Vol 3 Issue 9 Oct 2013

Impact Factor : 0.2105(GISI)

ISSN No : 2230-7850

Monthly Multidisciplinary Research Journal

Indian Streams Research Journal

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RNI MAHMUL/2011/38595 **ISSN No.2230-7850**

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Indian Streams Research Journal
Volume-3, Issue-9, Oct-2013
ISSN 2230-7850

Available online at www.isrj.net

GSM Based Automatic Energy Meter Reading And Control

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Abstract:The purpose of this project is to remote monitoring and control of the Domestic Energy meter. This system enables the Electricity Department to read the meter readings regularly without the person visiting each house. This can be achieved by the use of microcontroller unit that continuously monitors and records the Energy Meter readings in its permanent (non-volatile) memory location. This system also makes use of a GSM modem for remote monitoring and control of Energy Meter. The Microcontroller based system continuously records the readings and the live meter reading can be sent to the Electricity department on request. This system also can be used to disconnect the power supply to the house in case of non-payment of electricity bills. A dedicated GSM modem with SIM card is required for each energy meter.

Keywords:AMR, GSM, SMS, Rs232

1. INTRODUCTION

One of the greatest achievements in the human history is the invention of Electricity and transmitting them to every consumer. Almost every living place is powered with Electricity. Next to food consumption, electricity would be the next largest thing that every human consumes. Energy is being generated by many generating stations through Renewable and Non-Renewable resources such as Wind Energy, Thermal Energy, Solar Energy, Hydro Energy etc. The Energy generated is being consumed by many Commercial buildings, Industrial areas, Residential places and so on. Every consumer is equipped with an Energy meter, which keeps tracks of the energy units consumed by each consumer. Analog or Digital Energy meter serves this purpose. These consumers are charged on the basis of the units they consume. Thus Energy Measurement plays a vital role in the process of billing. Advancement of technologies in the area of GSM makes the transmission and reception of data easier. At the transmission side, the data would be converted into frequency and send through the transmitter. At the reception side, the transmitted frequency would be received through receiver and converted into data. Using GSM in the field of Energy Measurement makes the process of billing simpler. Also, human interventions to this process are almost reduced. This results in accurate calculations of the bill amount for the consumed units.

2. SYSTEM DESCRIPTIONS

The method used to carr yout this project is the principle of serial communication in collaboration with embedded systems. This is avery good project for Industries.This projecthasa GSMENERGY METER,which will beusedas the electronic device, and alsoa GSM modem,which is the latest technology used for communication between the mobile and the embedded devices. System will work like when the user wants to receive a SM Sont he consumption of the energy in houses and offices; the modem sentam essage through the subscriberidentity module(SIM)which is inserted inthed is play system MODEM. I will use liquidcry stald is play for displaying the message;I will also use GSM modem asan interface betweenmobile and micro controller.It will send message to any phoneirre spective of the GSM network through the modem connected to the programm able device.

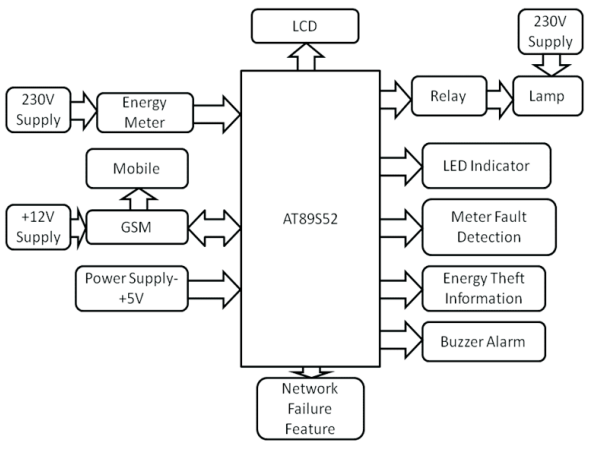

Fig 1. Block diagram

AMR continuously monitor and record the energy meter. This can be achieved by using microcontroller unit. Microcontroller unit are interfaced with digital energy meter. Microcontroller unit are also interfaced GSM modem for remote monitoring and control domestic energy meter. This AMR system works in conjunction with the GSM network to retrieve the power meter reading using SMS. The GSM energy meter is an integration of an electric meter with a GSM modem. A SIM card with a unique special number is required for meter to receive and reply its energy meter readings to the energy provider using SMS. The SIM number is identical to the one used for mobile phones except it is not used for voice communications. The SIM card is also used to identify and retrieve owner or consumer details from the database server for billing purposes. An automatic power reading takes place automatically on request by the energy provider. SMS gateway performs cell broadcasting of request through SMS to all meters to request for meter reading. The meter will immediately respond in the form of meter readings upon receiving the request from the energy provider.

