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GSM BASED ENERGY METER AND BILLING VIA SMS

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ABSTRACT: The technology of e-metering (Electronic Metering) has gone through rapid technological advancements and there is increased demand for a reliable and efficient Automatic Meter Reading (AMR) system. The proposed system replaces traditional meter reading methods and enables remote access of existing energy meter by the energy provider. They can also monitor the meter readings regularly without the person visiting each house. After processing the collected data, bill is generated and using web based system software it is sent back to the customer as SMS.
KEYWORDS: EEPROM, Energy Meter,GSM modem, Microcontroller 8051, RFID.

1. INTRODUCTION

Today the energy meter which is placed in the home/office collects the data of the energy consumed and displays it on either a number dial or digital display. At the end of every billing cycle the person from service provider has to visit the place where the meter is placed to get the reading and to note it down for further bill generation. The present system of energy billing is error prone and also time consuming [1].

The underlying aim of every technology is to ease human efforts as far as possible, so with that objective in mind we set off to achieve another such goal. An electricity meter or energy meter in simple terms would be a device that measures the amount of electric energy consumed by a residence, business houses, or an electrically powered devices or appliances. Electricity meters are typically calibrated in billing units, the most common one being the kilowatt hour [kWh]. Periodic readings of electric meters establish billing cycles and energy used during a cycle, the cycle generally extending for a month [2],[3].

The Microcontroller based system continuously records the readings and the live meter reading can be sent to the user after the authenticated card swiped by the electricity department person. The one more authenticated card also can be used to disconnect the power supply to the house in case of non-payment of electricity bills. A GSM modem with SIM card is required for each energy meter to send the meter reading to user via SMS.

The SMS has extended their service to content providers to deliver a wide variety of services to mobile phone users. SMS is one of the convenient mean of communication especially for reminder notification, and a short note when the mobile phone user is not expect to answer or respond immediately.

The kind of Energy Monitoring System which we are making is appropriate for Industries, manufacturing plants, commercial Buildings or any situation where an electrical system is used. The system provides the centralized Power Monitoring and Control for the electricity department and easy bill payment for the customers.

The Energy management System leads to savings in the overall cost. These savings may be from better utilization of manpower, no data tampering and time saving both for the customers as well as for the energy providers.

With the help of this device of ours, in addition to the electricity bill delivery, the electricity bill payment becomes easier and time saving, as for in this busy world of our time plays a crucial role.

2. FUNCTIONAL BLOCK DIAGRAM

3.

