

GSM Based Automatic Meter Reading – A Review

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Abstract: This paper is focused on the description of the possible benefits for the electric utilities and residential customers from the Automatic meter reading system usage. Major benefits of the AMR, mentioned in this paper are power quality monitoring, distribution network management, theft detection and so on. The paper also gives the idea about the reliability indices, communication topologies, AT&C losses concept in distribution system, present and last situations of the AMR integration in power utilities.

Keywords: GSM, Automatic Meter Reading.

1. INTRODUCTION

Over 40 countries have implemented prepaid meters in their markets. In United Kingdom the system, has been in use for well over 70 years with about 3.5 million consumers. Over the last few years, Prepaid Energy Meter has been proposed as an innovative solution aimed at facilitating affordability and reducing the cost of utilities. This mechanism, essentially, requires the users to pay for the electricity before its consumption. In this way, consumers hold credit and then use the electricity until the credit is exhausted. If the available credit is exhausted then the supply of electricity is cut off by a relay.

Secondly, In the modern era of technology we came to know about various wireless control system for our appliances or machines. **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. The AMR system is also able to provide a set of different services, which are useful for the utility companies in their operation and planning and maintenance; they are load management, outage and fault reporting, customer services, power quality monitoring, network management, theft detection, billing, balance settling, energy settling, asset management, energy usage information, interruption reporting etc.

2. AIM OF THE PROJECT

This project will help us to keep the track on electricity usage

WHAT IS?

➤ AMR:

- Stands for Automatic meter reading
- Automating the process of measurement through digital communication techniques

- Its goal is to collect the meter measurement automatically and possibly send commands to the customer & utility companies.

➤ **GSM:**

- Global system for mobile communication
- Wireless communication
- Used for sending data as SMS
- Band rate:9600 bps
- Frequency ranges 880-960 MHz

➤ *An AMR system consists of four levels:*

LEVEL 4	<i>Utility company processing</i>	Customer services	Billing, metering side management, network operations etc.
LEVEL 3	<i>AMR system</i>	AMR system for collecting and refining data	
LEVEL 2	<i>Communications</i>	GSM/GPRS, PSTN,LAN,PLC	
LEVEL 1	<i>Customers</i>	Residential, Commercial, Industrial, Grid etc.	

➤ **Scope:-**

1. It would be very beneficial for agriculture. Farmers could keep the track on electricity
2. In production industries supervisor can observe the consumed load.
3. It can be used domestically.
4. It can use in commercial buildings.
5. It can be used by Electricity Department
6. House hold energy meter monitoring
7. Railway electrical system
8. Industrial energy meter monitoring.

➤ **Features:-**

1. No physical boundaries
2. Low maintenance
3. Low cost because we are using pre established GSM network
4. High speed
5. Real time energy consumed details
6. Improved load profile
7. Automatic billing invoice
8. Load management
9. Alarm warning
10. Remote power switches on/off
11. Tamper detection
12. Bundling with water and gas

3. BRIEF LITERATURE SURVEY

The purpose of this project is to remote monitoring the domestic, industrial, commercial energy meter. 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 of energy meter. The microcontroller based system continuously records the readings and the live meter reading can be sent to the consumer through SMS. A dedicated GSM Modem with SIM card is required for each energy meter.

The proposed system automatically reads the energy meter data and sends it to the customer.

A GSM based wireless communication module is integrated with electronic energy meter of each entity to have remote access over the usage of electricity. A PC with a GSM receiver at the other end, which contains the database acts as the billing point. Live meter reading from the GSM enabled energy meter is saved periodically and these details are updated in a central database & also help the consumer to keep the track on electricity usage.

AMR include various technology for data collection:

- Wire based-Power line communication, and Telephone line network ;
- Wireless- bluetooth, Zig-bee, Radio frequency (RF method), and GSM/GPRS network.

4. PROBLEM FORMULATION

Lower cost to read the meters:

Using the GSM based automatic meter reading system, the power or utility company can read all of the meters in a closed proximity based on daily/monthly usage chart, high and low consumption alerts, increased leak detection efficiency , or more frequently as appropriate. It is not necessary to send a service person to visit every customer location once a month.

More accurate and complete reads:

The power or utility company will no longer need to estimate usage when meters are not physically accessible to their service people. They can get real-time usage data from any of the meters in the system instantly. Meters are always accessible.

Working as a two way communication with each meter:

With this technique two way communications can be made possible; the power company can manage their peak loads better and offer incentives for customers to shift their power usage off-peak times.

5. OBJECTIVE(s)

In liberalized electricity/water /oil markets, which have taken place in many countries over the world, the distribution companies operate in the competitive conditions. Therefore, accurate information about the customers' energy/units consumption plays an essential role for the budget keeping of the distribution company and for correct planning and operation of the distribution network. This paper is focused on the description of the possible benefits for the electric /Water and oil utility departments and residential customers from the automatic meter reading system usage. Major benefits of the AMR, illustrated in the paper, are distribution network management, power quality monitoring, load modelling, and detection of the illegal usage of the electricity/water/oil. By the example of the power system state estimation, it was illustrated that even the partial installation of the AMR in the customer side leads to more accurate data about the voltage and power levels in the whole network. The paper also contains the description of the present situation of the AMR in the electricity market.

6. METHODOLOGY

- To start this research getting knowledge from journals, books, papers etc.
- Throughout study of AMR and its properties.
- Comparison of data with and without AMR system.

- Conclusion of all this study.

7. CONCLUSION

From all data and study the conclusion is as following:-

- The project reduces the manual manipulation work and theft.
- As compared to other system GSM based AMR has low infrastructure cost, low operating cost , more data security and less manpower required.
- Other features such as power disconnect/connect, power cut alerts and tempering alerts etc.
- It saves a lot of time and energy.
- This system is fast and highly reliable as it gives real time data.
- Easily integrated with data acquisition, data transfer, data cleansing etc.
- Energy Auditing , Billing, Outage management and reduction in carbon footprint etc.

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