

# Image and Data Transmission using Visible Light Communication (Li-Fi)

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**Abstract:** Li-Fi technology is one of the fascinating field that enhances the power of wireless communication. Li-Fi technology, discovered by the German physicist Harald Haas, University of Edinburgh. This project is to design and developed a technology to send images as a form of data without any loss of pixel rather than radio wave data transmission using Wi-Fi. LED has high efficiency, durability, reliability and high data rate than any other source of light thus empowering the growth of Li-Fi technology and visible light communication VLC system has approximately speed 10Gbps data transmission rate can be achieved by using LED bulb instead using all traditional incandescent bulbs or any others light illuminating device. Data processing is done by Arduino uno using separate transmitter(LED) and receiver (photo diode).

**Keywords:** Light- Fidelity, Visible light communication (VLC), Light emitting diode (LED) , Arduino uno, Photo Diode

## 1. Introduction

Now days, wireless communication is done using electromagnetic wave, that are prone to noise their can be distortion in data transmission due to multipath reflection. Such technology like Bluetooth, infrared, which uses 2.4 to 2.5 GHz electromagnetic wave to deliver wireless Internet access around most of the homes, office, and any public place. To overcome this data transmission problem new technology i.e. Li-Fi (light-fidelity) using visible light communication, this term Li-Fi was discovered by German physicist Harald Haas, University of Edinburgh during a TED in 2011 is being used, it is 10,000 times faster than the radio frequency which is immune to noise. Both technology wireless fidelity and Light fidelity uses electromagnetic spectrum for data transmission but whereas Wi-Fi works on radio wave and Li-Fi is uses visible light communication there are four major criteria to follow the working Wi-Fi and Li-Fi i.e. efficiency, capacity, durability and security aspects. This Project is divided into two parts transmitter and receiver. Transmitter consist Arduino uno, Driver-IC, and LED. Receiver consist Arduino uno, photo diode, and Operational Amplifier. Base64 coding technique is used for encoding and decoding of data using VB.NET software and it is send through Arduino.

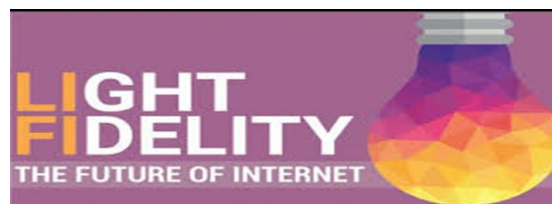


Fig. 1. High fidelity



Fig. 2. 100 times faster than Wi-Fi

## 2. Literature survey

Martin LA Monica. In this paper, motivated by the looming radio frequency (RF) spectrum crisis, the aims at demonstrating that optical wireless communication (OWC) has now reached a state where it can demonstrate that it is a viable and matured solution to this fundamental problem. In particular, for indoor communications where most mobile data traffic is consumed, light fidelity (Li-Fi) which is related to visible light communication (VLC) offers many key advantages, and effective solutions to the issues that have been posed in the last decade.[1]

Tsonev, D, Sinanovi c, S, and Haas. In this paper, As A promising complementary technology to alleviate shortage of wireless spectrum resources, visible light communication (VLC) has gained great attention from the world. Basically, VLC system mainly uses light emitting diode (LED) as the light emitting source with photodiode (PD) as the receiver. Since PD has a higher modulation bandwidth and larger linearity range compared with LED, the nature of LED becomes the bottleneck of the transmission rateof the VLC system, such as limited modulation bandwidth, frequency-selectivity and nonlinear response [2].

Khalid, A. M., Cossu, G., Corsini, R., Choudhury, P., and Ciaramella. In this paper, Li-Fi comprises a wide range of

frequencies and wavelengths, from the infrared through visible and down to the ultraviolet spectrum. It includes sub-gigabit and gigabit-class communication speeds for short, medium and long ranges, and unidirectional and bidirectional data transfer using line-of-sight or diffuse links, reflections and much more. It is not limited to LED or laser technologies or to a particular receiving technique. Li-Fi is a framework for all of these providing new capabilities. To current and future services, application and end users [3].

Kosuri Siva Satyanarayana Raju, Velisetti Mohana Venkata Sai Deekshith., Now a-days, majority of us are familiar with Wi-Fi (Wireless Fidelity), which generally uses 2.4, 5 GHz radio frequencies to transmit data wirelessly. But, these radio waves are harmful for living beings. So, the best alternative for this problem is Visible Light Communication (VLC), where LED lights are used to transfer the data wirelessly. VLC is recently referred as Li-Fi. It is a term often used to describe high speed VLC in application scenarios where Wi-Fi might also be used. The term Li-Fi is similar to Wi-Fi with the exception that light rather than radio is used for transmission. Professor Harald Haas, from the University of Edinburgh in the UK, is widely recognized as the original founder of Li-Fi. By the end of AUGUST 2013, data rates of over 1.6 GBPS were achieved using Li-Fi (light fidelity). In April 2014, the Russian company Stins Coman has announced the development of a Li-Fi wireless local network called Beam Caster. They achieved data rates of 1.25 GBPS. With Li-Fi, we can able to communicate under water, gives more security compares to Wi-Fi as light cannot pass through wall of the room [4].

### 3. Conclusion

Now-a-days everyone is using Wi-Fi technology this are time consuming, slow data rate and less secured since we are using light-fidelity (Li-Fi) for communication purpose and it is very cost effective system and as the speed of light is very fast, it increases the data transmission rate in giga bits per second which is not available in Wi-Fi technology. We are using VB.NET GUI (Graphical user interface) application to make it user friendly. In this system we are sending image as a data which is encoded and decoded using base 64 coding technique. It has an advantage that there is no loss of pixel in image.

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