

## Light as Source of Data Transmission

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**ABSTRACT:-** Li-Fi stands for Light-Fidelity. Li-Fi technology, proposed by the German physicist Harald Haas, provides transmission of data through illumination by sending data through an LED light bulb that varies in intensity faster than the human eye can follow. This technology focuses on developing a Li-Fi based system and analyzes its performance with respect to existing technology. Wi-Fi is great for general wireless coverage within buildings, whereas Li-Fi is ideal for high density wireless data coverage in confined area and for relieving radio interference issues. Li-Fi provides better bandwidth, efficiency, availability and security than Wi-Fi and has already achieved blisteringly high speed in the lab. Data transmission takes place from LED bulb by varying the current at extremely high speeds which undetectable by the human eye.

**Keywords:-** blisteringly, confined, illumination, LED, Li-Fi, transmission, Wi-Fi

### I. INTRODUCTION

Transfer of data from one place to another is one of the most important day-to-day activities. The current wireless networks that connect us to the internet are very slow when multiple devices are connected. As the number of devices that access the internet increases, the fixed bandwidth available makes it more and more difficult to enjoy high data transfer rates and connect to a secure network. But, radio waves are just a small part of the spectrum available for data transfer. A solution to this problem is by the use of Li-Fi. Li-Fi stands for Light-Fidelity. Li-Fi is transmission of data through illumination by taking the fiber out of fiber optics by sending data through an LED light bulb that varies in intensity faster than the human eye can follow. Li-Fi is the term some have used to label the fast and cheap wireless communication system, which is the optical version of Wi-Fi. Li-Fi uses visible light instead of Gigahertz radio waves for data transfer. German scientists succeeded in 2011 to creating an 800Mbps (Megabits per second) capable wireless network by using nothing more than normal red, blue, green and white LED light bulbs, thus the idea has been around for a while and various other global teams are also exploring the possibilities. In simple terms, Li-Fi can be thought of as a Wi-Fi based on light as it uses light instead of radio waves to transmit information. Instead of Wi-Fi modems or routers, Li-Fi uses transceiver-fitted LED lamps that can be used as a light or for transmission of the data communication through internet. This technology uses a visible light communication spectrum and has not major ill effect as we know that the light is very much part of our life. Moreover in this spectrum 10,000 times more space is available and it also multiplies to 10,000 times more availability as a light bulb and street bulbs are available already. The environment with the Li-Fi technology where light bulbs are used as a data communication medium to PC, Laptop, Tablet and PDA as it all have photo detector connected to it as receiver.

### II. LITERATURE SURVEY

As per our survey, there exist many technologies that can be used for transmission of data. Each system has its unique features:

1. Li-Fi Technology Transmission of data through light By Rahul Sharma, Jan-Feb 2014.

The working of Li-Fi is very simple. There is a light emitter on one end, for example, an LED, and a photo detector (light sensor) on the other. The photo detector registers a binary one when the LED is on; and a binary zero if the LED is off. To build up a message, flash the LED numerous times or use an array of LEDs of perhaps a few different colors, to obtain data rates in the range of hundreds of megabits per second. One of the major demerits of this technology is that the artificial light cannot penetrate into walls and other opaque materials which radio waves can do. So a Li-Fi enabled end device will never be as fast and handy as a Wi-Fi enabled device in the open air. Also, another shortcoming is that it only works in direct line of sight.

2. Li-Fi Technology A Visible Light Communication By Khushbu Mehta, Jan 2014.

Li-Fi is implemented using white LED light bulbs which used for illumination by applying a constant current. However, by fast variations of the current, the light output can be made to vary at extremely high speeds. If the LED is on, it transmits a digital 1 otherwise it transmits a digital 0. The LEDs can be switched on and off quickly to transmit the data that cant be detected by a human eye Apart from many advantages over Wi-Fi, Li-Fi technology is facing some problems such as Li-Fi requires line of sight. Receiving device would not be shift in indoors. A major challenge is how the receiving device will transmit data back to transmitter.

