Device Control using Power Line Communication

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Abstract— Power-line communications is the use of in-house power supply network for communication purpose. It is developed for transmission of power at 50-60 Hz and 230 volts. Power line device is a method to switch ON/OFF loads(device) from remote end. Therefore devices can be easily controlled with any other external wired or wireless system. Thus reducing the cost in excess cabling. It provides a certain level of security level. Therefore it is suitable for use in industries. Thus making our project an efficient substitute over other controlling devices.
Key words: PLC, Power Line Communication

I. INTRODUCTION

Power line communication (PLC) technology defines transmitting of message through power line using carrier modulation. To transmit electric power from a small number of sources (the generators) to a large number of sinks (consumers) in the frequency range of 50-60 Hz power lines were design In power line device control, we control devices which are placed at remote location from a secured location. The earth and the neutral pins of the power line to transmit controlling signals. Multiple devices over the power line can be controlled simultaneously. A keyboard is present to select which device to control. Further as a security level we have password protection. In PLC communication the major drawbacks are noise influence, signal attenuation, and multipath feeding and reflection. This is can be used as a communication tool especially at telecommunication sector, at home automation and for industrial communication.

II. RELATED WORK

Previously, the projects exciting to control device was either to Bluetooth, Wi-Fi ,zigbee or by establishing additional wire to control device. In order to use this Bluetooth, Wi-Fi or zigbee the transmitter had to be present in a certain range, which was not possible every time. Also to control devices using we had to setup additional wires or cables. The cost of implementing a new cable to every device would increase the cost significantly. This can be easily avoided by implementing our project. This project directly will use the existing present power line and therefore will be significantly cheaper. Also as long as the device and the controller are connected to the same earth and neutral the device can be easily controlled. Even though if the controller and devices are placed far apart they can be easily controlled.

III. PRODUCT ANALYSIS

A. Block Diagram

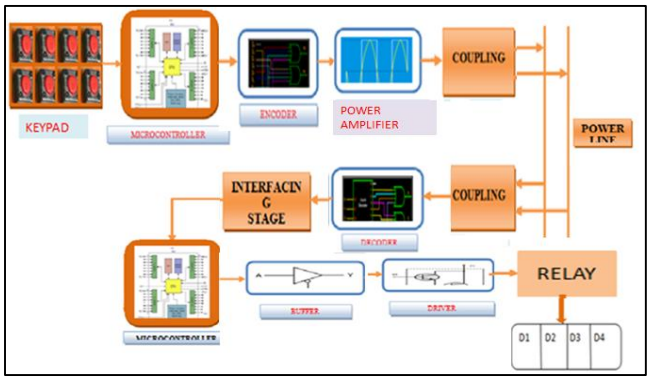

Fig. 1: Block Diagram

1) Transmitter

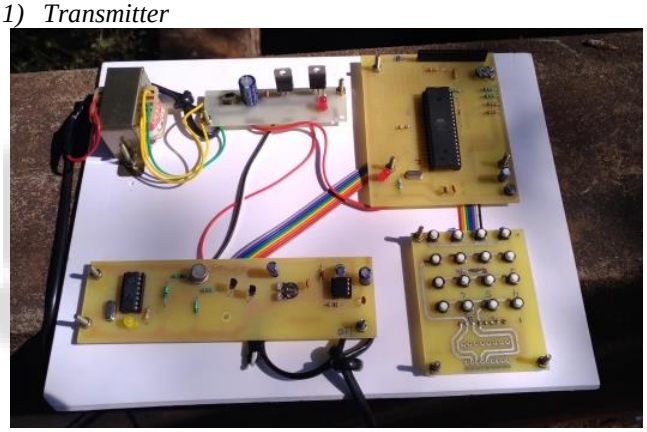

Fig. 2: Transmitter

2) Keypad 4X4

Signaling is the most critical function of any telecommunication system. Normally alternating voltages of low value are used for signaling or ringing, as commonly referred. In modern telecommunication uses two distinct tones, which correspond to a particular number. This is called the Dual Tone Multi Frequency [DTMF] dialing. If one dials, say, number '5', then two tones of 770 Hz and 1336 Hz is transmitted. These tones are sensed and decoded by the exchange and converted to the dialed digit, which is digit '5' in this case. The column pertaining to tone 1633 Hz is used for special facilities like flash, pause etc.

3) Microcontroller (89C51)

MC 89C51 is a 40 pin IC. It has four I/O bi-directional port. It works on a VCC of 5V. It also has 4K Bytes of In-System Reprogrammable Flash Memory. Fully Static Operation: 0 Hz to 24 MHz. it has Programmable I/O Lines. Six Interrupt Sources Programmable Serial Channel

4) Encoder UM95089

It is a 16 pin IC. This IC is used to convert digital input signal into analog signal. It is also known as tone generator. DTMF tones are used for frequency modulation of the carrier.

5) LM386 Power Amplifier

Pins 1 and 8 control gain. When not connected (NC), the amplifier gain is 20. Pin 2 is the negative input.

Pin 3 is the positive input – i.e. the actual signal to be amplified. Pins 4 (GND) and 6 (Vs) provide the supply voltage for the amplification. Pin 5 is the output

B. Receiver

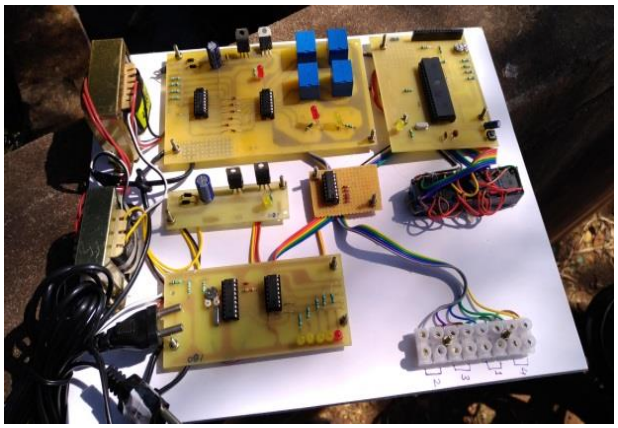

Fig. 2: Receiver

1) Decoder Mt8870

IC MT8870/KT3170 serves as DTMF decoder. This IC takes DTMF signal coming via power line and converts that signal into respective BCD number. Its decoder uses digital counting techniques to detect and decode all 16 DTMF tone pairs into a 4- bit code.

2) IC 4050 Buffer

It is a 16 pin Dual In line IC. It acts as a logic amplifier. It does not affect the logic state of the ckt.

It is used to provide extra current at the o/p.It acts as buffer and provide isolation to the main ckt from varying i/p signal.

3) Driver (ULN2003)

It is a 16 pin IC. We cannot drive the relay through mc because mc gives only regulating pulse(0 or1) which is not capable to drive the relay directly. The relay requires high +12V. So, driver is used to drive the relay it produce high gain which drives the relay.

4) Relay

A relay is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism mechanically. Relays are normally open and normally closed.

IV. CONCLUSION

Approach in designing a communication system for the power line channel is a simple and cheaper. Also data transmitted is noise free. Control of device is simple and hence can be operated by anyone. Its very easy to implement and cost of implementation is very less. Devices can be successfully controlled over a significant distance.

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