

# Automated E-Billing and Supply Control using Power Line Communication

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## ABSTRACT

*In every aspect of human life, electronics plays an important role. Power line communication (PLC) is an electronic solution for remote meter reading and power supply control. If such system via PLC is developed for power distribution network then automatic electrical billing can be possible. Power lines which already exist and connect every household in a particular area is more advantageous as it does not require any new installation for establishment of communication channels, and thus it is not a time consuming one. The advantages of this system are less labor, quick updates, no manipulation and cost effective. The transmitted data over power line is Frequency shift keying (FSK) modulated. The architecture of the system is presented. In this paper, the above said process is totally automated and the communication is made possible entirely through the power line.*

**KEYWORDS:** - Automatic meter reading, power supply control, Power line communication (PLC), AVR ATMEGA16 Microcontroller.

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## I. INTRODUCTION:-

Though many technological innovations are taking place in this world, existing electricity consumption billing process seems in India to be very obsolete and does not meet the latest technology available. In this paper, the above said process is totally automated and the communication is made possible entirely through the power line. Not only the billing, even the control of system is fully automated by this technique i.e. when a consumer fails to pay his consumption bill within a given period of time the supply automatically gets cut off to his house and the restoration is done only when the bill is cleared. The currently prevailing system involves the user to go up to the EB office to manually pay his bills. The readings are taken using the analog meter present in the customer's house. The readings are taken using an employee working at the EB office. This system has some disadvantages like erroneous readings, easy manipulation, manual labor and time consuming. In the proposed system, the analog energy meters are replaced by digital meters. The meter readings in the form of digital data are transferred from the customer end to the EB office through power line.

The meter readings are collected at the regular time intervals ( $t$ ) and the present reading ( $t$ ) is compared with previous reading ( $t-1$ ) and the bill is made ready as per the slab for the consumed units by the customer. At the EB end a computer maintains a data base of its entire customer. Once the bill is generated, the customers are provided with some grace period for the payment of bill. If a customer fails to pay his/her bill, a trip signal is sent to the trip circuit connected to the meter, through the same network. Once when the bill is paid, the supply is restored back. Thus the above system does not require any person from the beginning of recording the meter reading to, till the supply control when he/fails to pay the bill. The advantages of this system are less labor, no more queues, quick updates, no manipulation and cost effective.

## II. PROPOSED SYSTEM MODEL

The block diagram shown in the fig is divided into two sections. One section operates as transmitter and other one is receiver. The message which is send by the server side for the request of the reading which is firstly received by the GSM modem, then microcontroller(Master) first read the message from the sim card, then Master controller will communicate with the slave microcontroller which is continuously taking the reading from the meter via serial peripheral interface, the slave who setup the communication with master and slave will send the current reading which is store in the Stack of the slave will send it to the Master microcontroller. “GSM based control system” The message send from the server side or from user to control the power of the appliances which is receive by the GSM modem show in fug the microcontroller reads the message of the sim and it according to the data of the message like how much power need to control, is given to Zero crossing detector, zero crossing detector generates delay for the particular which decides for how much time Triac is on or off, accordingly the internal PWM will drive the loads with the help of phase reference of AC cycle. An electricity theft detection system is a real time power monitoring system. It consists of three units situated at different locations.

