

Li-Fi: Advanced Alternative of Wifi for Data sharing

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Abstract - It's quite common for us to suffer because of poor network connections and slow processing speed that can slow the network down at the cafeteria or at airports or in the office this leads too long processing hours and a lot of buffering. This project intends to develop the high speed data transmission through light. Light can generate data rates faster than 10 megabytes per second, much faster than the standard broadband connection. This system is more secure as compare to WiFi because light cannot passed through obstacles. Li-Fi is a transmission of data through illumination, in which data can be sent through a LED light bulb that varies in intensity faster than human eye can follow. The light which we are using in our daily life is not only used for providing light but also for communication by illumination. Transmission of image through LiFi technology is done. Using visible light for data transmission including many advantages and eliminates the disadvantages of transmission of data through electromagnetic waves

Key Words: Wi-Fi (Wireless Fidelity), Li-Fi (Light Fidelity), VLC (Visible Light Communication), USB

1. INTRODUCTION

Wireless communication schemes like Wi-Fi especially uses radio/micro wave frequencies for data transmission, primarily because of the possibility of high sensitivity receivers and ability to provide broad coverage at low frequencies and high frequency line of sight communication. But, radio frequency can support only a finite bandwidth due to confined spectrum availability. The idea behind this communication scheme is transmission of 'Data through illumination'. The intensity of the LEDs is varied by alternating the current passed through them at very high speeds. However, the human eye cannot recognize this change and the LEDs appear to have a constant intensity. This ON-OFF activity of LED lights facilitate data transmission using binary codes i.e., when the LED is ON, logical '1' is transmitted and when the LED is OFF, logical '0' is transmitted. [1]

Electronic devices acquires data with photodiode within area of light visibility. This means that everywhere where LEDs are used, lighting bulbs can deliver not only the light but wireless connection at the same time. With increasing requirement for wireless data, lack of radio spectrum and issues with hazardous electromagnetic pollution, LiFi

emerges as a new greener, healthier and cheaper, kin alternative to WiFi. Wireless systems and to overcome the confined amount of radio based wireless spectrum available by attaining a completely different part of the electromagnetic spectrum. The consortium believes is possible to achieve more than 10 gbps. Li-Fi also used in sensitive areas without causing interference. However, the light waves used cannot pervade through walls. Later in 2012, Pure VLC, a firm set up to depreciate Li-Fi, for firms installing LED-lighting systems. Moreover Li-Fi makes feasible to have a wireless Internet in specific environments where due to interferences or security considerations wifi is not allowed [4]

White LED's are used for indoor wireless networks for communication. These equipments should have capacity of wireless optical communication. The medium of communication is visible light. The communication throughout the whole room is provided by high power lighting equipment. This is often easy to install and low in terms of cost. However, arrangement of lighting device is fixed over the white ceiling. So, it is difficult to install new communication cable between pc and LED or among LED lightings. On the other hands, power line communication make it possible to use electricity for this medium of communication in Power line channel each terminal connected to power line can communicate [3]

It is desirable to achieve more than 10Gbps speed using this optical wireless technology also known as Li-Fi. The communication is done in direct line of sight manner by deploying transmit-ter and receiver. The speed of data transmission will reduce or data transmission will stop if line of sight is not used. As only photo receptors are used it is also more secure than other wireless networks, which can receive data within transmitted cone of light signals. [2]

2. LITERATURE REVIEW

Professor Harald Haas, coined the term Li-Fi at his 2011 TED Global Talk where he introduced the idea of Wireless data from every light. Li-Fi not only needs LED light bulbs to transmit data, but also a receiver that can interpret that data. In January it was reported that Apple had referenced Li-Fi capabilities in versions of the iPhone, iOS 9.1 and up. Visible light communication (VLC) has been used in a grocery store

in Northern France to track the location of customers with their permission.

