

## Telemetry System for Utility Metering Application through GSM Network

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### **Abstract**

When the domestic usage of electricity has started, the metering was the toughest thing that was encountered by the electrical engineers. Later the conventional energy meters have come into use for calculating the energy consumptions based on a standard, known as KWH (Kilo-Watt Hour) popularly known as a UNIT. The present meters used for energy calculation is a way of metering through some analog means and then taking the readings manually.

GSM (Global System for Mobile communications) is the most widely used mobile networking standard. In this project we are using GSM communication to transfer meter readings to the central transformer station.

### **Scope of the Project**

The auto-metering system has a conventional meter and the analog signals into this meter are converted into digital pulses using the sensor system. These digital pulses are fed to the micro controller which counts these pulses and calibrates them to KWH. These are stored in the memory of the Microcontroller unit. There is a GSM (module which is used as a transmitter which transmits the meter reading to the transformer station.

The data of each meter is received by GSM modem at the central transformer station and transmits to the nearest sub-station. If this total meter readings are lesser than the outgoing meter readings of the transformer which supplies energy to all these meters then we can predict that there is a power theft and can attend the problem.

### **Applications and Future Aspects**

There are two main advantages of this auto-metering system. The first is the 100% metering and the second is the eradication of power theft. So this is an effective method of metering which is an up gradation to the present energy meters to ensure complete metering, and also hampers the human hazards such as power theft, disabling the gear system of an energy meter.

## **Introduction**

The development of a Telemetry system for utility metering application through the GSM network is presented in this paper. This system consists of GSM digital power meter installed in every consumer unit and an Electricity Billing System at the energy provider side. The GSM digital power meter(GPM) is a single phase IEC61036 standard compliance digital KWH power meter with embedded GSM modem which utilize the GSM network to send its power usage reading using Short message service(SMS) back to the energy provider wirelessly. At the power provider side an e Billing system is used to manage all received sms meter reading, compute the billing cost, update the data base, and to publish billing notification to its respective consumer through sms, email, web portal and printed postage mailing. A working prototype of the telemetry system was build to demonstrate the effectiveness and efficiency of automatic power meter reading, billing and notification through the use of GSM network

Due to the drastic changes in technology in the last decade, so many advancements were introduced in electricity departments. The electricity bill can be paid now through E-Seva centers, ATMs, Net-banking and even through mobile phones. But prepaid electricity is a unique and new concept which saves lot of time and power for electricity department. In this system the user has to purchase an EEPROM based recharge card and it should be inserted in the slot provided on prepaid energy meter kit.

After inserting the recharge card into the system, the system will be loaded with specific units as per the recharge card value. An LCD is provided to read units available. The system consists of prepaid energy meter connected to it which sends a pulse to the microcontroller on power consumption. The controller reads the number of pulses and deducts one unit from the recharge card for every hundred pulses.

An EEPROM is provided on the board to store the updated recharge units and energy meter pulse count. This data will not be lost even in power failure cases. When the recharged units become zero on power consumption, the system shuts down all the loads connected to it.

### **1.1 Objective of the Project**

The project demands for the prepayment of the electricity bill. In other words, the user has to buy the electricity to enjoy the services of electricity department. The project uses the Embedded Systems to design this application. The main objective of this project is to design a system that continuously supplies power to the loads according to the available units, decrements the available units as per the power consumption and once the units have reached to zero, the power will be completely disconnected in the entire house..

The objective of the project is to develop a microcontroller based control and alert system. It consists of a microcontroller, EEPROM card slot, the relay through which the loads are connected to the microcontroller and energy meter.

### **1.2 Overview of the Project:**

This project is a device that reads the available units from the card inserted into the slot, deduct the available units as per the power consumed by the loads and disconnect the power completely once the available units are zero. This system collects data from the card, codes the data into a format that can be understood by the controlling section. This system also collects information from the master device and implements commands that are directed by the master.

The software application and the hardware implementation help the microcontroller read the available units from the EEPROM based card, give the power to the loads according to the available units and decrement the count of available units as per the power consumption and disconnect the power as soon as the available units reach to zero. The system is totally designed using embedded systems technology.

The Controlling unit has an application program to allow the microcontroller keep track of the available units and give the power to the loads accordingly. The performance of the design is maintained by controlling unit.

## Literature Survey

### 2.1 Existing System:

The existed system requires more human power and it is a time requiring process. By using existed system we cannot detect the power thefting. In existed system we will not know the information about the no. of consumed units and how much money we have to pay for those units until the billing man giving a billing receipt, this whole process takes nearly a month of time period.

### 2.2 Disadvantages of Existed System:

- We are not having the facility of detecting the power thefting
- We may get the errors in billing
- It is a complex process.

### 2.3 Proposed System:

Due to the drastic changes in technology in the last decade, so many advancements were introduced in electricity departments. The electricity bill can be paid now through E-Seva centers, ATMs, Net-banking and even through mobile phones. But prepaid electricity is a unique and new concept which saves lot of time and power for electricity department. Our system is established based on this concept only. All the existed systems are post paid systems only, here the proposed system is prepaid one. In this system we are using AT89S52 micro controller and GSM network on which the system working will depends.

The MAX232 acts as serial communication device between the GSM and micro controller in order to avoid the data loss. Here this system is not a real time system. we can implement the real time system by using the same concept.

### 2.4 Advantages of Proposed System:

- It is a simple process.
- It provides more accuracy.
- Detection of power thefting is possible,
- Required human power is very less.
- It saves more time.

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