

# AUDIO TRANSMISSION USING LIGHT FIDELITY

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**Abstract-** With the advancement of mobiles, Internet of things, Automotive Industry, Live video streams and along with the demand of users, the call for Internet is growing exponentially. This era has advanced a lot such that from our television to satellite wishes a connection to the internet. This leads to questions like: Will there be sufficient bandwidth for a majority use of gadgets? Will the information available will be secure? Whether the information will be transmitted or received in high speed? Will there be good analysis on network traffic? Answers to all these questions will be tackled with the aid of using the upcoming generation technology, Li-Fi (a subset of VLC). Let us see what is Li-Fi. Li-Fi means Light Fidelity. This will be the subsequent generation of net, where light can be used as a channel for transmission. This paper aids to know the information about the future generation, Li-Fi.

**Key Words:** Light Emitting Diode (LED), Li-Fi, Photo Detector, Audio, Wi-Fi.

## 1. INTRODUCTION

Light Fidelity, in short Li-Fi is a transmission of the information (text, audio) using the visible light communication technique that is by using the light as a communication medium of transmission. In the current generation, Wi-Fi and Bluetooth are the main means used for communication. Wi-Fi and Bluetooth uses the Radio Spectrum of Electromagnetic Radiation in order to transmit the information. But the spectrum of radio wave available for transmission is less to occupy the millions of users. Hence to cop up with the limited bandwidth of RF wave we need an alternative that is Li-Fi, where the bandwidth is 10000 times more than the RF spectrum. In Li-Fi the transmission of data takes place at 224 gigabits rate, which is 100 times faster than the current technology.

### 1.1 How Li-Fi is more advantageous than Wi-Fi?

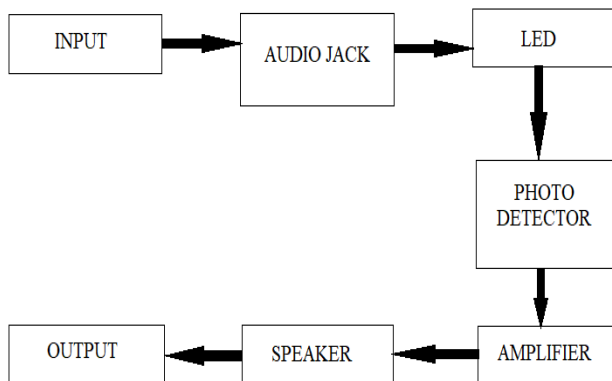
Transferring the information from one area to other is the main day-to-day activity. The current technology that we are using today, Wi-Fi and Bluetooth are very slow when many users are connected. As the number of users access the internet, the limited bandwidth get congested as a result the internet speed cuts down and we cannot enjoy the high speed data. In this digital era each and every users are using

their smart phones, laptops and tabs to communicate with their loved ones through Wireless-Fidelity systems, and these technology is used in all nook and corner of the world including homes, malls, restaurants, power plants, industries, harbors, resorts and airports. Due to this wireless systems usage is increasing day by day. As a result radio frequency spectrum is reducing. The solution to this problem lies in light fidelity which overcomes the problem of bandwidth limitation and produces a safer, faster and a secured transmission.

**Table -1:** Comparison between Li-Fi and Wi-Fi

Comparison Factor	Li-Fi	Wi-Fi
Abbreviation	Light-Fidelity	Wireless-Fidelity
Invented	Prof. Harald Hass in 2011	NCR Corporation in 1991
Principle of working	Data will be transmitted with the help of LEDs using the light.	Data will be transmitted using a Wi-Fi router by using the radio waves
Transmission rate	224gbps	150mbps-2gbps
Security	Light can be blocked by any physical object hence this will provides the security.	There is no barrier for radio waves so we need to deploy more techniques to the achieve security.
Frequency range	400THz-800THz	3kHz-300GHz
Distance	About 10m	About 32m
Density of Data	It can easily work in any environmental condition .it is more adaptable.	Working environment should not contain any interference related issues
Requirements	LED, Photo detector	Routers, modems

