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DESIGN AND IMPLEMENTATION OF EFFICIACE DATA TRANSFERER THROUGH POWER LINE COMMUNICATION

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ABSTRACT:
Power line communications is a novel idea of communication which may help in bridging the gap existing between the electrical and communication network. Power Line Communications (PLC) allows transmission of data over power lines. PLC is potentially the network with the deepest capillarity in the world, since power lines are almost ubiquitous. Power line communications is a rapidly evolving market that utilizes electricity power lines for the high-speed transmission of data. PLC works by transmitting high frequency data signals through the same power cable network used for carrying electricity power to household users. Such signal cannot pass through a transformer. This requires devices ("outdoor devices") that combine the voice and data signals with the low-voltage supply current in the local transformer stations to bridge the last mile. In the house, "indoor devices" (adapters) are used in order to filter out the data signals and to feed them to the various applications.

Index Terms- **power line communication, ,broadband power line, pic microcontroller ,plc modem.**

I: INTRODUCTION

Here in this project we will use wired type of communication. But we will not install separate copper wires for transmitting voice signal; we will use the existing electrical line of 220 volts/50 Hz for transmitting these voice signals.We can use the same electric line to transmit the voice or data. We just have to connect our instrument at any 3 pin socket of electric fitting.

It is a system for carrying data on a conductor. It uses the existing power lines to transmit data from one device to another. This makes power line communication one of the best means for networking. Power line communication is a novel idea of communication which may help in bridging the gap existing between the electrical and communication network.Power line communication allows transmission of data over power lines.

When data is transmitted over long distance there should be some mechanism of coding so that the data can easily be distinguished from noise and other signals being transmitted in the same channel and decoded. Modulation is the used to transmit signal over long distances. Modulation is the process of varying one or more properties of high frequency periodic waveform, called the carrier signal, with respect to a modulating signal. In modulation the signal to be transmitted, called the carrier signal, is modulated by some high frequency signal and transmitted and at the receiving end the signal is received and demodulated to recover the original signal. Frequency Modulation (FM) is the most popular analog modulation technique used in mobile communications systems.

In this receiver section the demodulation is takes place.The user interface for the control of units is implemented by an LCD.thelcd is used for display the transmitted information

II:SYSTEMOVERVIEW

Modulator/Demodulator:

The modulating circuitry would produce a specified high frequency signal, that would be transmitted over the channel and then subsequently be demodulated at the receiver to be decoded by the slave unit to activate/deactivate the appropriate devices. When data is transmitted over long distance there should be some mechanism of coding so that the data can easily be distinguished from noise and other signals being transmitted in the same channel and decoded. Modulation is the used to transmit signal over long distances. Modulation is the process of varying one or more properties of high frequency periodic waveform, called the carrier signal, with respect to a modulating signal. In modulation the signal to be transmitted, called the carrier signal, is modulated by some high frequency signal and transmitted and at the receiving end the signal is received and demodulated to recover the original signal

Frequency shift keying (FSK)

In FSK, the frequency of the carrier is changed as a function of the modulating signal (data) is being transmitted. Amplitude remains unchanged. In binary FSK a “1” is represented by one frequency and a “0” is represented by another frequency. Now all these three are discussed in detail.

User Interface:

The user interface for the control of units is implemented by an LCD for display of options and a keypad to choose the option of choice. This was connected to the master microcontroller which would generate a unique bit pattern for each device, which would be decoded at the slave unit.

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COUPLING CIRCUITRY:

One of the most critical components of any Power Line Communication system is its interface circuit (or coupling circuit) with the power distribution network. This is by no means a simple unit considering the challenging characteristics of the PLC channel. Due to high voltages, varying impedances, high amplitudes and time dependent disturbances, coupling circuits need to be carefully designed to provide both the specific signal transmission with the appropriate bandwidth, and the safety level required by the applicable domestic or international standard. A coupling circuit in a power line communications system is actually used for coupling an information signal from a transmitter unit to a power line and decoupling that signal from the power line to a receiver unit. The coupling circuit includes: (a) a ferrite core inductive coupler for isolating the transmitter unit and the receiver unit from a power line and for coupling information signals from the transmitter unit to the power line and from the power line to the receiver unit, (b) a high pass filter (capacitive coupler) which not only blocks random noise from entering into the modem but also suppresses 50Hz power signal. Hence it is the core part of Power Line Communication which isolates the modem from high voltages and allows only the information signal to pass through un attenuated.

