A survey on Li-Fi based audio transmission with home / office automation system.

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Abstract— This paper represent the importance of LI-FI Technology in the audio transmission and to monitor and control the house/office appliances and other equipments. Today Wi-Fi is replaced by LI-FI in many applications due the high data transmission rate of LI-FI as compare to Wi-Fi and due to low cost of LI-FI as compared to Wi-Fi technology. It is a visible light communication that uses LED's for audio and data transfer.

Keywords— LED (Light Emitting Diode),Wi-Fi (Wireless Fidelity),Li-Fi (Light Fidelity),VLC (Visible Light Communication),RF (Radio Frequency). DTMF (Dual Tone Multiple Frequency), LDR (Light Dependant Register.)

INTRODUCTION

Today, we have may technology for audio transmission as well as controlling the devices. Which may be wired or wireless. Li-Fi is the most effective technology for data transmission. It is a wireless technology. This uses LED's for data transmission. Li-Fi technology developed by Harald Haas. The technology was demonstrated at the 2012 Consumer Electronics Show in Las Vegas. Sending data through a LED light bulb that varies in intensity faster than the human eye, if the LED is on, you transmit a digital 1, if it's off you transmit a 0. They can be switched on and off very quickly, which gives nice opportunities for transmitted data. The LED intensity is modulated so rapidly that human eye cannot notice, so the output appears constant.

For Audio transmission the Power amplifier and voltage amplifier converts the sound into the digital signals i.e. '0' and '1'.

For home / office automation DTMF Encoder encodes the data form keypad and sends it to LED driver. At the receiver side DTMF Decoder is used to decode the data which encoded by the encoder and turn ON or OFF the devices. Advantage by using the Li-Fi technology is fast and safe audio transmission with fast and safe device switching.

METHODOLOGY

A mice and Audio jack are the inputs to the audio transmission. These audio signals are given to power amplifier and voltage amplifier. Then this signal is given to LED driver to transmit the signal using Li-Fi.

At the input side 4x4 keypad is connected to DTMF Encoder for encode the data for switching the devices. DTMF encoder encodes the data and sends it to power and voltage amplifier. This amplifies the data and sends it to LED driver to transmit the data using Li-Fi.

At receiver side LDR receives the signals which is transmitted by the LED. The audio signal is given to power and audio amplifier. And the output of amplifier is given to speaker.

The another DTMF signal is given to DTMF Decoder. The DTMF decoder decodes the signal which is encoded by the DTMF Encoder and turn ON of OFF the particular device.

HARDWARE UNITS REQUIRED

1. Power supply unit:-

It required two voltages levels +12 V & +5 V.

2. DTMF Encoder:-

Dual Tone Multiple Frequency is used to send multi key strokes with different frequencies. In DTMF each key has a unique frequency by combination of row and column frequency . When any of the key is pressed particular code is transmitted. This code consist of two frequency g which one is higher frequency and second one is lower frequency.

3. Keypad:-

4x4 key matrix is used to select the particular device by pressing the key to ON or OFF the selected device. It sends the frequency to DTMF encoder.

4. Microcontroller:-

The Atmel AT89C51 microcontroller is used to control the overall operation of the MIC, DTMF Encoder and decoder. It is a 8-bit microcontroller. ATMEL 89C51 has 4KB of Flash programmable and erasable read only memory (PEROM) and 128 bytes of RAM. In 40 pin AT89C51, there are four ports designated as P1, P2, P3 and P0. All these ports are 8-bit bi-directional ports.

5. LED Drivers:-

This is used to drive the relay where the output is complement of input which is applied to the drive but current will be amplified.

6. Li-Fi transmitter:-

White LED bulb is the Li-Fi transmitter.

7. Li-Fi receiver:-

LDR i.e. Light Dependent Register is the Li-Fi receiver.

8. Speakers:-

Speaker is the electrical device which converts electrical signals into voice signals. Here 4 Ohm speaker required.

9. DTMF Decoder :-

DTMF Decoder is decodes the signal which is encoded by the DTMF Encoder. This identifies the which key is pressed on the keypad by the user for turn ON or OFF the particular device.

10. Relays:-

It is a electromagnetic device. It will used to turn ON or OFF the device which is connected to relay. Here 12v relay is required.

SOFTWARE REQUIREMENT

It requires Keil compiler μVision 3.

ADVANTAGES

5.1 Use of Li-Fi in this project increases the speed of voice communication and data transmission.

5.2 Due to Li-Fi this project becomes very cheap, because it does not required any licence like Wi-Fi.

5.3 Due to use of Li-Fi the device switching is very simple.

5.4 Due to use of Li-Fi the installation cost is very low, because it uses simple LED.

APPLICATIONS

6.1 This project can be used for audio transmission in different Auditoriums, Multiplexes, Homes and   offices.

6.2 This project can be used for device automations in different areas like Hospitals, Power lines, etc. where Wi-Fi can be restricted.

FUTURE SCOPE

7.1 This project can be used in Robotics control.

7.2 This project can be used in Heavy machinery controls in varies industries.

CONCLUSION

Li-Fi replaces the Wi-Fi. Li-Fi can be used in varies field. Use of Li-Fi in audio transmission and device automation can improves the speed of communication and speed of device automation in varies fields. Li-Fi can be used in varies areas where frequencies can be restricted. The audio transmission and device automation is becomes secured due to use of Li-Fi technology.

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