This provides very useful data to marketers, who can offer coupons and other in-centives based on shopping habits. However, Li-Fi has much bigger applications than simply as a geo-location tool. Incorporating Li-Fi into the 14 billion existing light bulbs could provide more accessible and secure internet service, says Haas. Haas has proposed retrofitting the existing Internet structure to support Li-Fi bulbs. To that end, he created the company pureLiFi, which provides internet at speeds of first generation Wi-Fi



Fig : LiFi-XC by pureLiFi.

Philips lighting company has developed a VLC system for shoppers at stores. They have to download an app on their Smartphone and then their Smartphone works with the LEDs in the store. The LEDs can pinpoint where they are located in the store and give them corresponding coupons and information based on which aisle they are on and what they are looking at. The Li-Fi market is projected to have a compound annual growth rate of 82% from 2013 to 2018 and to be worth over \$6 billion per year by 2018.

It is reported that pureLiFi is ready to launch the world's first fully certified Li-Fi system. The LiFi-XC is the world's first certified complete Li-Fi system. The LiFi- XC system includes an access point and USB dongle compatible with the Windows 7, Windows 10, Linux and macOS operating systems. The move to commercialization of Li-Fi will enable pureLiFi to expand its deployment and begin to meet the excitement and needs of this new technology. Li-Fi is increasingly seen as a disruptive technology that can change the way the mobile Internet is part of the future 5G cellular network, and at the same time it is the promoter of emerging Internet of Things.

Most Remotely Operated underwater Vehicles (ROVs) use cables to transmit commands, but the cable length limits the ROV's detectable area. However, since light waves can propagate through water on Remotely Operated underwater Vehicles (ROVs).

Although it is theoretically possible to use Li-Fi for underwater applications, its practicality is limited by the distance the light penetrates the water. A lot of light cannot

penetrate more than 200 meters. After 1000 meters, no light penetrated.

3. EXPERIMENTAL SETUP

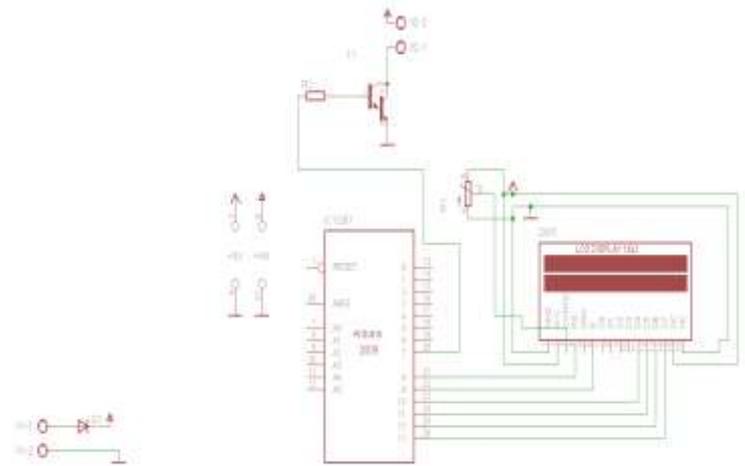


Fig: Transmitter Circuit Diagram

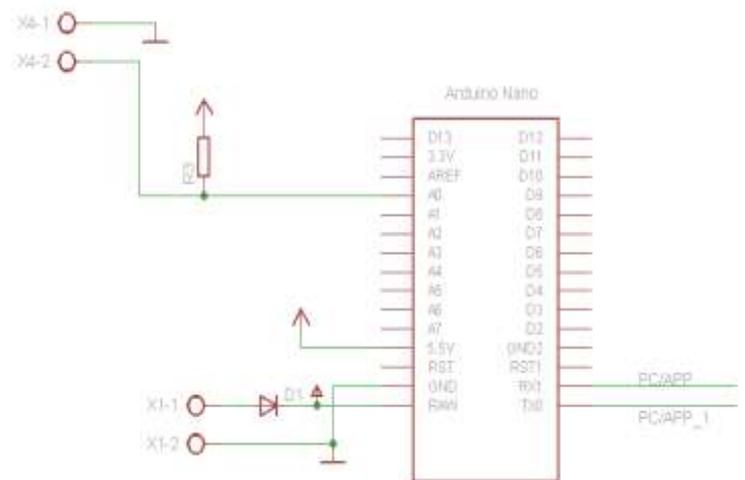


Fig: Receiver Circuit Diagram

4. COMPONENTS REQUIRED

Sr. No.	Components
1	Arduino UNO
2	Personal Computer
3	LED
4	LDR
5	Resistors
6	Arduino Nano
7	Wires
8	PCB
9	Soldering kit
10	LCD

