Power Line Communication (PLC)

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Abstract— Power line communication (PLC) offers expedient and economical intermediate for data transmission however this technology still face difficult challenges: The although enormous effort has been devoted to determine accurate channel model for power line, so far there is not widely accepted model in the PLC community. In this serve we present resent development and open research issue on PLC channel modeling. The decision is focused on the modeling of the indoor PLC, and in a particular, on its transfer function [2]. Then, we discuss the most representative indoor PLC modeling methodologies that we found in recent works. The encroachment in information and communication technologies (ICT) has made it possible that broadband services can be used to bridge urban–rural areas efficiently and economically, using a readily available and largely distributed power-line infrastructure.

Keywords- Microcontroller, PLC Modem, PLC data communication, model of power line.

I.   INTRODUCTION

Power Line Communications (PLC) is an auspicious unindustrialized technology, which has attracted much attention due to the wide availability of power distribution lines [1]. This concept provides a comprehensive overview to the use of power lines for communication purposes, ranging from channel characterization. The module provides bi-directional half-duplex communication over the mains of any voltage up to 230V AC and for frequency fifty cps or sixty cps. Duplex communications suggests that it will either transmit or receive information at a time however not each at same time. Normally module is in reception approach all the time listening to incoming communication on the power line. Once an application gives serial data to transmit on its RX_{IN} pin, it alterations over to communicate and communicates the data through power line. Once transmit method is complete it switches back to gather approach. The transmission of data is designated by any color LED. The reception of data by modem is indicated by other LED which is on TX out pin itself. Data communication of the modules is translucent to user's data terminals and protocol self-governing; as a result, multiple units can be connected to the mains without affecting the operation of the others. There is no aggravation of building interface circuits. Interface to user's data devices is a simple data-in and data-out serial link. Transmission is based on byte by byte source. Once you give one byte to module for transmission, you will have to wait at least 500 ms before a new byte is given to module again since the module waits for zero crossing of AC mains to transfer a bit. For AC fifty cps system the zero crossing of AC signals happens each ten ms and electronic equipment wants fifty zero crossings to speak one computer memory unit with error scrutiny knowledge. That is why it takes 500ms for one byte. For example we want to transmit character "TEST", then we will have to transmit 'T', then wait 500ms, then transmit 'E' and wait 500ms, then transmit 'S' and wait 500ms, then transmit 'T' and wait 500ms. This can be quite slow speed for big data transfer, but the purpose of this module is transfer of small data bytes like sensor readings and remote control for which this speediness is ok to implement.

