

LIFI BASED DATA AND AUDIO TRANSMISSION

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Abstract —In today's world communication is the primary key for exchanging information. With the increase in the usage of bandwidth which leads to a lot of congestion, we need to have an alternative for communication. There is a need of the new and even faster means of communication in this new generation. So Li-Fi can be thought of as a light-based Wi-Fi. Li-Fi is an abbreviation for Light-Fidelity. Professor Harald Haas is recognized as the original founder of Li-Fi who belongs to the University of Edinburgh in United Kingdom. Professor Harald Haas introduced the term Li-Fi and he is Chairperson of Mobile Communication at the University of Edinburgh and also the co-founder of pureLiFi. Harald Haas discussed about this technology in his 2011 TED Global talk. In LI-FI transmission of data is done through illumination, where sending of data is accomplished using LED light bulb that varies in intensity. instead of radio waves, Li-Fi uses light to send any kind of information. Li-Fi would LED lamps in which a transceiver is fitted, this gives us two advantages like it can light a room and it can also transmit and receive information. Generally simple light bulbs are used at many places like offices, home, etc. so technically there can be any number of access points.

Keywords- Li-Fi, Light, Visible Light Communication, Audio transmission, Data Transmission, Li-Fi application

I. INTRODUCTION

Wi-Fi uses radio wave frequencies for the transmission of data. But radio frequency supports only finite bandwidth due to availability of the confined spectrum. The idea behind Li-Fi is communicating through illumination. The intensity of the LED bulb varies alternatively. Human eye cannot recognize this since the current passes through the bulb is of high speed. The ON-OFF of LED bulb leads to data transmission using binary code. i.e. when LED is ON, logical 1 is transmitted and when the LED is OFF, logical 0 is transmitted. The LED working is simple, if the LED is ON, a digital 1 is transmitted otherwise a digital 0 is transmitted if LED is OFF. The LEDs can be turned ON and OFF easily and quickly, which makes it easy for the transmission of the data. Therefore we require only some LEDs and a component that helps to code data into those LEDs.

II. WHY VLC?

The Electromagnetic Spectrum is divided into different waves as shown in above figure. Out of these, X-rays are generally used in hospitals. Gamma rays are generally not used. Infrared rays used in low power applications. All these rays are extremely dangerous for human body so there are only radio waves and visible light for communication but Radio waves are already being used in Wi-Fi. Also in Radio waves when number of user's increases, that is when load increases it results in decrease of speed. So VISIBLE - LIGHT SPECTRUM is the only option we are left with. Light is a part of our lives from decades of years and does not have any adverse effect, Also the space available is 10000 times more as compare to radio waves.

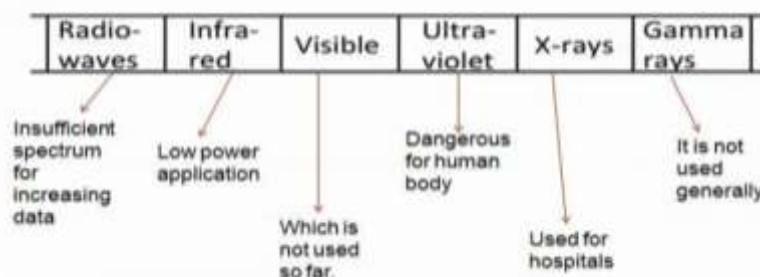


Figure 1. Electromagnetic Spectrum

Filling these basic inquiry boxes with various important terms may restore a similar arrangement of reports from the database. Representing every one of them would not be a decent recovery procedure as it yields a similar set again and again. Naturally, representing some ideal arrangement of terms that can recover an expanded report set covering the whole Hidden database is more attractive than representing the whole arrangement of terms that recovers and presents a similar arrangement of records over and over. Along these lines, it becomes fundamental not exclusively to rank the terms yet in addition select an ideal set from the positioned terms. Our work centers around how to plan suitable question terms for text box based straightforward pursuit structure interfaces that can yield most extreme number of archives from the database by representing a base number of such terms consecutively on the interface

III. COMPONENTS

A. TRANSMITTING ELEMENTS

A light-transmitting diode that is LED is a semiconductor light source that discharges light when current moves through it.

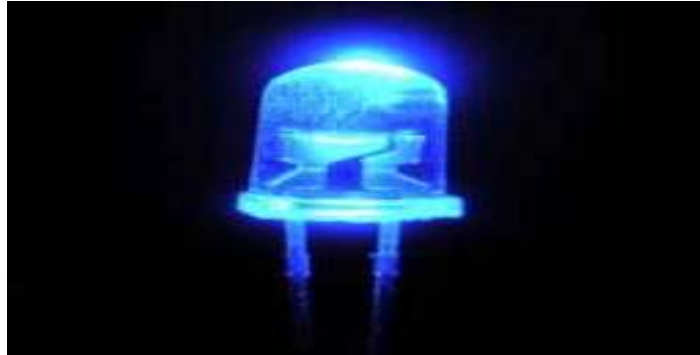


Figure 2. Light Emitting Diode

A fluorescent light also called as fluorescent cylinder or tube, is a low-pressure mercury-fume gas-release light that utilizes fluorescence to create noticeable light.



