Electricity Utilization And Involuntary Billing Through Power Line Communication

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Abstract - In human life electronics act as a very important role, electricity is very important part in human life, hence it is necessary to measure the use of electric energy. In this paper, to renounce the authority's solution for collecting data for energy meter based on previous technology tends to replace modern solution. Automatic meter reader (AMR) is a advanced solution, it means mechanically collect data from various types of meter, it is the best solution of digital data analysis and it has a secure user interface. In this paper presented AMR system based on Power line communication (PLC) and global system for mobile communication (GSM).In this system energy meter reading are being transposed by use of power line modem and GSM. Most important characteristics in this system is uses of digital meters consisting of the microcontroller and real time clock, thus the rejecting loss of meter data during power failure and the main advantage is eliminates the need for employing Electric board (EB) meter reader.

Keywords:-PLC modem, voltage transformer, current transformer, PIC 18F450, GSM module.

I. INTRODUCTION

Power is very important part in the world which is related to electricity, so proper use of this power huge significant to us. Hence it is essential to measure the proper use of power. In this paper enounced the procedure is completely automated and communication is made possible through a power line modem not only for the billing purpose even the control system completely automated. When a buyer does not pay his consumption bill within a given period of time, the supply gets automatically cuts off to his house or industry and the renovation is done when the bill is cleared.

In this manner the consumption of water, gas, electric energy can be remotely controlled and measured. AMR is advanced type, the previous system is manual meter reader available which is based on people hired to collect the information or data from different meter. It has lots of limitations, if to collect or take data from meters in a large scale building and apartments require a lot of time and many meter readers.

In this paper, to overcome these disadvantages to implementing automatic meter reading system, it is the best solution for energy calculation. The next section present literature survey of AMR and third section present block diagram and hardware used in AMR, next section describe simulation result and the last section describe the conclusion and feature scope.

II. LITERATURE REVIEW

References [1] descriptive approach to, automate power meter reading and billing system. In this paper to use GPRS enabled power meter, but some limitation present in this system, i.e. Network coverage issue, which required additional infrastructure to increase coverage.

References [2] describe an AMI based on PLC in this paper to design and implementation of gateway of system with detailed.

References [3] describe a paradigm of the detector system for illegal electric energy usage through power lines.

References [4] describe the deal with the implementation of power line network in the electricity billing. In the present scheme power line communication (PLC) is one of the reasonable ways of communication data.

References [5] design a smart metering protocol in this protocol included initialization to authorized devices in the network and interchange the data before distributing key between devices

In our paper to describe a fully automated system, this system not only for billing i.e. when some consumer fails to pay his energy consumption bill within a given period of time supply of his house gets cut off and as soon as after he pays the bill supply gets start.

III. BLOCK DIAGRAM
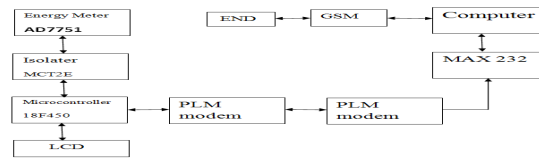
Energy meter:- It is an electronic device that evaluates the amount of electric energy supplied to residence. In energy meter section, energy used by consumer is evaluated digitally. AD7751 energy IC used, it is an energy processing IC for stored energy used by consumer. It requires +5V power supply.

Isolator:- Isolator provides electrical isolation between the circuitry. Opto-coupler MCT2E is used as an insulator.

Microcontroller: - PIC 18F450 microcontroller used in AMR system, it is the heart of the system, it controls the LCD display, power line communication unit and gets interrupted used control on off supply. It requires +5V power supply.

Power line modem (PLM):- It is one of the most important parts in the AMR system**.** PLM is a transceiver chip can be used to transmit as well as receive the data. This PLM provides 9600 baud rate, low rate bi-directional data and half duplex transmission present in this system. It requires +5V power supply.

MAX 232:- It is a level converter IC, is used to serially transmission and reception.