### 3. Comparatively Study: Li-Fi V/S Wi-Fi By Akshit Aggarwal, March 2014.

Researchers at the Heinrich Hertz Institute in Berlin, Germany, have reached data rates over 500 megabytes per second using a white-light LED. But blazing fast data rates and depleting bandwidths worldwide are not the only reasons that give this technology an upper hand. Since this technology uses only light therefore it can be used safely in hospitals and aircrafts where radio waves are banned Apart from many advantages over Wi-Fi, Li-Fi technology is experiencing some challenges. One of these shortcomings is that it works in direct line of sight. Another challenge is how the receiving device will transmit to the transmitting device.

### 4. Next of Wi-Fi an Future Technology in Wireless Networking Li-Fi Using Led Over Internet of Things By Vitthal S Saptasagare, March 2014.

Li-Fi is typically implemented using white LED light bulbs at the downlink transmitter. These devices are normally used for illumination only by applying a constant current. However, by fast and subtle variations of the current, the optical output can be made to vary at extremely high speeds. This very property of optical current is used in Li-Fi setup. The operational procedure is very simple if the LED is on, you transmit a digital 1, if its off you transmit a 0. The LEDs can be switched on and off very quickly, which gives nice opportunities for transmitting data. Hence all that is required is some LEDs and a controller that code data into those LEDs. The main problem is that light cant pass through objects, so if the receiver is inadvertently blocked in any way, then the signal will immediately cut out. If the light signal is blocked, or when you need to use your device to send information you can seamlessly switch back over to radio waves?, Harald says. Reliability and network coverage are the major issues to be considered by the companies while providing VLC services. Interference from external light sources like sun light, normal bulbs; and opaque materials in the path of transmission will cause interruption in the communication.

#### Outcomes of Literature Survey:

- Using a standard white-light LED, Germany, have reached data rates of over 500 megabytes per second.
- This technology has higher potential. It is very much possible to transmit the data via light by changing the flicker rate that gives different strings of 1 and 0.
- Safely in aircraft, integrated into medical devices and hospitals where Wi-Fi is banned, or even underwater, where Wi-Fi doesn't work at all.
- With the development of this technology LED can be used something like a hotspot to transmit wireless data.

### **III. PROPOSED SYSTEM**

Recent updations in technology each day putting extra overload on an exsting network ultimately this is applicable for cloud computing too. As recent survey of google show that number of persons connecting through mobile phones will be double than that of connecting through Computer device.This mobile devices are expecting connection at different speed and at errational time by using existing network and exsting frameworks of cloud computing is being a problematic to delivery such a front line service to users so we proposed public cloud service which is based on intermittent factor Quality of service. This will calculate users geo locations and service provided apply algorithms to maintain good service delivery a that end.

In terms of content delivery, migrating web services for example can reduce network congestion on a global scale for websites that are very frequently accessed or that have a lot of multimedia content. This position is further solidified by the trend of High-Definition media that consume a lot of bandwidth and in streaming scenarios, requiring consistent and high QoS. Furthermore, this type of service often has active content which is not possible to cache regionally, so moving the entire service closer to a geographical region is going to be of great benefit if there is high demand for that service in the area. Another benefit to web services using this framework is that load balancing becomes easier to . Services can be replicated or removed based on demand and this provides a highly adaptable resource allocation scheme. From a computational perspective, Cloud providers can share their resources with other providers. This gives them the exibility to request additional resourcewhen their Cloud needs them or rent some of their resources to other providers that need them. Provides highly adaptable resource allocation scheme.Cloud providers can share their resources with other resources.

#### IV. IMPLEMENTATION

In this project we transmit the data through light by using LED. By using other technique for data transmission such as Wi-Fi is less secure due to this we use light for data transmission purpose. By using this technique we get high security for data transmission. Hence this technique will be very secured technique.

##### Plan of project execution:

- First we shall be developing LED transmitter part
- Secondly execution of receiver part will be completed
- Thirdly TTL to USB convertor
- Fourthly we shall be designing software to receive data as to transmit data.