BLOCK DIAGRAM:

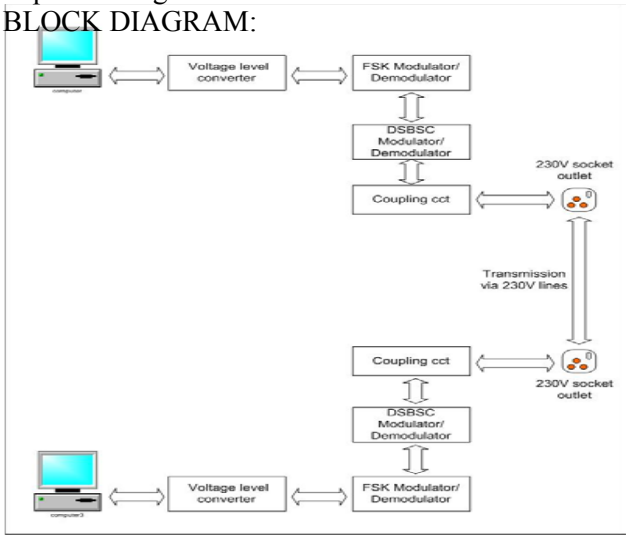

Fig 1:block diagram

Proposedsystem:

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III: DETAILS

In this system we are intended for the fast and efficient data transfer using power line. We are collecting data from the transmitter section then data through power line and data received by receiver section. In wired communication thedata transmission and reception is very efficient and speed.

IV:BLOCK DESCRIPTION

The input of the circuit is taken from the main. It is a single phase 230V ac voltage. This 230 AC voltage cannot be used directly, thus it is stepped down. The Step down Transformer is used to step down the main supply voltage from 230V AC to lower value. Because the microcontroller and sensors are operated at +5V dc voltage and relays and drivers will be operate at +12V dc voltage. So first this 230C AC voltage should be stepped down and then it should be converted to dc. After converting to dc it is applied to controller, sensors, relays and drivers. In this project we used 230/12V step down transformer.

In this circuit we used two regulators. 7805 regulator for producing 5V dc, and 7812 regulator for 12V dc voltage. The output of 7805 regulator is given to PIC microcontroller and three sensors. The output of the 7812 regulator is connected to three driver ICs and 12 Relays. The main parts of this project are sensors and PIC micro controller. The sensors are connected to the RB0 and RB1 pins of the Controller.

V: MODULES OVERVIEW

SOFTWARE MODULE:

- EMBEDDED C
- KEIL MICRO-VISION
- VISUAL BASIC 2008
- IES PROGRAMMER

HARDWARE MODULE:

- POWERLINE TRANSMITTER
- POWERLINE RECEIVER
- MICROCONTROLLER(PIC16F877A)
- 2*16 LCD
- MAX 232

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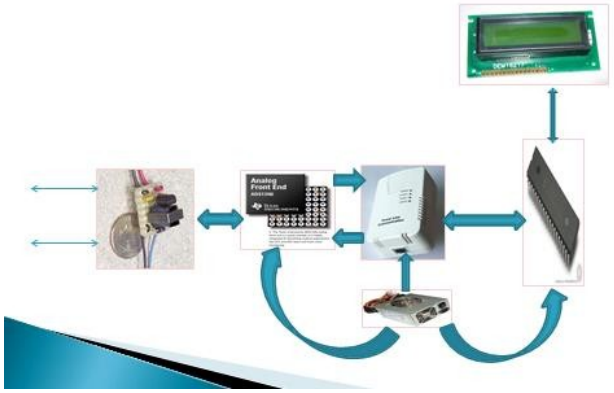

MICROCONTROLLER INTERFACING AND COMMUNICATION

Microcontroller PIC16F877A is one of the PIC micro family microcontroller which is popular at this moment, start from beginner until all professionals. Because very easy using of PIC 16F877A and use FLASH memory technology so that can be write erase until thousand times. This capability can be used to create assemply line production, to store calibration data available onlyafter final testing, or it can be used toimprove programs on finished products.

