

# Audio Data Transmission Using LI-FI

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## ABSTRACT

*Device to device communication using LED light is the next step of the information revolution. LI-FI (Light Fidelity) is a fast and cheap optical version of Wi-Fi. LI-FI is a term of one used to describe Visible Light Communication technology applied to high speed wireless communication. LI-FI is ideal for high density wireless data coverage in confined area and for relieving radio interference issues. This project is an aim to demonstrating the use of LI-FI in audio communication. The use of LI-FI in the voice and data transmission in home/office automation increases the speed of operation of voice and data transmission. Use of LI-FI is more secure, speedy and cheap communication.*

**Keywords:** *Audio Data, Light Fidelity, Modulated Light, Optical Wireless Communications, VLC*

## I. INTRODUCTION

LI-FI is the abbreviation of light fidelity and was expressed by Harald Hass who was a German physicist. In LI -FI the information is transferred through light signals instead of radio waves and mostly Wi-Fi plays an efficient role for wireless information coverage within the buildings whereas by using Li-Fi we can provide the excel density data coverage in a particular area without any radio interference issue. It furnishes well bandwidth, assurance than Wi-Fi and excels speed. In the coming generation, this technology will be used for transmitting data or information to smartphones, laptops etc. through the light in a room.

Visible light communication (VLC) make use of the fast pulsation of sun rays to transmit information wirelessly. It cannot be detected by human eye. By the development of this upcoming technology in the world , a one-watt LED lightweight bulb would be enough to supply internet property to four computers. So the utilization becomes more and the work gets finishes at a low rate or we can say this is the best technology. The best part of particular communication is, it may be a elevated intensity LED. So by doing modulation, the Light Emitting Diode can do clarification which can be used in the communication supply. There are reasons to like LED because the light acts is the visible radiation communication system whereas plenty of options illuminate the devices like lamps, incandescent bulbs etc. are elsewhere present.

The prime objective of the project is to create an application that transmits audio data using LI-FI technology for coping with the limited bandwidth problem we face in RF (Radio frequency) signals. For better, efficient, secure and a faster connection LI-FI is used. One of the advantages of using LI-FI over Wi-Fi is that it avoids radiation produced by Wi-Fi. The goal of our project is to transfer data with faster speed which is not easy to achieve

through Wi-Fi and see whether transmission is possible through various mediums or not. LI-FI can be thought as an alternative for Wi-Fi which uses light as a medium to transmit data.

We aimed at the transmission of data via LI-FI and all the possible aspects of transmitting data via light through various mediums which LI-FI will attentively participate a serious position in reducing the significant masses that are present in the wireless communication systems which has to be replaced and does not make the most use of the information which measured by light were presently obtainable radio waves for information transformation. It will give us a broad idea of where and how we can use LI-FI for transmission of data.

## II. RELATED WORK

The good plan was 1st introduced by Mr. Harald Haas in his plug-ugly world speak on the topic called Visible Light Communication . His intension was to make everyone clear and made them to understand the terribly straight forward problems and solution behind it. When the crystal rectifier is taking place you can convey a digital one, if it is in the rancid state you can convey only zero. The Light Emitting Diodes can be often toggled both on state and off state terribly. Radio signals can also be said as data-line signals which can be restored by the light-weight effects of the signals during the new technique of information communication takes place in the LI-FI. LEDs will be switched in the on state or can also kept in the off state quicker than any other object will sight, inflicting the sunshine supply to have a look to the air ceaselessly. Flicker can be used which is a light-weight, it will be improbably irritating, however it has been clothed to possess the upper side, which is being exactly makes the light doable to use such a light-weight for wireless information communication.

## III. PROPOSED WORK

### 3.1 Working of LI-FI

The LI-FI system consists of mainly two parts, the transmitter and the receiver. LED light is used as signal source between two end systems. Data is carried by the modulated light from the LED. The transmitter part modulates the input signal with the required time period and transmits the data in the form of 1's and 0's using a LED bulb. These 1's and 0's are nothing but the flashes of the bulb. The receiver part catches these flashes using a photodiode and amplifies the signal to produce the output. LI-FI is implemented using white LED light bulbs at transmitter. LED's can be switched on and off through which different unions of digital chains consisting of 1's and 0's are produced. The LED can be used as a transmitter or a source, the response of LED appears consistent to the human eye due to the quick flickering of LED light.

