

# Automatic Meter Reading and Theft Control System by Using GSM

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**ABSTRACT-**This paper deals with automatic meter reading and theft control system in energy meter. Current transformer is used to measure the total power consumption for house or industrial purpose. This recorded reading is transmitted to the electricity board for every 60 days once. For transmitting the reading of energy meter GSM module is used. To avoid theft, infrared sensor is placed in the screw portion of energy meter seal. If the screw is removed from the meter a message is sent to the electricity board. The measuring of energy meter and monitoring of IR sensor is done with a PIC microcontroller. The informative system will be helpful for the electricity board to monitor the entire supply and the correct billing accordingly without any mishap. This model reduces the manual manipulation work and theft control.

**Key word-** IR Sensor, Magnetic reed switch, PIC16F877A Microcontroller.

## 1. INTRODUCTION

AMR (Automatic Meter Reading) is to increase the accuracy reading and theft control system for customers and government. The AMR system consists of a current transformer to identify the reading, and then the calculated reading sends to the PIC microcontroller for authentication. Then the low-power GSM connected to individual energy meters to send the reading to the customer and government for 60 days once. Theft control is the major theme of my project which explains about the types of theft and how to control it with several techniques which explain in the following paragraphs.

## 2. EXISTING METHODS

In the existing methods wireless communication system of energy meter used with Zigbee [10] [9], relay control and GPRS [8] [7]. The cryptographic method is used to secure the communication channel [6] [5] and Zigbee for the transmission of data in a serial process [4] [3].

## 3. PROPOSED METHODS

In the proposed method GSM technology used to transmit the meter reading to the customer and government with the required cost. This process will happen for 60 days once transmission between customer and government. Then the energy theft controlled by IR sensor , magnetic reed switch and some other technique with high security.

## 4. ENERGY METER

Energy meter is a device that calculates the cost of electricity consumed by a home, business, or electrically powered device. In this project our meter box made of current transformer, IR sensor and magnetic reed switch. According to the energy meter calculates the reading with the help of the current transformer [2] [1] . IR sensor and magnetic reed switch are used to detect the theft in energy meter.

## 5. PIC PROCESS OF THE SYSTEM

The PIC is the main part of AMR and theft control. It is based on low power 16bit PIC16F877A processor. PIC consists of high performance and low cost of network technology. The memory organization of PIC consists of three memory blocks . The program memory organization consists of 13bit program count memory space. Data memory split into number of banks and it consist of GPR and SFR. The general purpose register file can be accessed in a straight line or in some way through the file select register. SFR is used in the processor and peripheral for controlling the system.

## 6. THEFT CONTROL SYSTEM

The theft in energy meter is the major drawback in our country because of theft more than lakes of money loss per state in our country. So our project deals about the theft control in energy meter by using embedded systems. To control the theft we use two types of theft controlling process namely tapering of seal in energy meter, underground power theft control .The first process of theft control by using IR (infrared) sensor. IR sensor is fixed in the energy meter screw with 12v rechargeable battery for identifying the tapering of seal. After

identifying the theft IR sensor send the data to the PIC micro controller and then message send to the government office by using GSM. The second process of theft control by using the step down circuit fixed between 50 meter gap to analyze the underground theft. If the intruder cuts the underground cable at the time of a power cut the connection of sensors also disconnected. Then the data transfer also disconnected between the circuit and send the information about the disconnection between the circuit to the PIC micro controller and then message send to the higher officer of the EB (electricity board).

