique and pattern classification technique in order to detect and identify load consumption patterns of fraud customers. In this system customer committing fraud activities before the two year period will not be detected by the FDM.

[5]Various theft detection method have been proposed, based on consumer not paying the bill, bypassing the poles, reception of misused Energy, tapping on transmission line as explained.

[6]Ashna.K "GSM Based Automatic Energy Meter Reading System with Instant Billing" proposed the design of a simple low cost wireless GSM energy meter and its associated wave interface, for automating billing and managing the collected data globally.

[7]Vivek Kumar Sehgal "Electronic Energy Meter with Instant Billing" introduced the concept of Postpaid Energy Meter which automatically sense the energy used in the home and when it reaches value which is initially fed in the hardware it will disconnect the power line. A user interface given in the hardware for user which will interact with the hardware, through user interface user can set a value.

[8]Mr.Nazir Bin Abdullah developed an automatic meter reading system (Automation of ResidentialElectricity Cut off Using Embedded Controller). In 2012 for domestic user. In this project he used GSMmodem for transmitting and receiving information, both sides means user side and energy provider side.

[9]Mr. Hung Cheng Chen proposed a wireless automatic meter reading system in 2012. In thisproject he used ZigBee module on both sides. This technology is chip and low cost. In [16],Mr.Alauddin Al –Omary develop an automatic meter reading system using GPRS technology in 2011.

[10]Mr.H.G..Rodney Tan develop an automatic power meter reading system using GSMnetwork in 2007.In this system GSM digital power meter installed in every consumer unite d electricity ebillingsystem at the energy provider side.
 [11]Mr.MejbauiHaque develop a microcontroller based single phase digitalprepaid energy meter for improved meter and billing system.

 [12]Amit Jain proposed a prepaid meter using mobile communication in 2011.

3.TOOLS USED

3.1 GSM

GSM/GPRS Modem-RS232 is built with Dual Band GSM/GPRS engine- SIM900A, works on frequencies 900/ 1800 MHz . The Modem is coming with RS232 interface, which allows you connect PC as well as microcontroller with RS232 Chip (MAX232). The baud rate is configurable from 9600-115200 through AT command. The GSM/GPRS Modem is having internal TCP/IP stack to enable you to connect with internet via GPRS. It is suitable for SMS, Voice as well as DATA transfer application in M2M interface. The onboard Regulated Power supply allows you to connect wide range unregulated power supply. Using this modem, you can make audio calls, SMS, Read SMS, attend the incoming calls and internet ect through simple AT command.
a) GSM Features:-
• Dual band GSM/GPRS 900/1800MHz.

• Configurable baud rate.

• SIM card holder.

• Built in network status LED.

• Inbuilt powerful TCP/IP protocols stack for internet data transfer over GPRS.
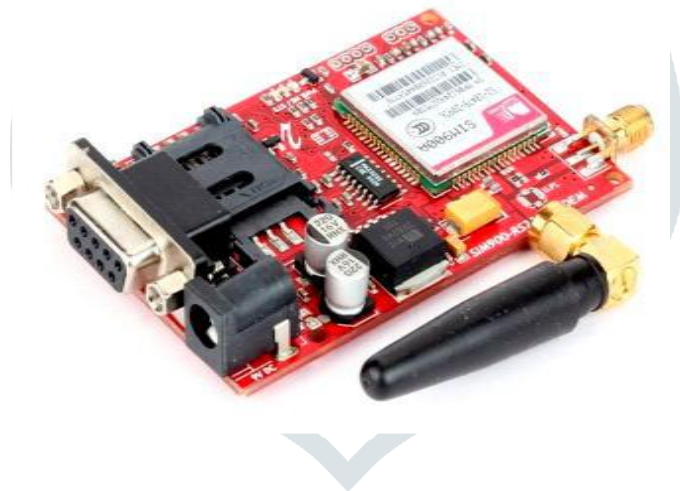
3.2 ENERGY METER

Electromechanical meter consists of an aluminum disc positioned between two electromagnets, one of whose coil is connected to the load and is the current coil and the coil of another electromagnet is connected to the supply voltage. The interaction of the fluxes between the two coils is responsible for providing a torque to the disc, which starts rotating, with the revolutions proportional to the load current. The counter records the number of revolutions and displays them, which indicates the energy consumed.