PLC MODEM:

PLC modem act as a transmitter as well as receiver.In FSK, the frequency of the carrier is changed as a function of the modulating signal (data) is being transmitted. Amplitude remains unchanged. In binary FSK a "1" is represented by one frequency and a "0" is represented by another frequency. Now all these three are discussed in detail power line communications system is actually used for coupling an information signal from a transmitter unit to a power line and decoupling that signal from the power line to a receiver unit. The coupling circuit includes: (a) a ferrite core inductive coupler for isolating the transmitter unit and the receiver unit from a power line and for coupling information signals from the transmitter unit to the power line and from the power line to the receiver unit, (b) a high pass filter (capacitive coupler) which not only blocks random noise from entering into the modem but also suppresses 50Hz power signal. Hence it is the core part of Power Line Communication which isolates the modem from high voltages and allows only the information signal to pass through un attenuated.

PERFORMANCE PARAMETER:

Power line carrier communications take place over the same lines that deliver electricity. This technique involves injecting a high frequency AC carrier onto the power line and modulating this carrier with data originating from the remote meter or central station. Power line communications has many new service possibilities on the data transferring via power lines without use of extra cables. AMR is a very important application in these possibilities due to every user connected each other via power lines. In this power network, every user connected to each other via modems with data originating from the remote meter or central station. Electrical power systems vary in configuration from country to country depending on the state of the respective power sources and loads. The practice of using medium-voltage (11-to-33kV) and low-voltage (100-to-400V) power distribution lines as high-speed PLC communication means and optical networks as backbone networks is common place. Under normal service conditions, they can be broadly divided into open-loop systems, each with a single opening, and tree systems with radial arranged lines. In the case of tree systems,

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connection points for adjacent systems are provided in order that paths/loads may be switched when necessary for operation. Additionally, in terms of distribution line types, there are underground cables and overhead power distribution lines. Where transformers are concerned, they can be divided into pole-mounted transformers, pad-mounted transformers and indoor transformers.

PLC APPLICATION:

Automatic Meter Reading:

Using power lines the EB servent measure the usage of power units and amount of power unit of the homes, industries ,etc.. at main office.

Data Communication Networks:

In power line communication we share the information by using existing power lines without any cost.In wireless network data communication is done by any network,it's make tower problem.

Signs and Information Displays:

We use this project in schools,colleges. mainly used for circular purpose.Any important informations are from principal room to class room to be displayed by already using power lines.

Power system fault detection.Power theft detection, leakage current detection,and the measurement / control /energy-management of electrical power equipment for electrical power companies.

Home security, the remote- monitoring/control of electrical household appliances, online games, home networks, and billing.

ADVANTAGES:

- Simple to install and inexpensive.
- Additional wiring is not required.
- Nointerference due to sight obstructions like wall, etc.
- High availability of the power outlets.
- Low cost

RESULT:

The transmitter was fixed in the MASTER room and the receiver is fixed in the SLAVE rooms. When the MASER wants to send any message to the SLAVE then he will type the message through keypad unit. This message displayed on the transmitter side LCD. Then the message sent to the controller. The controller then decodes the data and sent it to the transmitter antenna. The transmitter antenna generates the signal.

At the receiver section the receiver antenna receives the signals from the transmitter antenna. The Receiver then sends these signals to PIC controller. The PIC controller also receives the data from the sensors. In this project we used two sensors. One is object detecting sensor and the other is temperature sensor. The object detecting sensor is used for counting. And the temperature sensor is used to measure the temperature in the class room. Then the LCD which was fixed in the classroom thus displays the message from HOD, number of students presented in the class and the temperature of the class room. By this way The HOD can send the messages to class rooms.

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