Design and Implementation the System of Autonomous Electric Bill Generator

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Abstract

Traditional metering method for retrieving the energy data is not convenient and the cost of the data logging systems is high. So we designing and developing Automatic meter reading (AMR) system. AMR system give the information of meter reading, power cut, total load used, power disconnect .This information is being sent and received by concerned energy Provider i.e. MSEB with the help of Global system for mobile communication (GSM) network. Energy provider receives the meter reading within a second without visiting person. AMR minimize the number of traditional visits required by employs of energy Provider Company. This system not only reduces the labor cost but also increase meter reading accuracy and save hugs amount of time.
Keywords: Short Message Service (SMS), Automatic Meter Reading (AMR), Energy Meter, Energy Provider Company, GSM Modem

I. INTRODUCTION

Electrical power is now day's need for businesses, industries etc. Apart from efforts to meet growing demand, automation in the energy distribution is also necessary to enhance people's life standard. In traditional meter reading, human resource is compulsory needed. In our System, There are all reading and billing process are completely in autonomous way. Autonomous Utility meter have many feature which reduced the cost of travel and paper.

In traditional meter reading, billing process is done by Electrician by visiting one place to another .For that process requires lot of time to collect the Data regarding Energy Consumption by customer and also require the more labour persons. Sometimes there are many problem occur to colleting meter reading such as absence of customer at home and weather condition. After collecting information of meter reading then send to Electric Provider Company i.e. MSEB and start the Generating Billing process using paper and finally one human send this bill to customer of allocated areas.

In our System, Minimize the Paper working and human resources .We used the GSM technology to capturing the reading of the Meter and Send to the Electric Provider Company i.e. MSEB.The proposed project provides a convenient and efficient method to avoid this problem. The electricity department and the user can get the readings of the energy meter of consumers via GSM. The loads can also be controlled by the user of this system via GSM using this project.

II. LITERATURE SURVEY

A. GSM Based Automatic Energy Meter System with Instant Billing: 2014 E.Moni Silviya, K.Meena Vinodhini,

This 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 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. After getting the current consumption the ARM processor will reduce the unit given for specific user. The unit here is taken as numeric value. If the unit is reduced to minimum value it will intimate the user through alarm and LCD unit. This system may be applied in Industrial control, medical system and access control.

B. Design of GSM Based Smart Automatic Energy Metering System: 2015, Kiran Mahale, Shraddha Bansal

This system provides opportunities in implementing energy efficient metering technologies that are more precise & accurate, error less, etc. The implementation of GSM based smart automatic energy meter provides with many vital features as compared with the analog meter reading.

This system provides a full duplex communication between the electricity company and the load by sending in a lot of power parameters and control signal to reach the goal of load management and power need control. Based on GSM smart automatic power

meter on supply automation can supply many capabilities such as efficient meter-reading, distribution, power control and monitoring, load organization and time of use rate. With quick growth of wireless mobile communication network, future use service will gradually concentrate on data communication service. GSM was developed wisely and has many real-time applications at current.

C. *Real Time AMR & Control of Household Energy Meter with Zigbee communication: 2015, Dipti Yeolekar, H.H. Kulkarni.*

AMR is a process of automatically collecting consumption, diagnostic, and status data from energy metering devices and transferring that data to a central database for billing, troubleshooting, and analyzing.This technology mainly saves power supply providers to reduce the expenses of periodic trips to each Physical location to read a meter. Another advantage as mentioned is that billing can be based on near real-time consumption rather than on estimates based on past or predicted consumption. This timely information coupled with analysis can help both utility providers and consumers for better control & use of Electrical energy. AMR technologies include handheld, mobile and network technologies based on telephony platforms (wired and wireless), RF (Radio Frequency) or power line transmission. Various AMR methods an technologies are developed using SCADA (Supervisory Control and Data Acquisition), Zigbee,GPRS and GPS etc.

D. *Automatic Energy Meter Reading System Using GSM Technology: 2016, Prof. S.R.Kurkute, Gopal Girase, Prashant Patil*

The goal of this System 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. They use the digital energy meter in implies a times-sampled system. An analog to digital converter sampled current and voltage transducers output at a high frequency, translating real world waveforms to binary words that digital circuitry can understand and manipulate. Digital energy meters maintain their accuracy over a larger current range than the mechanical meter. These new meters are also stable over change in temperature, voltage and line frequency.

III. SYSTEM ARCHITECTURE

GSM (Global System for Mobile Communication) is a digital mobile telephony system that is widely used in world. GSM networks operate in a number of different frequency ranges (800 to 2100 MHz) one of the key features of the GSM is the Subscriber Identity Module (SIM) card. It is a detachable smart card containing the user's subscription information and contacts. This system is an implementation to the ides of the wireless communication between a mobile phone and a microcontroller. Currently the main work that has been done on this proposed system The Energy Meter used in our system has the following objectives:

- Programming of the mobile phone with AT (Attention) command sequence.
- Interfacing the programming chip with the personal computer.
- Interfacing of the mobile phone with the programmable chip
- Sending messages from the remote phone to control device.