### III. PROPOSED SYSTEM ARCHITECTURE

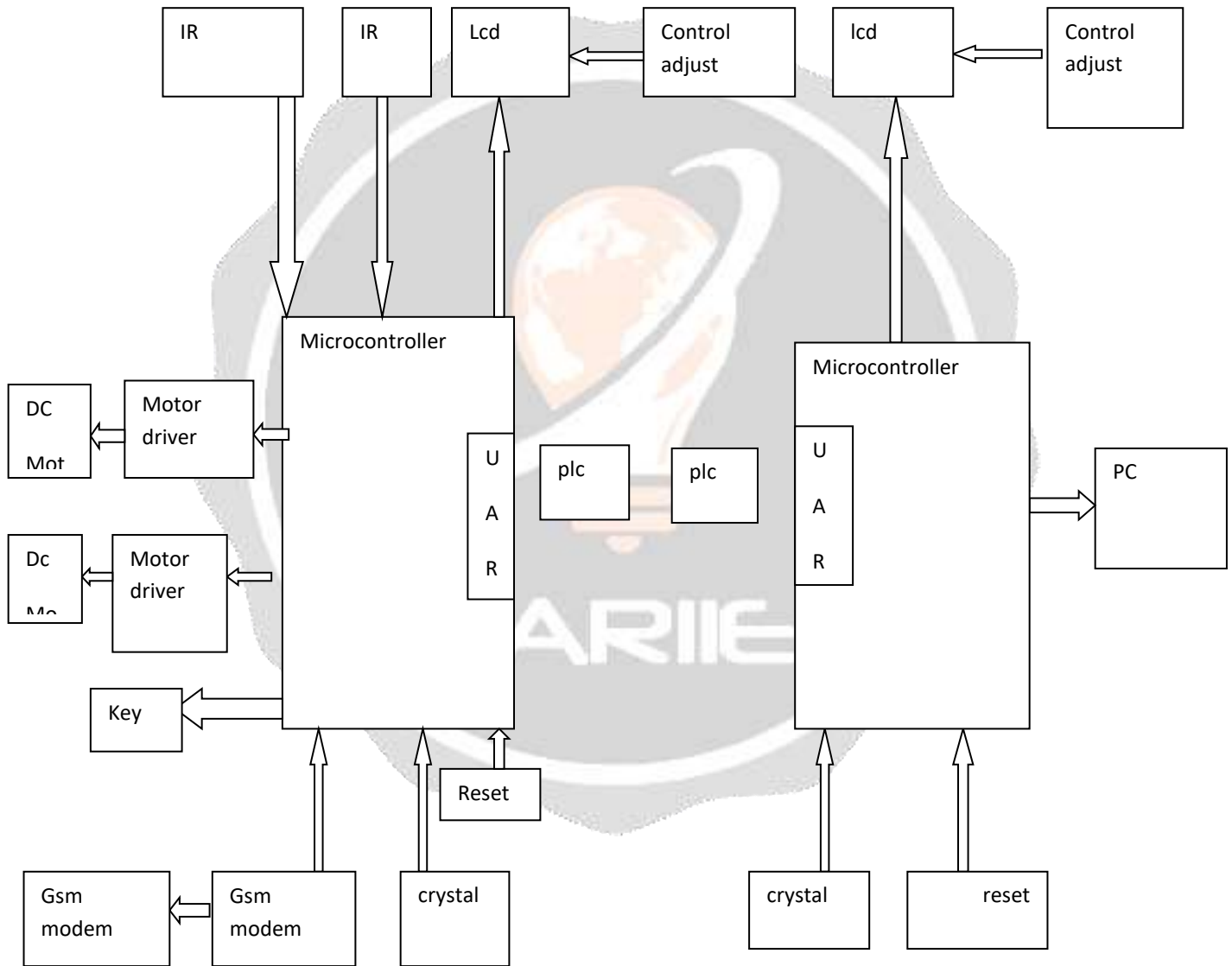


Figure - Block Diagram

Each household is allocated a particular ID so that they can be uniquely identified. There is no chance of manipulation in the proposed system. The network path is also not fixed. This helps in creating a dynamic environment as there is no fixed path in the network. The data sent by the home unit then and there is automatically stored in the back end database at the EB office. This saves hours and hours of manual data entry needed for entering the data into the central system. The power line communication used here is a bi-directional communication enabling data transfer at a faster data rate through long distances. Also power lines may be noisy at certain times due to interference. In such a case the data transmission may be disrupted. Hence a dedicated micro controller is used to enable data transmission even in the noisiest power line and also at any weather condition. By digitizing, the currently used analog energy meter has been completely transformed to a digital one. Hence it is beneficial to the customers as the system is made very user friendly. The automated EB billing procedure has the ability of fulfilling a set of needs for the user and the EB workers.

This paper being advancement to the proposed project of sending the details to the customer house, it has A few objectives which have to be met.

1. Presence of a meter ID at each house and a node ID to which the meter is connected.
2. Encryption techniques present at each house for securely sending the data
3. Tripping circuit at the customer end.
4. A consistent database of all the details of each house under a given zone.
5. A Concentrator PLM under each EB office that is connected to nodes through power line.

In the proposed project each EB office consist of a computer and a concentrator PLM is connected to the computer through RS 232 cable. The concentrator is connected to various nodes PLM placed at the customer side through power line. A single concentrator can be connected to 2256 nodes. Hence practically a single concentrator is capable of connecting the entire house under a zone. And further more each node MODEM can further be connected to 256 meters serially using RS 485. Thus the data from each meter is transmitted to the computer in the EB office which consists of the entire database of its entire customer. Also for each month the bill details are calculated and customers are provided with the bill detail through SMS or e-mail.

#### IV. CONCLUSIONS:-

The proposed automated system saves time and money, increases customer satisfaction, reduces complaints and worker injuries and can pay for itself in a handful of years. Utilities should look beyond basic meter reading expenses to determine how an automated system will drive efficiencies and savings throughout many departments in the organization. This proposed Automated EB model includes an office module which has a PC with its back end connected to a database. The other module is the customer home module which is present at the home this module is used to make note of the amount of power consumed by the customer and after a period of 1 month it sends to the PC in the EB office. This EB office module calculates the data and sends it to the customer along with the due date. The customer also gets details of the bill on his mobile phone through which he can pay the bill. If the customer fails to pay the bill the automated system, cut OFF the customer's supply and the restoration takes place only after the bill is cleared. Even though there are new modern methods of communication of billing data, the use of existing power line seems to be the most economical one and readily adaptable system, when compared to the other methodologies. Thus this system proves to be very advantageous as well as efficient, the one which might become the bench mark in the history of automation.

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