Liquid crystal display (LCD):- LCD is used to display the final output reading, 16*2 LCD used in AMR it provides wide range display functions. This LCD is connected to an energy meter section at the consumer end. This LCD also requires +5V power supply.
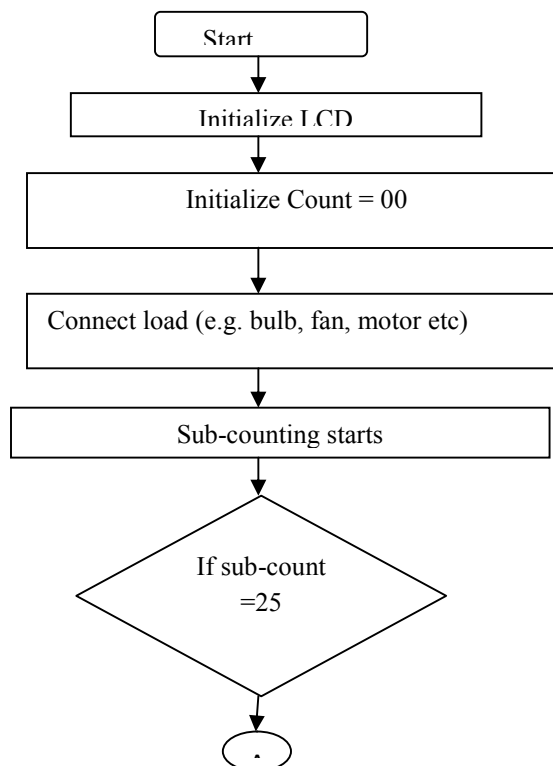
Computer: - The final output reading is calculated using software installed on the computer and then it will be transmitted using GSM and PLM modem to energy meter and consumer mobile.
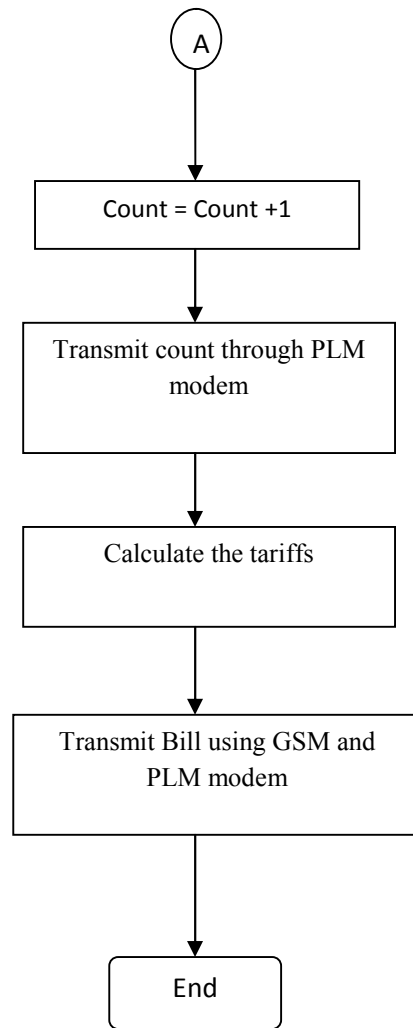
Global system for mobile communication (GSM) :- It is used to carry out communication between server and consumer mobile so as to provide him to bill as soon as it generated, the purpose of GSM is to keep customer update about his bill and usage so that he need not to have wait for paper bill.

IV. FLOW OF PROPOSED SYSTEM

Complete working and flow of the proposed system is shown in the diagram below. Simple and efficient procedure takes place in order to carry out an operation.

As load connected to the system, the count of the utilization displayed on the LCD screen, the counting is done by process as shown in the flow. after the PLM modem used to transmit the count which nothing but the number showing the amount of electricity used. The tariff is calculated for the purpose of a generate the bill which can be send to respective customer through GSM and PLM modem.

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        ( A )
          │
          ▼
┌──────────────────────┐
│    Count = Count +1  │
└──────────────────────┘
          │
          ▼
┌──────────────────────┐
│ Transmit count through PLM │
│        modem         │
└──────────────────────┘
          │
          ▼
┌──────────────────────┐
│  Calculate the tariffs │
└──────────────────────┘
          │
          ▼
┌──────────────────────┐
│ Transmit Bill using GSM and │
│       PLM modem      │
└──────────────────────┘
          │
          ▼
      (  End  )
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V.   SIMMULATION AND RESULTS

There is a requirement of load which has to be applied at the customer end in order to carry out testing of the system. The loads should not be of the same type, as we have to determine deviation in the consume power with respect to different loads.

The number of pulses is produced at the output of AD 7751 is equivalent to power used by user at the load. Practically in electricity board unit, 25000 pulses are generated   which are measured as a one unit. i.e. power consumed by 1000w load for one hour is equal to one unit.
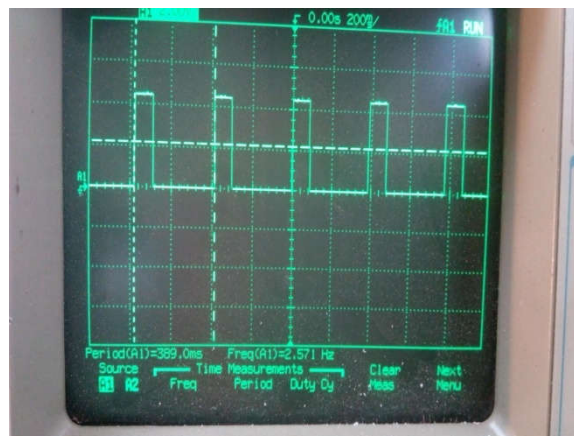