3. PROPOSED WORK

The proposed system involves automating of current meter reading process. By automating them, human interventions and the time consumed to this process are minimized. The calculated bill amount and the number of units consumed by the consumer are accurate. In the proposed system, the Electricity Board has to send a consumer code to the consumer side. The setup provided at the consumer side has to receive the consumer code and has to send the amount of units consumed to the Electricity Board. The Electricity Board has to receive the amount of units consumed and in turn it has to send the bill amount for the units consumed.

4. IMPLEMENTATION DETAILS AND RESULTS

4.1 Hardware Design

The method used to carry out this project is the principle of serial communication in collaboration with embedded system. The project has a electric meter which will work and a GSM modem which is the latest technology used for communication between MODEM and embedded systems. The modem will send a message as and when desired to the electricity officials through Subscriber Identity Module inserted inside the MODEM.

Monitoring terminal collects the data from monitor object. According to field research it is obvious that every monitor object has its own front-end transmitter. These equipments used to connected output voltage of 0 ~ +5 V to the protection systems and the system displays the data for the staff to record. But this system uses this existing transmitter to complete the remote and field data collection.

4.2. Working and Configuration command

GSM Modem Initialization Starts.
After initialization LCD will display message "GSM BASED AUTOMATIC ENERGY METER READING AND CONTROL".
After this message UNIT and UNIT COST is display on LCD.
System has a provision to configure both EB and User mobile phone.
To configure user mobile number send SMS "35791 US" from user mobile.
To configure EB mobile number send SMS "35791 EB" from EB mobile.
To on bulb 1 send SMS "35791 ON1" from user mobile.
To on bulb 2 send SMS "35791 ON2" from user mobile.
To off bulb 1 send SMS "35791 OFF1" from user mobile.
To off bulb 2 send SMS "35791 OFF2" from user mobile.
Three push buttons are used to show the status for meter fault, power theft and overload. Push button is pressed for 2-3 seconds.
First Push button pressed for 3secs message sent to user & EB mobile "Meter is not working Consumption Unit 000Kwh".
2nd Push button pressed for 3secs message sent only EB mobile "Energy Theft Detected".
3rd Push button pressed for 3secs message sent to user & EB mobile "Overload Detected".
After reach 5 units of power are consumed a message sent to user & EB mobile "Consumption unit 000Kwh Unit amount Rs.000"
When 15 units of power are consumed a warning message is sent on user mobile and EB mobile "Kindly pay the bill within Due date. If you paid please ignore"
And when 20 units are consumed then power is automatically cut off and message send to user & EB "Your amount not paid. So service connection disconnected". Buzzer will blow for some moment and led indicator is on. Led will be on till EB send the secret code from his mobile. Otherwise message sent "contact to electrical board".
When EB send SMS "35791PON" from his mobile then power is ON and unit and amount is initialized to '0'.

4.3 Results

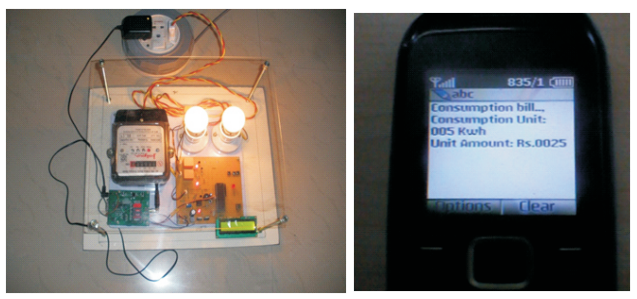

Fig 2: Experiment Output

5. ADVANTAGES AND FEATURE SCOPE

In this Automatic Energy Measurement through GSM, a setup associated with transmitter and receiver is kept with the Energy meter of the consumer. The setup being controlled by the microcontroller (8052) counts the number of units consumed. To know the amount of units consumed, Electricity Board would send a consumer code. This consumer code would be received by the consumer and checks whether the consumer code belongs to the same consumer. When it is same it sets on the transmitter and sends

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the amount of units consumed to the EB side. The bill amount is calculated from the received data and sends it to the consumer side to display the bill amount and the number of units consumed in the LCD display. Also this information would be send to the mobile through SMS. Also in this system used to rectify the energy meter fault, consumers also disconnect the load, network failure correction and energy theft.

6. CONCLUSION

Through this project we can remotely connect and disconnect the power supply through mobile as well we can have the status of the meter from anywhere of the globe. It is a smart automated process instead of manual work which provides accurate information from the network load. We can monitor power at each premise to know the power consumption. Certain modifications provide Outage information and Revenue protection in industrial level. Any modification can be made to the code in less time. Changes in rate or unit calculation can be done very effectively. By doing this project, we have gained invaluable knowledge on wireless communication (GSM) and 8052 microcontroller.

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