**BLOCK DIAGRAM**

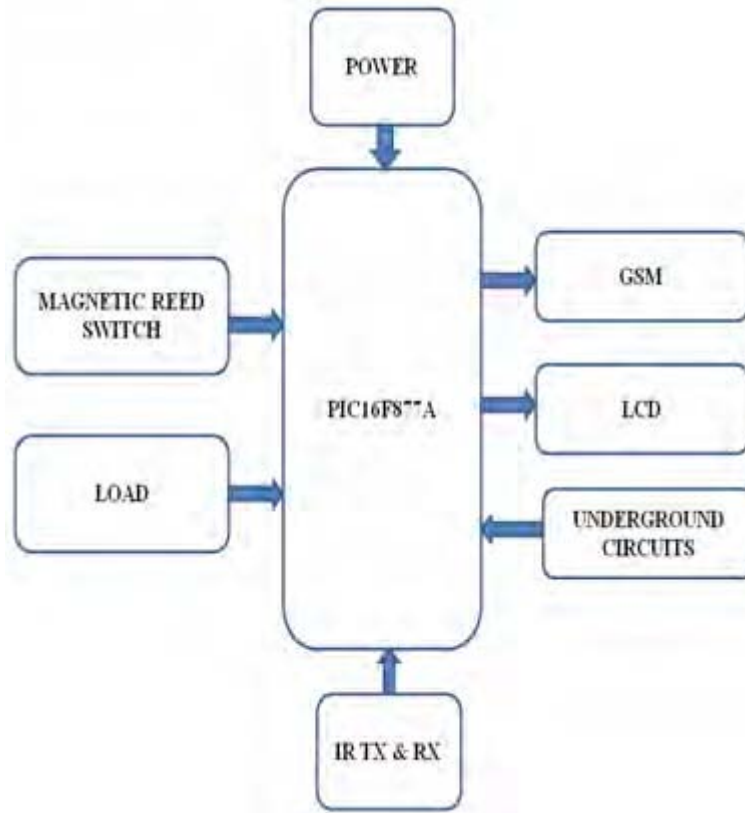


Figure 1: Design of AMR and theft control by using GSM



Figure 2: Design of the control station in AMR and theft control by using GSM

**7. HARDWARE DESIGN**

The hardware of the AMR and theft control systems by using GSM consist of the PCB PIC board design. In this project we use our own creation of energy meter with current transformer to calculate the reading. According to energy meter we are fixing the IR sensor in the screw portion of energy meter and then the IR sensor sense the theft in energy meter. After sensing the theft message send to the controller and government electricity board by help of GSM. The digital energy connected to the controller and GSM for transmitting the energy meter reading to the government electricity board. Whenever there is a power cut the 12V rechargeable battery give power to the IR sensor automatically. So during power or power cut the theft circuit is helpful to detect the theft in power supply. Then the message is sent to the higher authority of government electricity board for further action to detect the theft in underground cable connection of power.

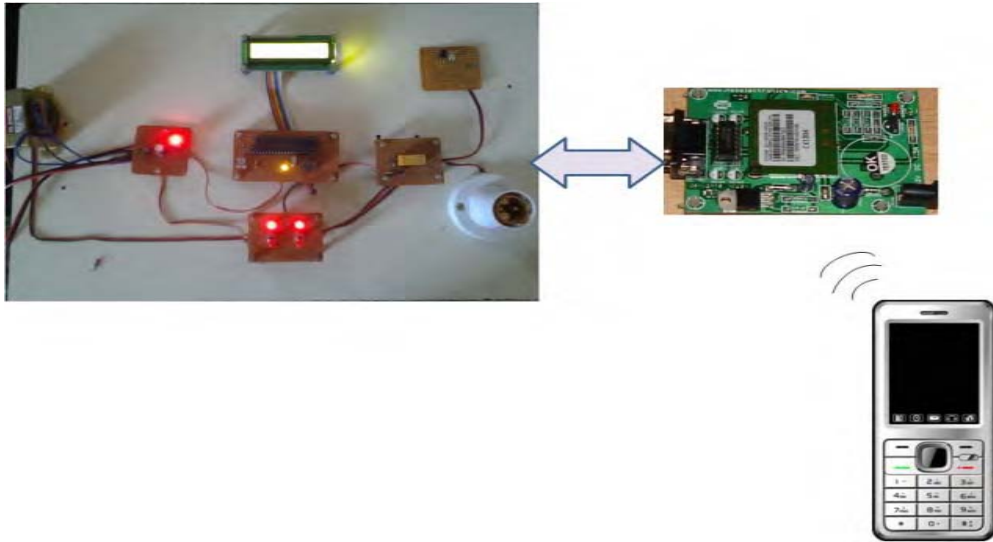


Figure 3:Hardware model of automatic meter reading and theft control system by using GSM

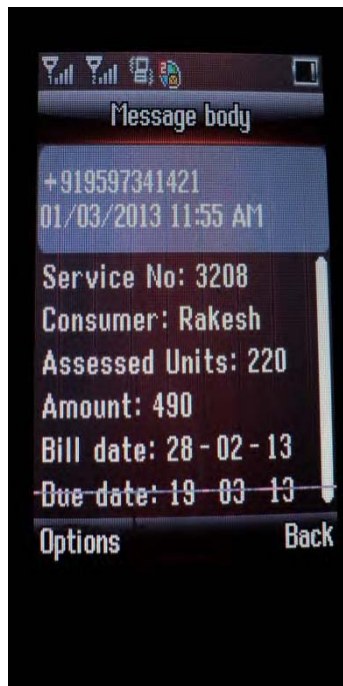


Figure 4: Bill payment reminder in mobile with consumer number



Figure 5: Detected energy meter theft send's to government with a specific consumer number

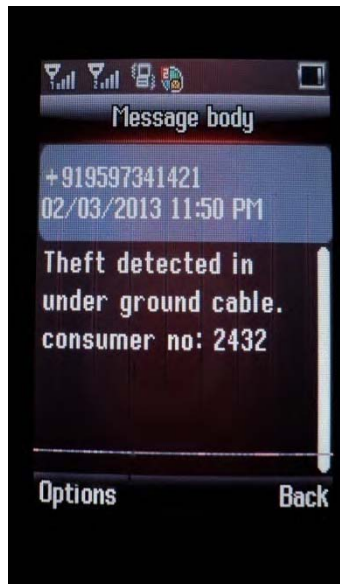


Figure 6: Detected underground theft send's to government with a specific consumer number

## 8. CONCLUSION

The project model reduces the manual manipulation work and theft .Use of GSM in our system provides the numerous advantages of wireless network systems. The government saves money by the control of theft in energy meter and also more beneficial for customer side and the government side. The metering IC ensure the accurate and reliable measurement of power consumed. Cost wise low when compared to other energy meter without automatic meter reading and theft control.

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