AUTOMATIC METER READING SYSTEM USING GPRS

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Abstract: Designing and implementing commercial as well as industrial systems based on Wireless communication has always been a prominent field of interest among many researchers and developers. This paper presents an implementation methodology for a wireless automatic meter reading system (WAMRS) incorporating the widely used GSM network. In many countries GSM and GPRS network is widely known for its vast coverage area, cost effectiveness and also for its competitive ever growing market. Using GSM as the medium for WAMRS provides a cost effective, wireless, always connected, two way data link between utility company and WAMRS, the WAMRS sends information of utility usage, power quality and outage alarm to utility company, tampering detection to the utility servers.

I. INTRODUCTION

The wide proliferation of wireless communication propose and explore new possibilities for the next generation Automatic Meter Reading (AMR) whose goal 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. WAMRS provides a two way 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 demand control. Using WAMRS on distribution automation can supply many capabilities such as efficient meter-reading, distribution, power monitoring and control, load management and time-of-use rate. With rapid growth of mobile communication network, future application service will gradually concentrate on data transmission service. GSM has been developed maturely and has many practical applications at present. It has many advantages such as more stable network with robust features, covers virtually all parts of the world, maintenance and security of data transmission. It satisfies the need of speed for data transmission required for automatic meter reading system. Today the energy meter which is placed in our 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 either notes it down or takes an image of energy meter for further data processing.

II. HARDWARE SYSTEM

Micro controller: This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller
forms the heart of the project because it controls the devices being interfaced and communicates with the devices according to the program being written.

**ARM7TDMI:** ARM is the abbreviation of Advanced RISC Machines, it is the name of a class of processors, and is the name of a kind technology too. The RISC instruction set, and related decode mechanism are much simpler than those of Complex Instruction Set Computer (CISC) designs.

**Liquid-crystal display (LCD):** is a flat panel display, electronic visual display that uses the light modulation properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock.

Now-a-days technology has developed to a large extend. At the same time the need for systems with automation and high security are preferred. So, by using one of the best technologies available i.e. GSM we are designing an automatic power meter reading system for commercial and domestic purposes. Traditional meter reading for electricity consumption and billing done by human operator from houses to houses and building to building. This requires huge number of labor operators and long working hour to achieve complete area reading and billing. Human operator billing are prone to reading errors as sometime the houses electricity power meter is placed in location where it is not easily accessible. Labor billing job is sometime also restricted and is slowed down by bad weather conditions. By using this project we can avoid such problems.

This project is aimed to develop a system to provide security by intimating the condition in the form of SMS by making use of GSM technology. In this project we have two sections.

In section 1 For measuring energy consumed by the user we are going to use one digital energy meter, at the same time as it uses 1 unit the count will be displayed in LCD And that particular data is stored in the eeprom. Whenever the request sms received. Then, it will send the consumed number of units (meter reading) information to another section. The main objective of this project is to design a prepaid energy meter system with the help of GSM technology. In this project we are using bulbs as a load. On LCD we are going display No of units consumed in this hour.

**III. METHODOLOGY**

**OPTO COUPLERS:**

There are many situations where signals and data need to be transferred from one system to another within a piece of electronics equipment, or from one piece of equipment to another, without making a direct electrical connection. Often this is because the source and destination are (or may be at times) at very different voltage levels, like a microcontroller which is operating from 5V DC but being used to control a triac which is switching 230V AC. In such situations the link between the two must be an
isolated one, to protect the microprocessor from over voltage damage. Relays can of course provide this kind of isolation, but even small relays tend to be fairly bulky compared with ICs and many of today’s other miniature circuit components. Because they are electro-mechanical, relays are also not as reliable and only capable of relatively low speed operation. Where small size, higher speed and greater reliability are important, a much better alternative is to use an Optocoupler. These use a beam of light to transmit the signals or data across an electrical barrier, and achieve excellent isolation.

FIG: Optocoupler structure

**ENERGY METER**

An electricity meter or energy meter is a device that measures the amount of electric energy consumed by a residence, business, or an electrically powered device. Electricity meters are typically calibrated in billing units, the most common one being the kilowatt hour. Periodic readings of electric meters establishes billing cycles and energy used during a cycle. In settings when energy savings during certain periods are desired, meters may measure demand, the maximum use of power in some interval. In some areas the electric rates are higher during certain times of day, reflecting the higher cost of power resources during peak demand time periods. Also, in some areas meters have relays to turn off nonessential equipment.

**GPRS:**

GPRS (general packet radio service) is a packet-based data bearer service for wireless communication services that is delivered as a network overlay for GSM, CDMA and TDMA (ANSI-I36) networks. GPRS applies a packet radio principle to transfer user data packets in an efficient way between GSM mobile stations and external packet data networks. Packet switching is where data is split into packets that are transmitted separately and then reassembled at the receiving end. GPRS supports the world's leading packet-based Internet communication protocols, Internet protocol (IP) and X.25, a protocol that is used mainly in Europe. GPRS enables any existing IP or X.25 application to operate over a GSM cellular connection. Cellular networks with GPRS capabilities are wireless extensions of the Internet and X.25 networks.

FIG: GPRS Architecture

**IV. CONCLUSION**

With this system the 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.

V. REFERENCES