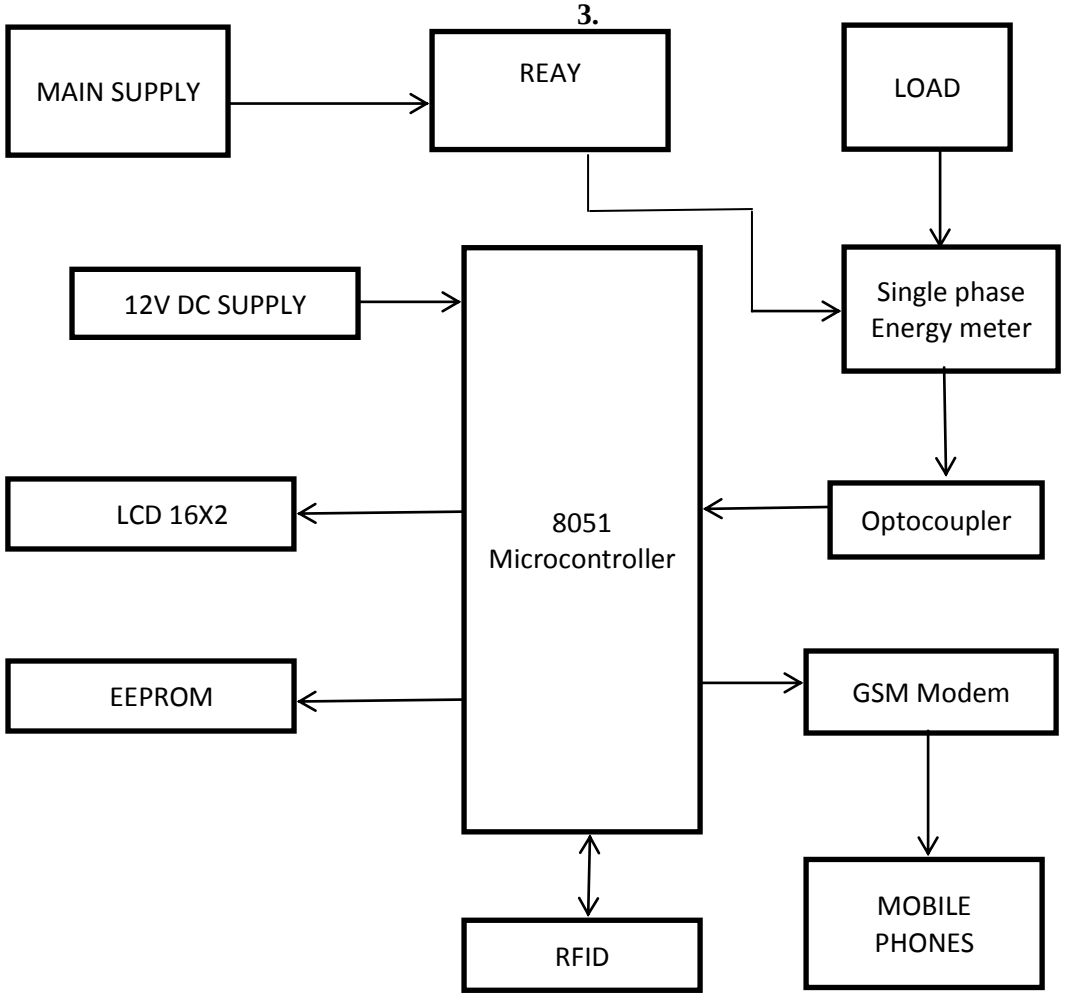

Figure.1. Functional Block diagram

The above block diagram shows the major components required for automation of energy meter. Its function can be explained as fallows:

- The energy meter reads the pulses, i.e. the power consumed by the load which is connected to it.
- The IR receiver receives the pulses which are read by the energy meter and those pulses are transmitted to the microcontroller.
- Both microcontroller and EEPROM simultaneously count the pulses.
- The counted pulses are displayed on LCD.
- When the authenticated RFID card is swiped(once in 30 days), the amount of power consumed and the cost of the same is sent to the user as well as the board as an SMS with the help of GSM technology.
- IF user fails to pay the electricity bill within the specified time by the electricity department, another RFID card is used for power cut down by the authenticated person.
- Once the user pays the bill, the RFID card which was used for power cut down is again swiped to reconnect the power.

4. METHODOLOGY

Figure.2 shows the prototype model of GSM based energy meter. In this project the pulse and unit (meter reading) count continuously according to load connected. The energy meter counts the pulses, these pulses are received by IR Receiver and from IR Receiver the pulses are passed to Microcontroller. Simultaneously both Microcontroller and EEPROM which is interfaced with the Microcontroller starts to count the pulses coming from IR Receiver.

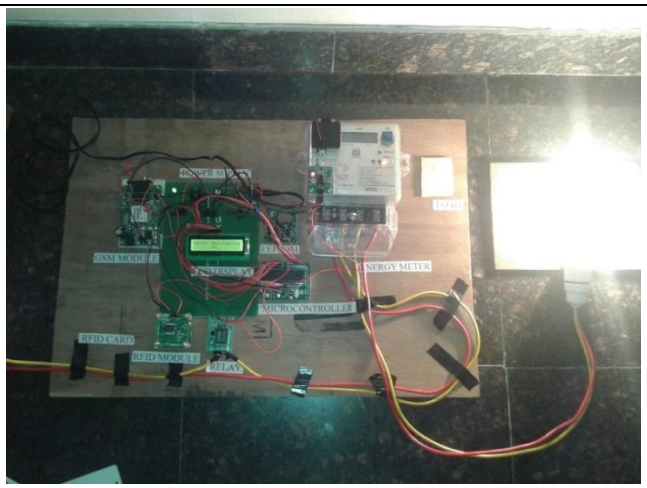

Figure.2. Prototype model of GSM based energy meter

Figure 3 shows the display of pulse count in LCD .The pulses which are counted by Microcontroller is sent to LCD for displaying.