## 2. BLOCK DIAGRAM

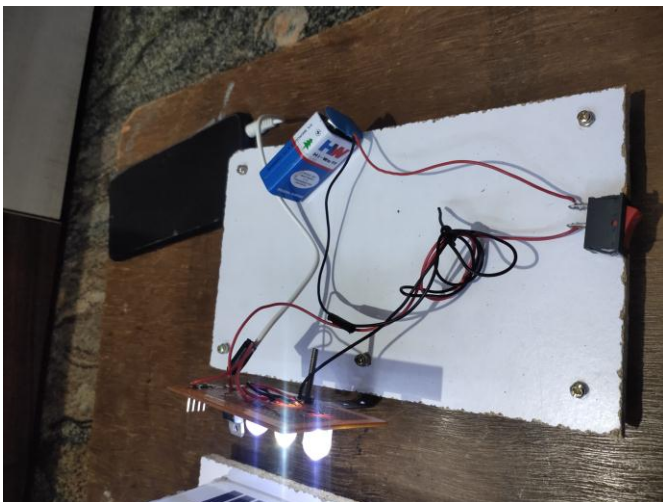


### 2.1 HARDWARE REQUIREMENTS

- Audio jack.
- Battery-9v
- Switch (if necessary)
- Resistors.
- Capacitors.
- Light emitting diodes.
- Solar panel-7v.
- Voltage regulator.
- Amplifier-LM386.
- Speaker.

### 2.2 METHODOLOGY

#### TRANSMITTER:



The transmitter side consists of a power supply, audio jack and LED.

Connections: LED has two terminals anode and cathode and the audio jack has three terminals left, right and ground

in which left and right are shorted as we are using one speaker at the receiver. Resistors are used in series with the LEDs to control the flow of current.

The basic principle of operation is that when the constant current is provided to the LED it produces constant illumination and similarly when no current flows, the LED stops illuminating. We consider logic 1 when LED is glowing and logic 0 when LED is not glowing. Hence by flickering the LED the audio can be transmitted in the form of 1's and 0's. The flickering of LED is so rapid that it can't be seen from the naked eyes. The electrical signal converted to the digital form will be transmitted to the receiver.

#### RECEIVER:



The receiver side consists of Photo detector, amplifier and a speaker. The digital data is received by the photo detector and it converts digital data into the electrical signals. The electrical signals are then passed to the amplifier circuit to strengthen the signal if in case if there is attenuation of the signal. Finally, the audio is played at the receiver side by the speaker.

### 3. WORKING

The above pictures show the hardware implementation of the transmitter and receiver circuit. The battery connected is ON through a switch provided at the transmitter and mobile is connected to the audio jack through which audio input is provided to the circuit, ON the receiver's side switch also. Once the above specifications are done, open any audio file in the mobile, the LED's will glow and the light when falls on the solar panel we can hear the audio from the speaker(line of sight) . if the solar panel is moved far then there will be scattering and the audio will not be clear. Hence make sure there is line of sight between the LED and solar panel to obtain clear audio at the receiver.

#### 4. ADVANTAGES

- The information will be sent 100 times faster by using the light, than the radio waves
- It is easy to implement Li-Fi architecture than Wi-Fi modems.
- The limitation of light i.e., light can be easily blocked by any physical thing, is itself a security provider.
- Interference does not have any effect on Li-Fi
- Low cost.
- Portability.
- Low bit mistakes rate.
- High efficiency.
- Consumes much less energy.
- Robust and reliable.
- Low latency.
- Localization.

#### 5. APPLICATIONS

- Li-Fi may be utilized in the diverse regions like hospitals. Automation due to the fact that operating theatres do not longer permit Wi-Fi, on the grounds that Wi-Fi radiates harmful signals.
- Li-Fi audio transmission may be utilized in petrochemical industries, automations where use of radio spectrum is very dangerous.
- Li-Fi can also be utilized in power plants as Wi-Fi and many other radiation types are very bad for such sensitive areas.
- Li-Fi can be used in underwater systems for audio communications and device control.
- Localized advertisement can be done by broadcasting through the Li-Fi channel into smaller distances.

#### 5. CONCLUSIONS

If Li-Fi come into existence we can use each bulb has similar to the Wi-Fi hotspot to transmit the wireless statistics and we can move forward towards the cleaner, ecofriendly, more secure and brighter future. The idea of Li-Fi is presently attracting a brilliant deal of interest, now no longer least due to the fact that it may provide a true and really green opportunity to radio-primarily based totally Wi-Fi.

As population is increasing many gadgets can entry to Wi-Fi internet, the airways are becoming more and more

clogged, making it increasingly more tough to get a reliable, high velocity signal. This may also clear up the problems which include the lack of radiofrequency bandwidth and additionally permit net where in conventional radio based Wi-Fi is not allowed such a plane or hospitals.

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