3.3 RELAY

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate 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. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

3.4 LCD DISPLAY

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.
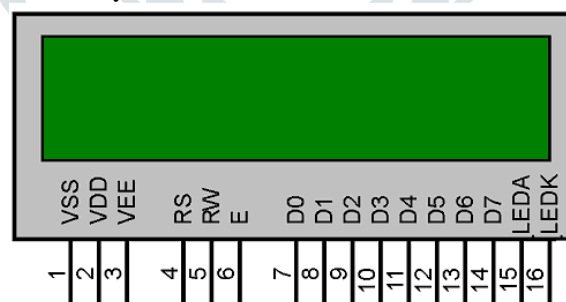
3.5 MICROCONTROLLER

Microcontroller is a programmable device which contains a microprocessor, memory, input-output ports etc which can be compared with the microcomputer. Microcontroller is a single chip computer. As microcontroller is a low cost programmable device. It is used in the automatic control application. Now the pulses produced at the pin CF is directly applied to the counter pin of the microcontroller. The microcontroller counts the pulses that appear at pin 1 of Microcontroller (ATmega32) within every 20 seconds. The number of pulses per second appeared at pin 22 of Energy Meter IC is directly proportional to the instantaneous real

power information for a particular load. Information such as power, energy, and maximum demand are stored at the EEPROM of
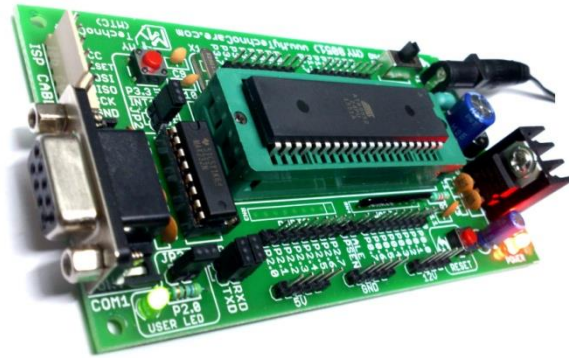

the Microcontroller (ATmega32).

3.6 TAMPERING ALERT

In order to minimize the cost of electrical energy consumption, many consumers try to tamper the energy meters. Today energy theft is a worldwide problem that contributes heavily to revenue losses. Consumers have been found manipulating their electric meters, causing them to stop, under-register or even bypassing the meter, effectively using power without paying for it. Some of the tampering techniques are as follows,

- Reverse Tampering
- Open Cover Tampering
- Magnetic Tampering

4. Bock diagram:
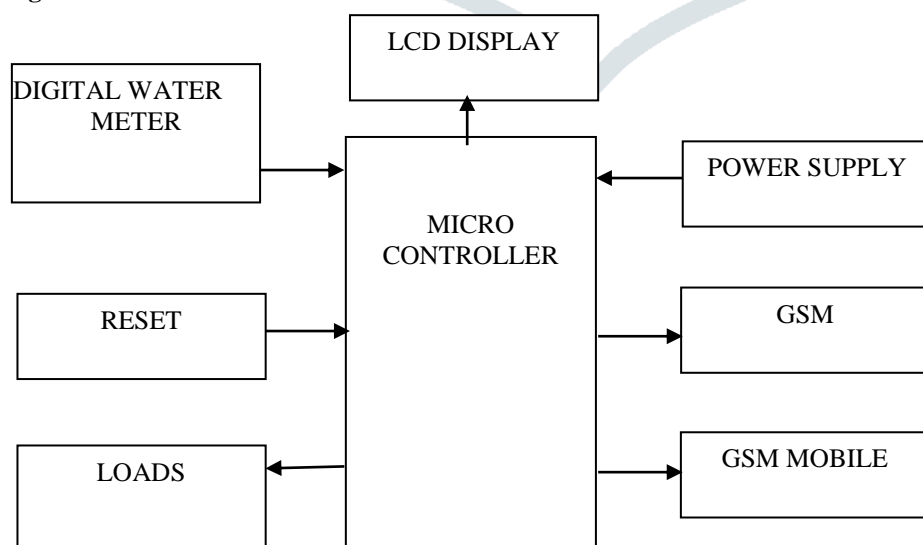
pre-paid meter will be installed in the house. The supply from the utility comes to the meter terminals, similar to a conventional meter. The load is connected to the meter through a latching relay that is provided inside the meter. The user has to buy the prepaid cards from the local store or via the Internet, or via your cell phone. The user has to decide how much they want to buy like Rs.100, Rs.250, Rs.500 and Rs.1000, whatever amount. The prepaid cards will be programmed for the required number of amount. The card is shown before the card reader that reads the card. The net energy credit is displayed on the LCD display. The relay connects the supply to the load. The energy consumed is continuously measured and the display is updated accordingly to display the net credit available. After 75% of the credit energy is consumed, the 25% alarm LED lights up. From this point, the meter is ready to accept a new card to append the credit. When the credit becomes zero, and the credit energy is still not renewed, the relay switches off supply to the load. After the meter accepts a fresh credit, it will restore supply to the consumer. If the owner or any person tries to alter the extension are they try to change the flow of power of the input line from poles to meter then sensor will detect such activities and sends alert to the respected authorities then they can find the location and they are allowed to capture the images of the victims using advanced IOT Technology.

5. CONCLUSION

When prepaid mode is selected by the consumer the units are reduced as per the consumption. When balance is low, the message is sent to user. If the counter reaches to zero, power is automatically shutdown. But if the balance is filled power is continuous. Traditional electricity meter have no ability to detect tampering because they only measure energy based on voltage and current flowing between inlet and outlet terminal. Hence by including tampering sensor we can detect faults.

6. REFERENCE

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