

## AUTOMATIC METER READING USING PLC

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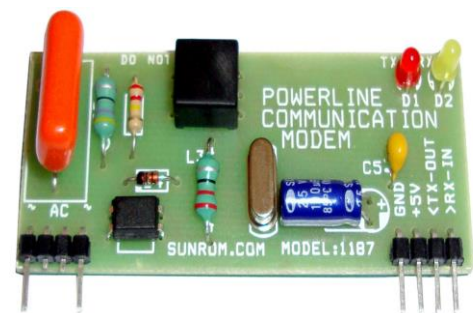
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**Abstract** – In present day automation is an important part in every industry so we are implementing to “Automatic Meter Reading Using PLC”. It is the modern power measuring technology. It is being used in the electricity, gas, water consumption in many countries in the world since it has a huge of benefits that the old analog meter does not have. It has advantages in safety. Data is sent to the existing carrier and it also reduces the complexity and cost of this system. Energy confrontation is the problem faced by our society. That the system to control the energy con-Vientiane is one is one of the clarification for this confrontation, load shedding, power cut etc. Applicable at hand power comfort to but they cannot to anticipate to the rejected of energy, peak time load control etc. Power consumption is a specified area to select that area of a suitable control of the energy convention of this system is demanded and observed. That system is one of the very easy solution to using power line communication.

power helps to rearrange but they can't be used to prevent the rejected usage of energy, peak time load control etc.

### 1.1 POWER LINE COMMUNICATION



**Fig-1** Power line communication modem

**Key Words:** Automatic meter reading, Energy meter, Power line communication.

### 1. INTRODUCTION

This System is mainly implemented for the purpose of getting a fully automatic electricity billing system. To observed and calculate the electricity consumed by consumers in a locality and transmitting the measured reading between the consumer and utility it is the aim of this project. The system can monitor the power usage and can warn the users when the power usage is getting close to the prescribed energy usage level. The main thing of this project is Power Line Communication is used for the transfer of data between consumer and utility. Power Line Communication uses the high power line for the communication. This data is a frequency. The very big benefit of this system is that no additional transmission line is required for the transmission of data. The old billing systems are discrete, inaccurate, costly, slow, and lack flexibility as well as reliability. The fast readings are obtained, bill payment is still performed based on the old billing procedure an even though accurate. Require an individual/agent to physically come and take down the readings and report to house hold/office the amount one has to pay. This suitable system to control the energy usage, Load shedding, power cut etc. This available

Fig-1 shows Power line communication modem Power line modem is useful to send and receive serial data over existing AC mains power lines of the building. It has high immunity to electrical noise persistence in the power line and built in error checking so it never gives out corrupt data. The modem is in form of a ready to use circuit module, which is capable of providing 9600 baud rate low rate bi-directional data communication. Due to its small size it can be integrated into and become part of the user's power line data communication system.

**1.2 Problem definition-** The traditional billing systems are discrete, inaccurate, costly, slow and lack reliability. The old billing system require an individual /agent to physically come and take down the reading and report to house hold / office the amount one has to pay.

**To overcome this problem:** one of the easiest solutions for this is by using power line communication. PLC is a Communication technology that enables sending data over existing power cable.

### 1.3 Literature review-

S.Ventatesula, L.Hemansundar has focused on “data transmission & reception using power line communication” is presented on a digital data transmission/reception via power lines. The Power line communications uses the existing power line infrastructure for communication

purposes. This technology is preferred over other communication technologies like Satellite, Wireless and Optical fiber communications due to wide availabilities of power lines as Power lines are one of the most widely available communication medium for PLC technology and also it is already existing infrastructure.[1]

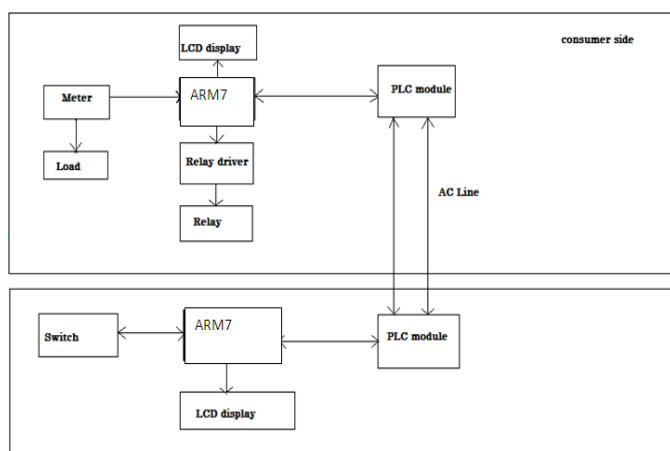
E. Mainardi, S. Banzi has focused “ALow cost home automation system based on power line communication links is presented on the system AC power line systems, instead, are applied over AC voltages both in closed environments houses [2]

Er Liu, Yangpogao, golamsamdani, omarmukhtar and timokorhonen, has explained on “Power lincommunication Over special system”, Power line communication and its application. Hospitals, airports and so on [3].

