Automatic Multiple Meter Reading System

Saifullah Patel[1], Zeeshan Ansari[2], Ishtiyaque Khan[3], Mohammed Patel[4]

[1]*U.G. Student, Electronics & Telecommunication Engineering, Theem college of Engineering, Boisar*

[2] *U.G. Student, Electronics & Telecommunication Engineering, Theem college of Engineering, Boisar*

[3]*U.G. Student, Electronics & Telecommunication Engineering, Theem college of Engineering, Boisar*

[4]*U.G. Student, Electronics & Telecommunication Engineering, Theem college of Engineering, Boisar*

Abstract — The existing systems are either an electronic energy meter or an electro-mechanical meter which are currently in use is limited to record up to kWh units. The kWh units recorded by meter readers monthly, on foot which need to be processed by a meter reading company. For processing the meter reading, company needs to link each recorded usage data to the particular account holder and then determine the amount owed by means of the specific tariff in use. A GSM based Energy meter with instant billing facility is introduced is efficient, but still the problem of missing SMS will degrade the accuracy and performance. A more reliable and user friendly system by creating web portal for multiple access using the advanced Visual studio .net frame work which will manage the data efficiently even if there is loss of SMS. It makes the design different from the previous proposals and also increases the throughput. The GSM/GPRS channel is a very useful means of communication as sending data as SMS turns out to be a very handy tool, due to its good area coverage capability and cost effectiveness. The front end web portal is User friendly and any employee with minimum knowledge of computers can work on this software.

Keywords-GSM, Electronic Energy Meter, Micro-controller, Reliable, User friendly

I. INTRODUCTION

Traditional meter reading for electricity consumption and billing is done by human operator from houses to houses and building to building. This requires huge number of labor operators and long working hours to achieve complete area data reading and billing. Electronic utility meters are an important step towards automating the utility metering process. Automated utility meters have many new features that help to reduce the cost of utilities to customers and the cost of delivering utilities to the utility provider. Collection of meter readings is also inefficient, because a meter reader has to physically be onsite to take the readings. This method of collecting of meter readings becomes more problematic and costly when readings have to be collected from vast, and often scattered rural areas. There exists chance for missing bills, absence of consumer etc. In order to achieve efficient meter reading, reduce billing error and operation costs, Automatic Multiple Meter Reading (AMMR) System plays an important role to address the above mentioned problems. AMMR is an effective mean of data collection that allow substantial saving through the reduction of meter re-read, greater data accuracy, allow frequent reading, improved billing and customer service, more timely energy profiles and consumption trends updates and better deployment of human resources. With the advent of digital technology, analog electro-mechanical meter is continuously replaced by digital

1.1. Motivation

Basic idea behind selecting this topic for the project is that there is no such system available in our country. Many people present their papers on this topic using different methods. But they face some problem by using this technology. To overcome this we try to implement the same project on the basis of automated technology because it is more advance, accurate, and compact one and the most important is that we can operate it manually.

1.2. Problem definition

Meter reading for electricity consumption and billing is done by human operator from houses to houses and building to building which requires huge number of labor operators and long working hours to achieve complete area data reading and billing. Human operator billing are prone to reading error as sometime the houses electric power meter is placed in a location where it is not easily accessible. Labor billing job is sometime also restricted and slowed down by bad weather condition. This increases the energy provider operation cost for meter reading.

1.3. Objective

Due to rapid growth of technology, we have thought of implementing the concerned project. The main objective of our project is to achieve effective, reliable and efficient meter reading, reduce billing, errors and operating costs in order to ease the service provider workload.

1.4. Existing system

Automatic Meter Reading System is a sophisticated system which allows the energy provider to collect the reading without visiting the site. This system helps the customer and energy service provider to access the accurate and updated data from the energy meter and also can send energy consumption in hourly, monthly or on request. This data is sent to central system for billing and troubleshooting and are stored into the database server for processing and recording.

II.   RELATED WORK

Automatic meter reading or (AMR) is the technology of automatically collecting consumption, diagnostic, and status data from water meter or energy metering devices (gas, electric) and transferring that data to a central database for billing, troubleshooting, and analyzing. This technology mainly saves utility providers the expense of periodic trips to each physical location to read a meter. Another advantage 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 customers better control the use and production of electric energy, gas usage, or water consumption. AMR technologies include handheld, mobile and network technologies based on telephony platforms (wired and wireless), radio frequency (RF), or powerline transmission. Advanced metering systems can provide benefits for utilities, retail providers and customers. Benefits will be recognized by the utilities with increased efficiencies, outage detection, tamper notification and reduced labor cost as a result of automating reads, connections and disconnects. Retail providers will be able to offer new innovative products in addition to customizing packages for their customers. In addition, with the meter data being readily available, more flexible billing cycles would be available to their customers instead of following the standard utility read cycles. With timely usage information available to the customer, benefits will be seen through opportunities to manage their energy consumption and change from one REP to another with actual meter data. Because of these benefits, many utilities are moving towards implementing some types of AMR solutions