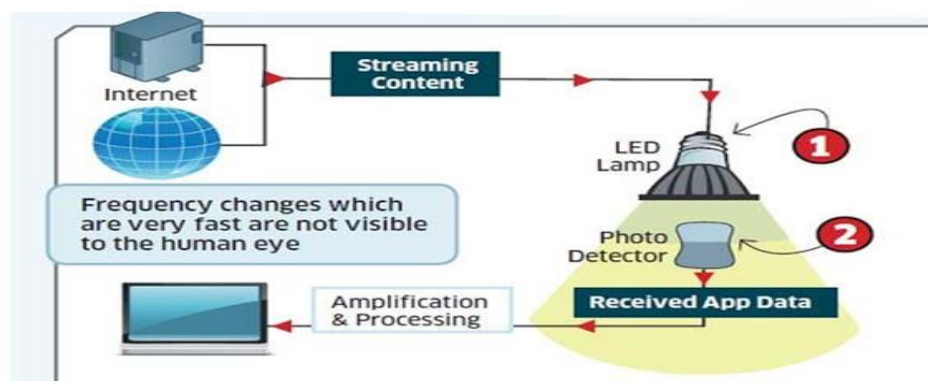
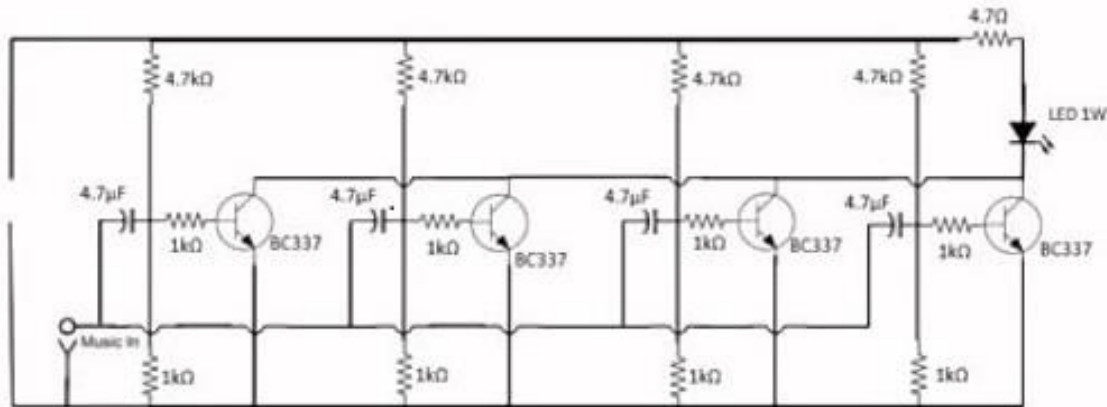


Fig 3.1.1 Block diagram

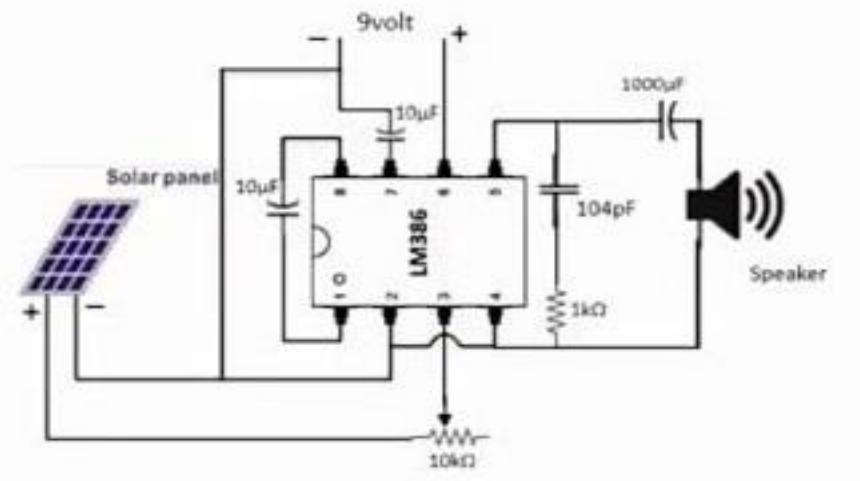
### 3.2 THE HARDWARE SETUP

The hardware design for any LI-FI is an interactive and an important phase, as all components and/or parts are assembled to build one LI-FI system.



**Fig 3.2.1 Transmitter circuit**

The LI-FI transmitting module consists of a circuit that can modulate light with a low frequency signals. The pulse signal is equivalent to an ON/OFF signal that is used to control the intensity of LED. The form of pulse wave decides the way light is emitted from LED to make VLC alive. The input signal controls the blinking of LED. It should take place in nanoseconds so that human eye doesn't detect it.



**Fig 3.2.2 Reciver circuit**

The receiver module consists of a photodetector. When the light falls in it detects the data that is transmitted via light. The receiving section has to be kept in in line of sight with the transmitting module. Any changes in the position of any of the modules while transmission can result in the loss of data and in this case audio. This receiver provides an audio signal that corresponds to modulation envelope.

## IV. HARDWARE REQUIREMENTS

**Table:4.1 Hardware requirements**

<b>SL. NO.</b>	<b>HARDWARE REQUIREMENTS</b>
<b>1.</b>	<b>IC LM386</b>
<b>2.</b>	<b>Transistor BC337</b>
<b>3.</b>	
<b>4.</b>	<b>Audio Jack</b>
<b>5.</b>	<b>6V Solar Panel</b>
<b>6.</b>	
<b>7.</b>	<b>Led (1 watt)</b>
<b>8.</b>	<b>Resistors:1k ohm, 4.7k ohm</b>
<b>9.</b>	
<b>10.</b>	<b>Capacitors: 10uF, 104 pF, 1000uF, 4.7uF</b>
	<b>9V Battery</b>
	<b>Speaker (5 watts, 4 ohm)</b>
	<b>Potentiometer 10k ohm</b>

## **VI. CONCLUSION**

The possibilities are numerous and can be explored further. If this LI-FI technology can be put into practical use, every bulb can be used something like a Wi-Fi hotspot to transmit wireless data and we will proceed toward a cleaner, greener, safer and brighter future. The concept of LI-FI is currently attracting a great deal of interest because it may offer a genuine and very efficient alternative to radio-based wireless. As growing number of people and their many devices access wireless internet, the airwaves are becoming increasingly clogged, making it more and more difficult to get a reliable, high-speed signal. This may solve issues such as the shortage of radio-frequency bandwidth and allow internet where traditional radio based wireless isn't allowed such as aircraft or hospitals.

There are numerous applications of LI-FI technology, from public Internet access through existing lighting(LED) to auto-piloted cars that communicate through their headlights (LED based). Applications of LI-FI can extend in areas where the Wi-Fi technology lacks its presence like aircrafts and hospitals (operation theatres), power plants and various other areas, where electromagnetic (Radio) interference is of great concern for safety and security of equipments and people.

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