E.Mainardi, S.banzi, has explained on“A low-cost home automation system based on power line communication links”in the big distribution power networks, over very long distances and with big amount of power in play. In this last case AC power line systems are able to offer several services such as reading the electricity meter, transmitting data and voice over the standard lines, paying the electricity bill, storing information about the network (peaks of power absorption, revealing tampering attempt), solving the “local-loop” problem.[4]

Kiran Mahale,Shraddha Bansal “Smart and efficient energy metering system using GSM” is presented on this system used the smart and efficient energy metering system using GSM is most popularly used because of its vast coverage area & its cost effectiveness. [5]

### 1.4 Proposed Experimental Work



**Fig- 2** Block diagram of automatic meter reading using power line communication.

Fig-2 shows to the Automatic meter reading using Power line communication. And also consumer and utility section is shown in figure given above. This system has two main sections, consumer and utility section, which are intercommunicated using Power Line.

**1) Load Management System** The effective management of the loads at the consumer side is an one of the main aim of this system. A Microcontroller(LPC2148) is provided at each consumer side which controls the load. In this system the peak time is decided by total load connected to the utility and is not fixed. Hence a predetermined peak value is initially set in the microcontroller and if the power consumption exceeds the predetermined value, the microcontroller initially warns the consumer through the LCD module. If no action is performed by the consumer, the controller cuts of the supply to certain devices in a prioritized manner.

**2) Energy meter system** -This system is kept in synchronizing with the utility. Each and every consumer is provided with a unique address which is stored in the Microcontroller as well as the utility data bank. When the meter reading of a particular consumer is to be done, the Utility sends the required address through the power line. The required consumer microcontroller is uniquely identified and the microcontroller is instructed to read the Meter. The meter reading is taking with the help of the blinking pulses and the reading is returned to the utility. At the utility, the required calculations are done and the bill details are retransmitted and the microcontroller displays this in the LCD module. The information is also saved in the data bank for future use.

**3) PLC modem-** It is the ‘modem’ system of the setup. It modulates and demodulates the data that is to be sent through the power line. FSK modulation technique is followed by the unit. It is placed at the consumer as well as utility side for transmission and reception and vice versa. Serial communication method is used for the power line transfer.

### 1.5 METHODOLOGY

The system setup is divided into 2 sections, namely the Consumer section and the Data Monitoring section.

A) The consumer section of the automatic electricity billing system has-

- 1) An energy measuring unit consisting of a digital energy meter and a light dependent resistor.
- 2) Relay is an used to the working of the switching unit.
- 3) A control unit used to control the processes taking place.
- 4) An LPC2148 microcontroller is used.
- 5) An LCD module is used.

6) PLC modem is used to the wireless communication module.

B) The Data Monitoring section is present at the utility side- This section consists of A Central Control Unit (CCU) which is mainly a computer. A Data bank refers to the memory where all the information about the different consumers is stored.

**Main hardware component-**

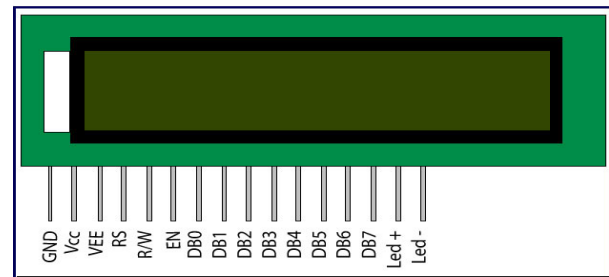
**A) Arm7Lpc2148-**



Fig-A LPC2148 program development The LPC2148 microcontroller are based on 32/64 nit ARM7TDMI whit real time emulation. It is a powerful development platform based on LPC2148 ARM7TDMI microcontroller with 512K on chip memory . this board is powered by usb port and does not need external power supply. It is ideal for developing embedded application involving high speed wireless communication , usb based data logging, real time data monitoring and control. One or two 10-bit ADCs provided.

**B) Relay And Relay driver-** A high power relay is a important part of this system. It provides the useful functionality of switching the power ON/OFF to the user based on the signal send to it from the controller Corresponding to the status of bill payment. A relay is an electrically controllable switch widely used in Industrial controls, automobiles and appliances. The relay allows the isolation of two separate sections of a system with two different voltage sources i.e., a small amount of voltage/current on one side can handle a large amount of voltage/current on the other side but there is no chance that these two voltages mix up. When current flows through the relay coil, a magnetic field are created around the collie., the coil is energized.

**C) LCD Display-16x2**



**Fig C) LCD Display**

LCD (Liquid Crystal Display) screen isan electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters animations.

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.

**1.6 CONCLUSIONS**

There are no additional cable is required for the purpose of the transmission. Power line communication is a competitive solution to transmit information. It presents an interesting and economical solution for automatic meter reading. Communication over a power line can reach anywhere there is an ac outlet. It is popular due to cost effectiveness and availability.

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