The microcontroller used in the system is AT89S52. The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pinout. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications. It is embedded as part of a complete device often including hardware and mechanical parts. Embedded systems control many devices in common use today. 98 percent of all microprocessors being manufactured are used in embedded systems. Modern embedded systems are often based on microcontrollers. But ordinary microprocessors are also still common, especially in more complex systems. In either case, the processor(s) used may be types ranging from general purpose to those specialized in certain class of computations or even custom designed for the application at hand .Following Flowchart Shows the Flow of Our proposed System:
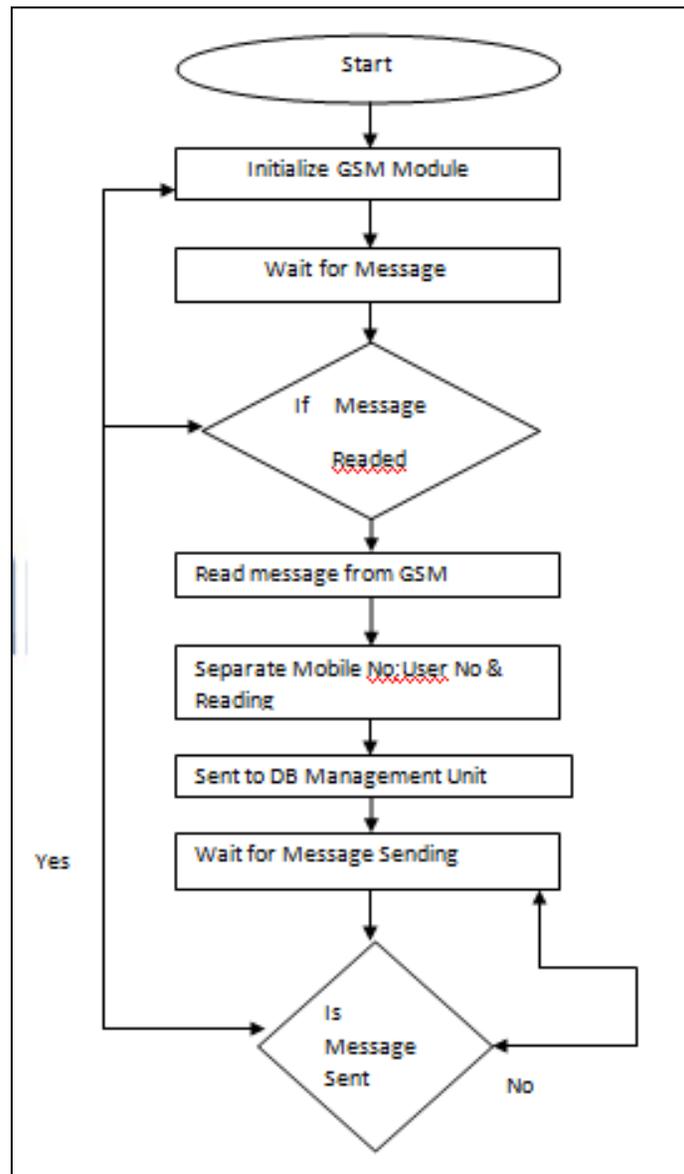
Fig. 1: Flow of Our proposed System

IV. SYSTEM IMPLEMENTATION

Our System is Embedded System which includes Combination of hardware and software. The microcontroller, a LCD display, GSM modem, MAX232, USB-to-serial port cable for compatibility purpose and microchip are used for constructing the GSM energy meter.

A. *Hardware Implementation*

– Microcontroller: In Our project we have used a microcontroller 89S52.Which is the heart of the project. This controls all the functions of project which will Continuously Monitor the Meter reading.
– Max232: The Max232 is used to transmit the data to the Microcontroller 89S52 and also from controller to GSM
– LCD 16x2: LCD 16x2 display is used to display the Meter reading and also Load is ON or OFF. It has 1/16 duty cycle. It works on +5v supply and also on +3v.
– LM7805: It is a 3-terminal 1A positive voltage regulator. This device can be used with external components to obtain variable voltage and current.
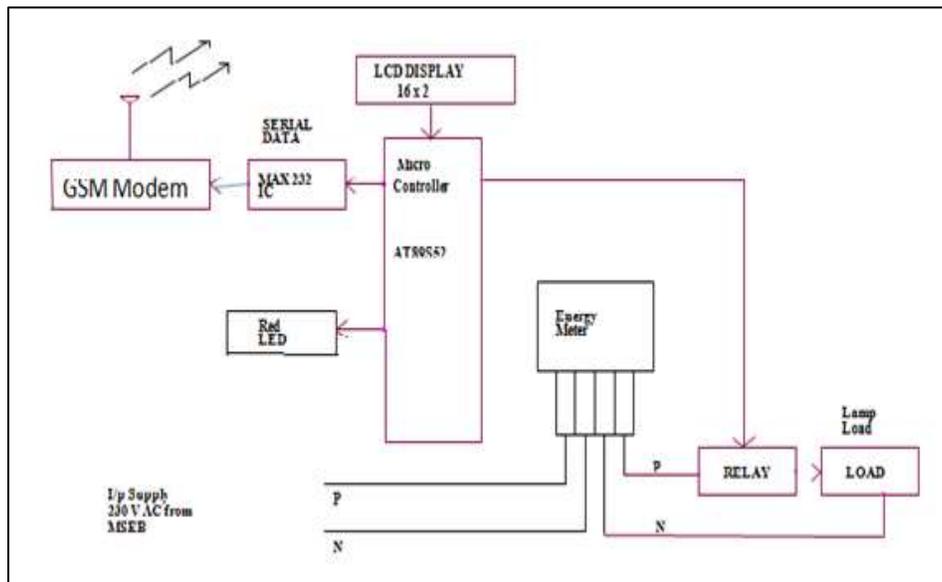– Power Supply: It is used to supply the power to Max232 and microcontroller, LCD, etc.

