**POWER LINE COMMUNICATION USING X-10 PROTOCOL**

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Abstract—

The communication can be done by using either wireless transmission or wired transmission. But in the Wireless transmission there may be lack of connectivity range or we can say that range is the important factor. In the Wired communication the main problem is the cost of wire, Length of wire, sometimes we need extra circuitry to amplify the weak signal, so it increases the cost of the overall thing. So for all these problem there is a solution called Power line Communication. Power line communication refers to the concept of transmitting information using the electrical power distribution network as a communication channel.

**Introduction**

Power line communications (PLC) refers to the concept of transmitting information using the electrical power distribution network as a communication channel. This technology allows a flow of information through the same cabling that supplies electrical power. This novel idea of communication helps in bridging the gap existing between the electrical and communication network.

1. Using this simple circuit you can switch on/off upto 256 appliances remotely by the power line.
2. Here we are using X-10 protocol transmitter and receiver to control the appliance.
3. The two units are connected via Phase (L), Neutral(N) wires of the AC mains line with the AC phase being the same.
4. At the Transmitter side we are using control panel, microcontroller and modulator with the help of which our data is transmitted.
5. At the Receiver side we are using microcontroller and demodulator with the help of which our data is received.

 A "smart home" typically is a domestic environment that has been partially automated. Home automation includes centralized control for lighting, HVAC (heating, ventilation and air conditioning), appliance management, and others. Home automation aims to enhance the comfort and security in domestic scenarios. Generally, houses are equipped with independent control panels to control all of the systems and appliances present in the house. Moreover, those control panels are often not related each other.

 The main purpose of a smart home is to centralize the control of all the devices into a single control unit which can be programmed to do specific tasks suitable for the owner and the home in question.

 In this presentation we are going to use the concept of PLC based on X-10 protocol. X-10 is a communication protocol designed for sending over 230V AC wiring. Using this system we can control upto 256 appliances remotely through power line. The objective in this work is to develop a lower cost communication system with an intermediate data transmission rate.

**About X-10 Protocol:**

 X10 was developed in 1975 by Pico Electronics of Glenrothes, Scotland, in order to allow remote control of home devices and appliances. It was the first general purpose domestic network technology and remains the most widely available. X-10 is an international and open industry standard for communication among electronic devices used for home automation (domestic). It primarily uses power line wiring for signaling and control.

**5.2 How Does X-10 Works? :**

 In order to control specific devices, all modules are assigned an address, which consists of a House and Unit code. There are 16 House codes (A through P) and 16 Unit codes (1 through 16). Each House code has 16 Unit codes. This means there are 256 possible addresses. House/Unit codes are referred to in the following manner: A5, C7, M13, P4, etc.

 When you wish to turn on an X10-controlled lamp, you have to tell the Lamp Module controlling that lamp to turn on. The Lamp Module is monitoring the powerline for a command specifically addressed to it. In other words, any command sent must be preceded by an address matching the Lamp Module's address. Let's say the Lamp Module's address is set to A5. The Lamp Module will not respond until it "sees" the A5 ON command on the powerline.

 Since these devices would not have any direct wiring between them, it was necessary to devise a way of sending the data over the existing electricalwiring. The actual binary data is transmitted by sending 1ms bursts of 120khz just past the zero crossing of 50hz power. It was also obvious that complementary bit pairs were necessary. Therefore, a binary "1" was defined as the presence of a pulse, immediately followed by the absence of a pulse. A binary "0" was defined as the absence of a pulse, immediately followed by the presence of a pulse.

Conclusions

With current available data transmission speeds of 14 Mbps and a remarkable increase promised in the near-future, Powerline Carrier Communication Systems are a preferred choice over Wireless or other Home Networking technologies due to factors including ease of installation, availability of AC outlets, higher throughput, low cost, reliability and security. PLC Communication Systems are also a potential candidate for the deliverance of xDSL and Broadband Internet services (data, multimedia etc.) along with electricity (and automation control signals) to the consumers by the energy utilities.

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