Fig: Components Required

6. HARDWARE DESIGN

This section will put light on the hardware part of the project i.e. block diagram, circuit diagrams of transmitter and receiver, components used, key features of Arduino UNO. Also block diagram for the system will be explained further in this section.

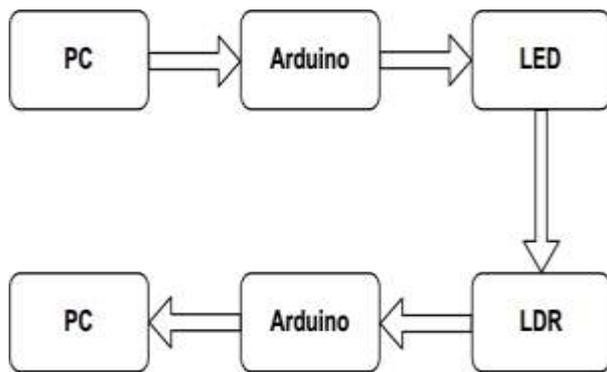


Fig: Li-Fi data transmission block diagram.

5. SOFTWARE USED

Arduino IDE

Arduino provides an Arduino Integrated Development Environment for programming (IDE). Arduino IDE is open source cross-platform software that makes it easy to write and upload programs to Arduino boards. The code written in this software are compiled and uploaded to the Arduino board using USB to Arduino cable. This cable that connects the Arduino to PC also provides power supply to Arduino. By programming Arduino the LED is controlled connected to its digital pin. The image below (i.e. figure 3.6) shows us how basic Arduino IDE software looks like.

6. EXPERIMENTAL DESIGN

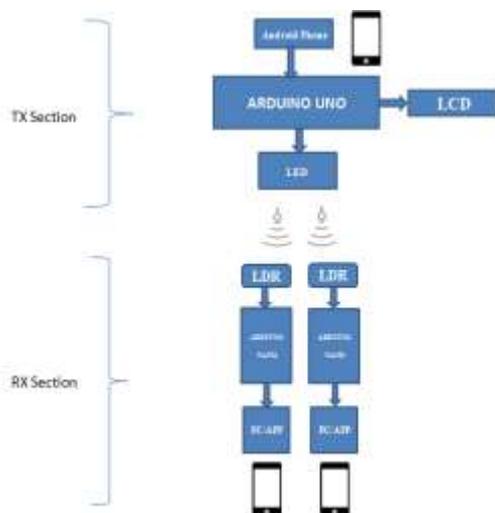


Fig : Experimental Design

7. CONCLUSIONS

There are various potential outcomes and can be investigated further. In the event that executed effectively each wellspring of light i.e. bulbs, LEDs, road lights, and so on can be utilized like Wi-Fi hotspot.

This will prompt cleaner, more secure, brighter and greener future. It might turn into a real and extremely proficient option for radio based remote correspondence. This may comprehend issues, for example, deficiency of radio recurrence data transmission and furthermore permit web where conventional radio based remote isn't permitted, for example, flying machine or healing centers. The primary inadequacy of which is require- ment for coordinate viewable pathway. The world of lighting organizations experiences a genuine insurgency with the advancement of LED lighting gadgets with decreased vitality utilization and a more extended lifetime.

Wi-Fi is awesome for general remote scope inside structures and Li-Fi is perfect for high thickness remote information scope in kept region and for easing radio impedance issues, so the two advancements would be able to thought about complimentary.

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