Fig. 2: Block Diagram of Meter side System.

In Implemented system power supply, GSM modem, relay, transformer, registers, capacitors are the main components which are used for implementing the smart meter.

The power supply is always provided to the meter in which we can give the load on bulb.

A GSM unit shows the interfacing with the microcontroller. For this system we use the microcontrollers AT89S52 .The MAX 232 chip is also used for the compatibility purpose in interfacing of different components. Every consumer's meter has unique meter number provided by Electric Provider Company. When the power supply is given to the meter, the metering IC creates the output in the form of pulses which are counted using the timer of AT89S52 microcontroller unit.
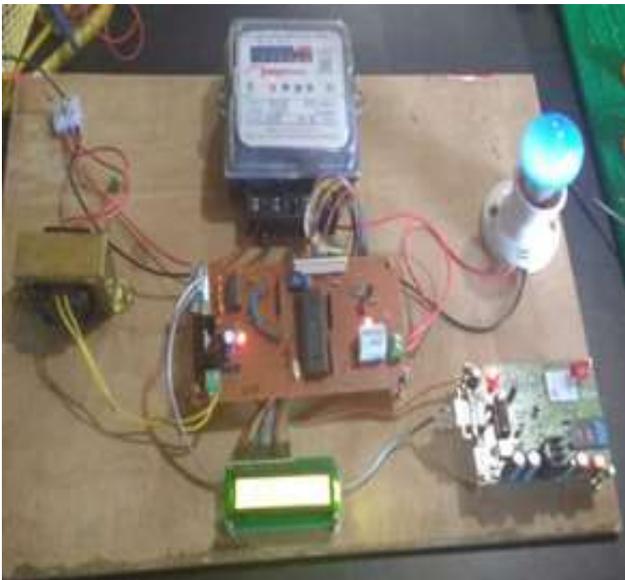

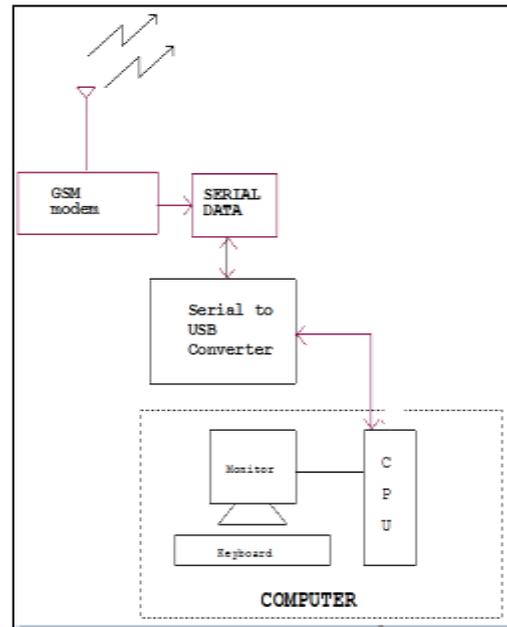Fig. 2: Practical design of system

Fig. 3: Block Diagram of PC side System

When the power supply is given to the meter, the metering IC creates the output in the form of pulses which are counted using the timer of AT89S52 microcontroller unit. For reading the data from the metering IC, microcontroller is programmed using software interfacing with the help of Keil software. When microcontroller reads the energy usage, this data is stored and updated in software. In this, meter is measured for 1 unit of energy consumption and it creates 3200 pulses in LED. The final design and assembly of proposed meter which is handy tool and has less weight. On the Bottom of the meter, there is 16x2 LCD display used for displaying reading. Relay is used for on and off the bulb automatically from the administrator. We used different capacitors, registers, and wires for implementing the practical set up of Implementing system.

V. CONCLUSION

By using this embedded system along with GSM module, provide automation for electrical distribution system. Along with this, it provides better accuracy in meter reading, better control over distribution & management.

Same system can be expanded for multipurpose like water & natural gas. Also many users can share same system.

ACKNOWLEDGMENT

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