II. MODELING/DEVELOPMENT OF SYSTEM
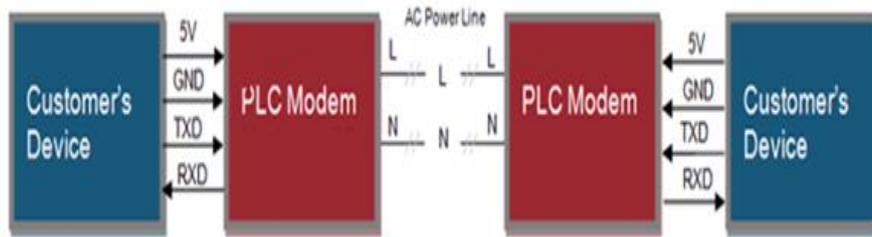
2.1. Development of system

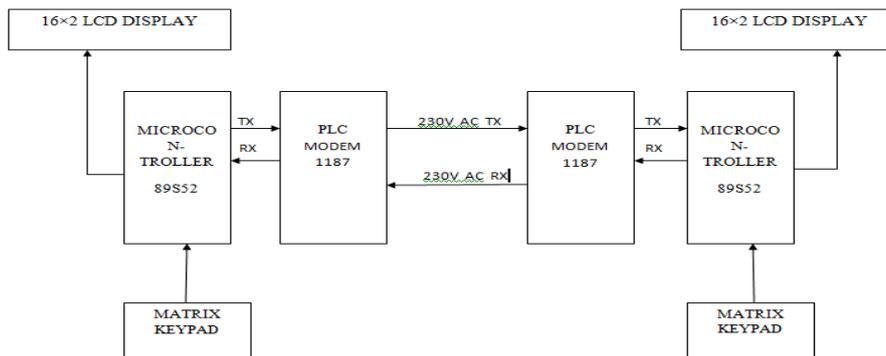*Figure1. Development diagram*

2.2. Block Diagram

Figure2. Block Diagram of PLC

Power line modem is helpful to send and receive serial information over existing AC mains power lines of the structure. It's high protection to electrical noise persistence within the line and in-built error checking thus it offers out immoral information. The electronic modem is in sort of a able to use circuit module, that is capable of providing 9600 baud low rate bi-directional digital communication. Cheers to its tiny size it is integrated into and become a part of the user's line digital communication system. Narrowband line communication systems sometimes operate within the frequency vary from three kc to five hundred kc, & Broadband line communication systems sometimes operate within the frequency vary from one megacycle to three hundred megacycle.

2.2.1. PLC MODEM 1187

This electronic equipment contains a Transmit and Receive serial knowledge at 9600 rate, knowledge Tx/Rx LEDs, power-driven from 5V, Low price & straightforward to use, inbuilt Error Checking, Direct interface with microcontroller UART TXD, RXD pins. It's Specifications area unit Embedded ready-to-go line Carrier electronic equipment module with SMT parts, tiny kind issue for simple of system integration, Bi-directional half-duplex digital communication over the mains, Applicable to universal mains voltage and frequency up to 250v, 50 - 60 Hz, Protocol freelance, knowledge transfer clear to user's knowledge terminals, High noise immunity and reliable digital communication, straightforward serial interface to user's knowledge devices of 9600 rate, integral on board AC coupling circuit with direct affiliation to mains, integral carrier generation and detection, Multiple units may be connected to the ability line of the distribution electrical device, TTL level serial interface to user's knowledge devices, engineered with industrial grade parts for operation below harsh atmosphere, Indicates Transmit and Receive with LEDs, inbuilt Error Checking therefore it ne'er offers out corrupt knowledge.

Figure3. PLC MODEL: 1185

2.2.2 AT 89S52 Microcontroller

The Hardware utilized in the subsequent thus referred to as as Anti-Collision System based mostly is predicated relies} on a soft-core based silicon chip AT 89S52 created by Atmel natural philosophy Co. it's a forty pin DIP (Dual in Line Package). The AT89S52 may be a low-power, superior CMOS 8-bit personal computer with 8K bytes of Flash programmable and effaceable scan memory (PEROM). The device is factory-made exploitation Atmel's high-density non-volatile memory technology and is compatible with the industry-standard 80C51 and 80S52 instruction set and pin out. The on-chip Flash permits the program memory to be reprogrammed in-system or by a standard non-volatile memory computer programmer. By combining a flexible 8-bit computer hardware with Flash on a monolithic chip, the Atmel AT89S52 may be a powerful personal computer that provides a highly-flexible and efficient resolution to several embedded management applications.

Table1. Control word of 89S52

(MSB)							(LSB)
EA	–	ET2	ES	ET1	EX1	ET0	EX0

Enable Bit = 1 enables the interrupt.

Enable Bit = 0 disables the interrupt.

Symbol	Position	Function
EA	IE.7	Disables all interrupts. If EA = 0, no interrupt is acknowledged. If EA = 1, each interrupt source is individually enabled or disabled by setting or clearing its enable bit.
–	IE.6	Reserved.
ET2	IE.5	Timer 2 interrupt enable bit.
ES	IE.4	Serial Port interrupt enable bit.
ET1	IE.3	Timer 1 interrupt enable bit.
EX1	IE.2	External interrupt 1 enable bit.
ET0	IE.1	Timer 0 interrupt enable bit.
EX0	IE.0	External interrupt 0 enable bit.

