FINAL YEAR PROJECT REPORT

Communication Through Power Lines Using X-10 Protocol

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Abstract

X-10 is a communication protocol which is designed for sending our data signals over 220V AC wiring. X-10 protocol uses 120 kHz bursts with the power line at zero-crossings to represent digital information. Plug-in modules are available of different company to create home automation systems by using the AC wiring already installed in a home . X-10 components send signals through your home electrical wiring or simple AC wiring through X-10 transmitter ,which is received by X-10 receiver modules and perform the specific task according to the transmitting signal on the selected device.

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1.1 Introduction

Normally, If want to control a device there must be one switch required to control that device.So,If there are hundred devices in a house,then there should be 100 controlling switches required to operate those devices on a single big switch board or multiples switch boards.By using only one X-10 board we can control 256 devices, using only 5 switches which are placed on X-10 transmitting board.

All modules are assigned a specific address, In order to control specific devices, which consists of a start bits , House code and Unit code. There are 16 House codes (from A to P) and 16 Unit codes (from 1 to 16). Every House code has 16 Unit codes. This means there are total 256 possible addresses. House code and Unit codes are expressed in the following manner :

B15, M7, E13, P10, etc

When you wish to turn on a X-10 controlled device, you have to communicate the Appliance Module controlling to turn on the device. The Appliance Module is monitoring the powerline for a code which is specifically addressed to it. On the other way, any command sent must be according to an address matching the Appliance Module's address. Let's say the Appliance Module's address is set to M7. The Appliance Module will not respond until it checked the M7 ON command on the powerline.

X-10 is a power line communication protocol which is designed for sending carrier signals over 220 VAC wiring. X-10 uses 120kHz burst as a carrier . Low cost receiver modules are available from different vendors that facilitate users to create home automation systems by using the AC wiring already installed within a home.

The greatest things about X-10 are its flexibility and the large number of X-10 components available which could be further extended. These factors also make it a little bit challenging to learn.

PIC microcontrollers can easily be used to integrate it with X-10 technology to create home automation applications. The specific PIC microcontroller (MCU) used should be selected on the basis of their memorier, frequency, peripheral, and cost requirements for a particular application. The PIC16F877A was selected for this application because of its versatility as a general purpose microcontroller.

This application note discusses the implementation of X-10 on a PIC microcontroller unit to create a home controller that can both send and receive X-10 signals.The reader may implement the home controller as it is ,or adapt the circuits for other applications.

1.2 History

In 1970, a team of engineers started a company with the name Pico Electronics, in Glenrothes, Scotland . This company revolutionized the industry of calculator by developing the mono-chip calculator.By falling the prices of calculator IC ,Pico Electronics refocused on commercial products instead plain ICs.

In 1974, the Pico engineers jointly developed a vinyl LP changer , as a largest manufacturer of record changers of the whole world. Vinyl LP changer could be operated by a remote control by using ultrasound signals, this thing glow the idea of remote control for lights and appliances.

By 1975, the X10 project was develop, named so because it was their tenth project. In 1978, X10 products started to appear in Radio Shack and Sears stores. Together with a company BSR a partnership was formed, with the name X10 Ltd. At that time the system consisted of a 16 channel command console, a lamp module, and an appliance module and very soon they came with the wall switch module and the first X10 timer.

1.3 Aim of the project

The objectives of this project are :

1) We designed this project to marcketized our product ,to step in our professional life.
2) Due this reason we designed our product efficent , cheap and power saving.
3) Our project is light weight , economical ,easiy to install and easy to operate.

The proposed approach for designing this system is to implement a microcontroller-based control module that receives its instructions and commands by using X-10 protocol through 220VAC power lines.