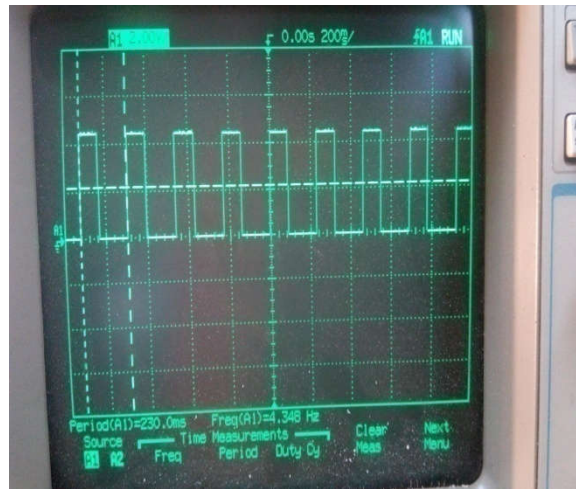*Fig.1 Output of pin CF of AD7751 with 60 watt load*

Fig.2 Output of pin CF of AD7751 with 100 watt load

For testing purpose of the system 25 pulses (on/off pulses), to be considered as one unit and made the design, So to select bulbs of different watts as like (15w, 180w, 250w) or any another load as like fan ac motor, etc. we can choose, to behave as a load at the customer end in order to show the output which is difference in the consumer.

Hence the difference in the number of pulses at the output of AD7751 is shown in fig. 2 and 3

VI. COMPARATIVE ANLYSIS

The curve shows the comparison of efficiency in the previous and our system, the efficiency increased in the present system because of the following reasons:
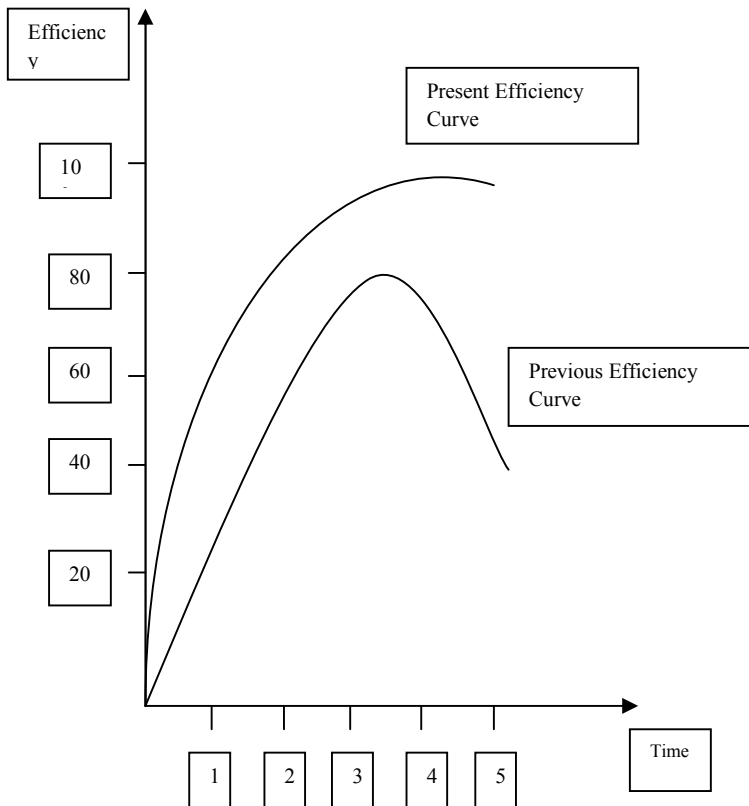
- ➢ Theft detection
- ➢ Automatic power cut off
- ➢ Advanced billing using PLM modem and GSM

- ➤ Low power consumption
- ➤ Reduced human feat and less functioning time

VII.   CONCLUSION AND FUTURE ADVANCEMENT

This paper presented automatic meter reader using a plc can be used to automatically carry the data in different type of meter calculated the bill, and then transmit this billing invoice using PLC modem and GSM. The primary lineament in this system is no more required human source, this is a commodious billing system this system communication can be made much secured.

This system used to power cut and automatic billing, further modify to detect theft catching of electric energy between pole and individual subscriber. Alerting functionally can be set up for consumer load limitation. This system utilized to single phase, further alteration to use system for three phase supply.

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