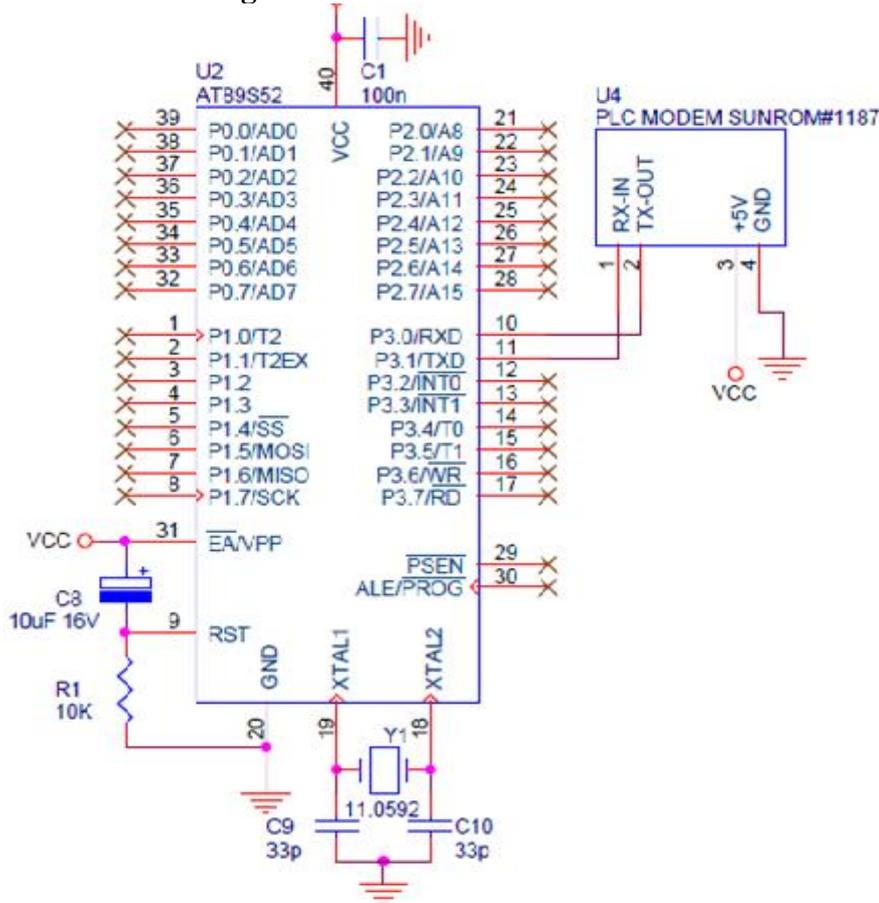## III. Interfacing PLC MODEL: 1187 with Microcontroller

Figure5. Interfacing PLC MODEL: 1187 with microcontroller

3.1. Interfacing Pin Details for PLC MODEL: 1187

Figure6. Pins of PLC Modem: 1187

Table2. Pin Description of PLC MODEL: 1187

Pin	Pin Name	Details
RX-IN	Receive input	Input serial data of 5V logic level, Usually connected to TXD pin of microcontroller.
TX-OUT	Transmit output	Output serial of 5V logical level, usually connected to RXD pin of microcontroller.
+5V	Power supply	Regulated 5V supply input.
GND	Ground	Ground level of power supply must be comman ground with microcontroller.

VI. CONCLUSION

Digital power cable technology is an exciting various to connecting to the net via phone and electronic equipment. Although this technology isn't commercially obtainable however, it ought to be obtainable before different broadband technologies owing to the comparatively low price of its native loop. Moreover, its high speeds can offer web access, video on demand, native phone, and long distance phone services to customers. Seen from a utility purpose of read, one among the most blessings of PLC is that the full management over the physical medium, while not the requirement to rely upon third party suppliers like telecommunication corporations or cellular operators. Especially, PLC standardization and harmonization as, for instance, fostered by office PAP15, area unit necessary for the PLC trade as an entire once defensive territory against competitor wireless and wire line choices.

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