III.   LITERATURE SURVEY

We researched a lot and after a lot of considerations we decided to implement the automatic multiple meter reading system. While doing the same we searched many websites on the internet and came up with the implementation methodology and circuit diagram for the same. Automatic Meter Reading (AMR) technology, electrical utilities (EUs) have been exploiting their own infrastructure to bill their customers in an efficient and economical way. Since the amount of data that has to be send is quite low related to the available time to perform this task, AMR applications have been demanding low bit rates. At this moment, EUs are exploring and demanding other services as load and alarm management, remote monitoring and disconnections, etc. In this context, the Low Voltage modems should provide more throughout while keeping the cost of the hardware low. The results of this low complexity AMR technology are that in order to deploy an AMR network, the cost of the equipment on the customer premises and the added value services of system. The meter reading and management processes are free from human involvement. Based on the existing telephone networks, it is very flexible for the utility companies to access, service and maintain this meter reading system. A user friendly and window based user interface is designed which fully utilizes the personal computer's terminate and stay resident programming technique to achieve communications between the remote meter reading units and the personal computers in the utility control centre.

IV.   COMPONENTS

4.1. SIM300 HD V2.03:

SIM300 is a Tri-band GSM/GPRS engine that works on frequencies EGSM 900 MHz, DCS 1800 MHz and PCS1900 MHz SIM300 provides GPRS multi-slot class 10/ class 8 (optional) capability and support the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4. With a tiny configuration of 40mm x 33mm x 2.85 mm, SIM300 can fit almost all the space requirement in your application, such as Smart phone, PDA phone and other mobile device.

4.2. Microcontroller (AT89c51):

The AT89C51 is a low-power, high-performance CMOS 8-bit microcomputer with 4K bytes of Flash programmable and erasable read only memory (PEROM). The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard MCS-51 instruction set and pin out. 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 Flash on a monolithic chip, the Atmel AT89C51 is a powerful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control applications.

4.3. Microcontroller (AT89c2051):

The AT89C2051 is a low-voltage, high-performance CMOS 8-bit microcomputer with 2K bytes of Flash programmable and erasable read-only memory (PEROM). The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard MCS-51 instruction set. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C2051 is a powerful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control applications. The AT89C2051 provides the following standard features: 2K bytes of Flash, 128 bytes of RAM, 15 I/O lines, two 16-bit timer/counters, a five vector two-level interrupt architecture, a full duplex serial port, a precision analog comparator, on-chip oscillator and clock circuitry. In addition, the AT89C2051 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port and interrupt system to continue functioning. The power-down mode saves the RAM contents but freezes the oscillator disabling all other chip functions until the next hardware reset.

4.4. MAX 232 (USB to serial converter):

The MAX232 is an IC, first created in 1987 by Maxim Integrated Products, that converts signals from an RS-232 serial port to signals suitable for use in TTL compatible digital logic circuits. The MAX232 is a dual driver/receiver and typically converts the RX, TX, CTS and RTS signals. The drivers provide RS-232 voltage level outputs (approx. $\pm$ 7.5 V) from a single + 5 V supply via on-chip charge pumps and external capacitors. This makes it useful for implementing RS-232 in devices that otherwise do not need any voltages outside the 0 V to + 5 V range, as power supply design does not need to be made more complicated just for driving the RS-232 in this case. The receivers reduce RS-232 inputs (which may be as high as $\pm$ 25 V), to standard 5 V TTL levels. These receivers have a typical threshold of 1.3 V, and a typical hysteresis of 0.5.

V. CONCLUSION

From this we concluded that, for the fast growing world, everything need to be fast, sophisticated, accurate, precise and all this requirement in electric power meter reading field should be fulfilled by this system. The AMMR system takes the advantage of existing GSM infrastructure thus reducing implementation cost, simple and easy installation of GSM Power Meter at consumer side. The GAMMR system proven to provide more effective, reliable and efficient wireless automatic power meter reading and notification through the use of GSM network, thus reduce human operator meter reading operation cost.

REFERENCES

[1] Rob Kavet and Gabor Mezei. 2010, "A Perspective on Radio-Frequency Exposure Associated With Residential Automatic Meter Reading Technology", Electrical Power Research Institute.
[2] Xin Longbiao and Liu Chunlei. 2008. "Summary of Remote Meter Reading system based On Carrier Power" Low Voltage Apparatus. Beijing, April 2008, pp.1–4, 9.
[3] Mr. Rahul Ganesh Sarangle, Prof.Dr.Uday Pandit Khot, Prof. Jayen Modi / International Journal of Engineering Research and Applications (IJERA) ISSN: 2248-9622 www.ijera.com Vol. 2, Issue 4, June-July 2012, on GSM Based Power Meter Reading and Control System.
[4]Automatic meter reading - Wikipedia, the free encyclopedia:
http://en.wikipedia.org/wiki/Automatic_meter_reading
[5] http://www.electricity-today.com/et/issue0707/AMR_Evolving_Techology