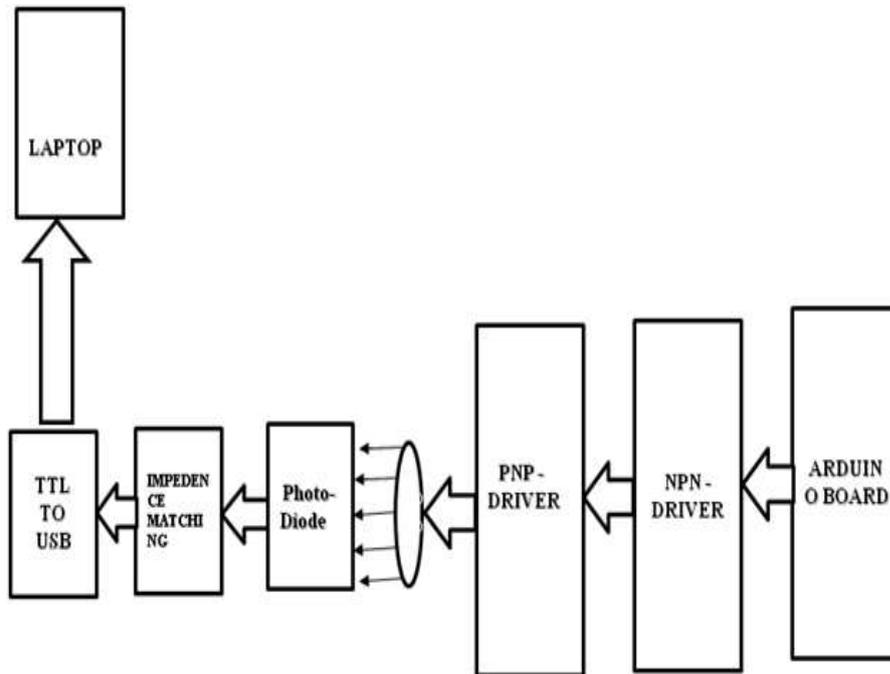


Fig. System Architecture

##### Flow of System:

- User will press a data message sequence using push button.
- A sequence of Manchester coding will activate .
- A stream of high and low pulse with defined sequence will be fired at base of transistor.
- Transistor will turn on and off which in turn will bypass and allow the RC combination to vary.
- Cd 4047 as is a pwm based inverter shall receive change in RC time constant and will go on changing the intensity by the means of change in frequency.
- At receiver with prior Manchester code sequence data will be decoded through photo diode.
- Photo diode will output the data to comparator and inverted output will be fired at microcontroller.
- Received sequence shall be compared with the lookup table and message shall be printed.