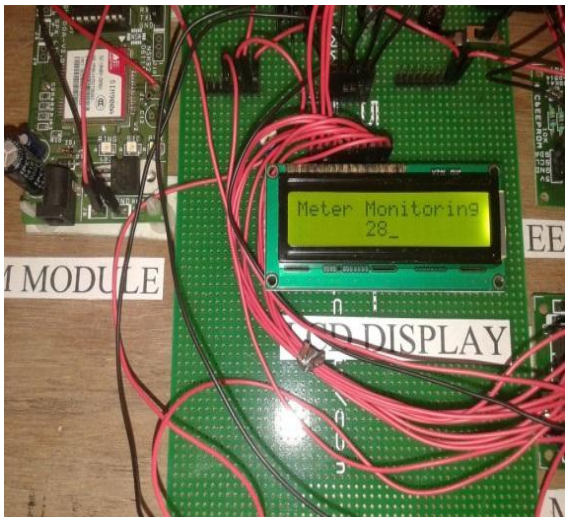

Figure.3. Displaying the count values on LCD

Figure 4 shows the Working of RFID Module along with the RFID cards. When authenticated RFID card is swiped for every 30 days the counted pulses from Microcontroller of 30 days is sent to the user as SMS using GSM technology.

Figure.4 Meter pulses received by the user to his mobile when the authenticated card is swiped

Figure.5 shows the power cut down process due to nonpayment of the electricity bill. When the user does not pay the electricity bill within the given period by the electricity department, the authorized person comes and swipes the RFID card for the power cut down. The SMS alert is sent to the user to notify that the power is cut down

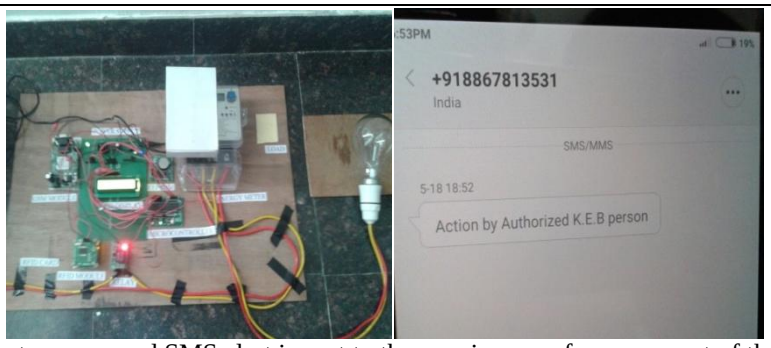

Figure.5 Power cut process and SMS alert is sent to the user in case of nonpayment of the electricity bill.

5. CONCLUSION

The Design of this system model reduces the manual billing system work also the conventional electricity bill payment procedure in India would be made simple. As witnessed a customer has to spend long hours standing in the queue waiting for his turn to pay the bill. But with this technology the customer has to suffer no such inconvenience. The customer can easily know his bill in his mobile phone at the month's end via an SMS and can pay his bill using his debit card without having to go anywhere, using the card reader embedded energy meter from his household's perimeter.

GSM based energy meter is easy to installation and beneficial for both energy provider and consumer. This system is secure and reliable because it can be accessed only by an authorized person.

This project is prototype implementation of the system which can be utilized in a real time system which reduces the man power and save the nature by saving the cut down of trees which is used to make paper. Thus this project reduces the man power of paper billing system and also the saves the nature which is eco-friendly.

Also, this technology can be further broadened to other bill payments such as water bill, newspaper bill etc.

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