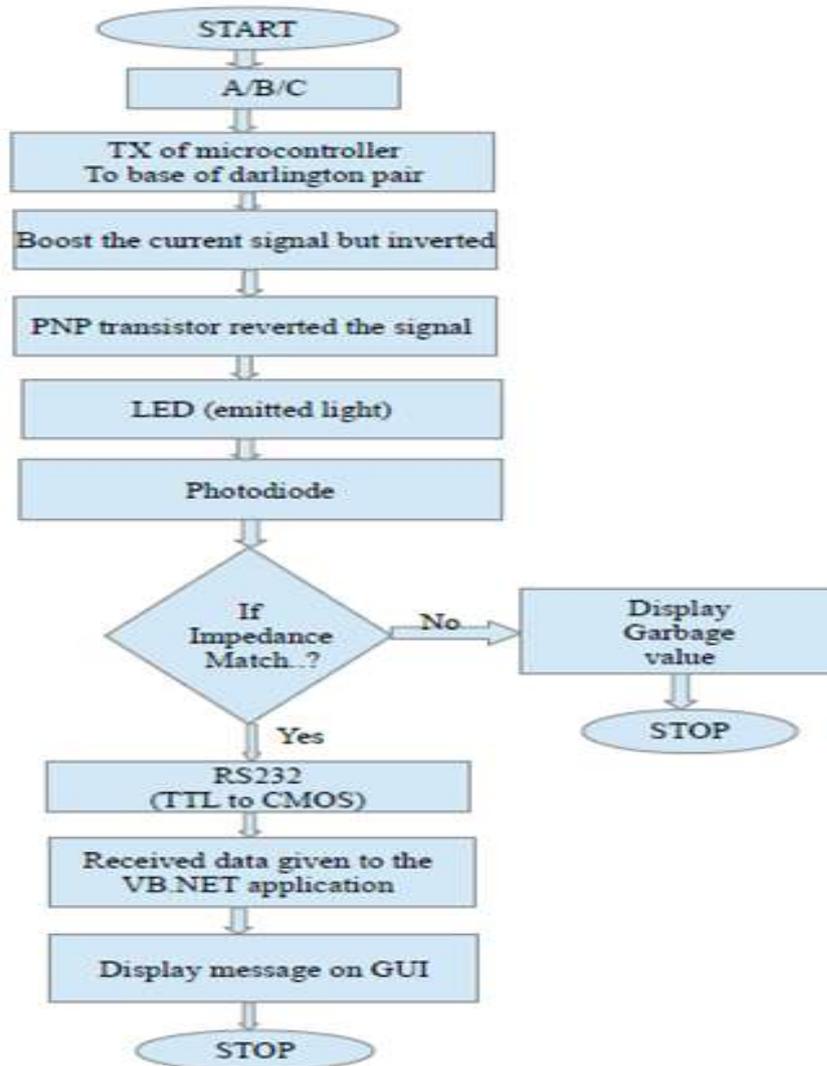


Fig. Flowchart

## V. CONCLUSION

In this review paper, we represented the design of the system which transfers the data through LED. LED's are used to transmit data and lead toward the cleaner, greener, safer and brighter future. Li-Fi is solving issues such as the shortage of radio-frequency bandwidth and is aimed towards creating new communication channels with the use of existing equipment. Currently, Li-Fi is attracting a great deal of interest, because it provides an authentic and very efficient alternative to wireless devices which use radio spectrum. By using Li-Fi technology, most of the disadvantages of Wi-Fi can be eliminated, and hence Li-Fi technology is not only very high speed but also very secure technology. Therefore, by using this technology, we get a simplex, half-duplex communication system with very high speed data communication. The efficiency of Li-Fi technology is greater than Wi-Fi technology.

## REFERENCES

- [1]. Jay Bhut, Dharmarajsinh Parmar, Khushbu Mehta, Li-Fi Technology: A Visible Light Communication, International Journal of Engineering Development and Research | (IJEEDR-2014) - 17th, 18th January 2014
- [2]. Li-Fi: Line-Of-Sight Identification with Wi-Fi, IEEE INFOCOM 2014 - IEEE Conference on Computer Communications
- [3]. F. Benedetto, G. Giunta, A. Toscano, and L. Vegni, Dynamic LOS/NLOS Statistical Discrimination of Wireless Mobile Channels, in Proc. of IEEE VTC, 2007.
- [4]. F. Adib and D. Katabi, See Through Walls with Wi-Fi! in Proc. of ACM SIGCOMM, 2013.
- [5]. Y.P. Singh, A comparative study and critical technical study of the Li-Fi- (A future Communication) V/S Wi-Fi, International Journal of IT, Engineering and Applied Sciences Research (IJIEASR) Volume 2, No. 4, April 2013

- [6]. Tsonev D. Sinanovic , Complete Modeling of Nonlinear Distortion in OFDM-Based Optical Wireless Communication, September 2013
- [7]. Harald Haas, Wireless data from every light bulb TED Global, Edinburgh, July 2011.
- [8]. Jyoti Rani, Prerna Chauhan, Ritika Tripathi, Li-Fi (Light Fidelity)-The future technology In Wireless communication, International Journal of Applied Engineering Research, ISSN 0973- 4562 Vol.7 No.11 (2012).
- [9]. <http://visiblelightcomm.com/an-ieee-standard-for-visible-light-communications>