Figure 3. Fluorescent Lamp

B. RECEIVING ELEMENTS

An Avalanche Photodiode that is APD is an exceptionally sensitive semiconductor photodiode that makes most of the photoelectric impact to change or convert light into power.



Figure 4. Avalanche Photo Diode

Solar panel is the device which is utilized to assimilate the sun's beams and convert them into power.



Figure: 5. Solar Panel

IV. AUDIO TRANSMISSION

The transmission of sound sign was accomplished using a mobile at the senders end, providing audio the through 3.5 mm jack. The 3.5mm sound jack and the input sound from the phone is changed over to analog from digital. There are 3 lines in 3.5mm sound jack which are right, left and ground. Both the ends have the sound output signal, which is associated with the negative terminal of the 9V battery. The ground of the 3.5mm jack is connected to the negative terminal of the LED cluster associated on a breadboard and the positive of the 9V exhibit is given to the resistors in arrangement with the LED exhibit. This variety in the power of light, in any case, is caught on a solar panel that acts as photo detector. It catches all the varieties and forwards the signal which is received to the pre-amplified speaker. The signal which was transmitted was analog in nature and it was send through the fluctuating LED cluster to the solar panel in order to get it amplified in the speaker and produces the sound waves which can be heard through the speaker. Based on the distance between the LED and the solar panel, the intensity of the sound can vary which was received from the speaker. So it can be said that the received information is through line of sight of LED.

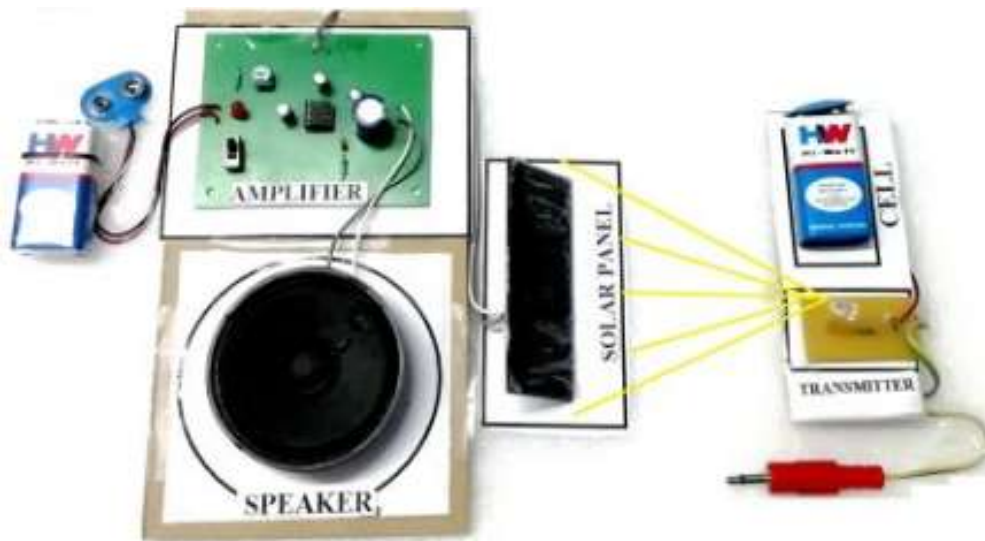


Figure 6. Audio Transmission

V. APPLICATIONS

Traffic Light:

Traffic contains LED light which are used to project traffic signals, if these ordinary LED lights are replaced with Wi-Fi bulb then these traffic lights can communicate with each other using Li-Fi technology. Suppose there is a huge traffic in Peak hours, then these Li-Fi LEDs will analyze the traffic using smart Sensors and depending on the traffic scenario it will operate the traffic signals which will help us in reducing traffic jam.

Airplanes:

In Airplanes, cell phones cannot be used for data transmission because the same frequency is used by pilot to communicate with Navigation center. There is a possibility that his communication will get interrupted which can be dangerous, but we can see that there are many light bulbs in airplanes cabin. So Li-Fi can be implemented in airplanes for the transmission of data.

Street Lamps:

On the street around the world there are many street lamps. If Li-Fi is implemented and used in our physical world, then every street lamps can be utilized as an access point which can be freely available.

Health Sector:

In various hospitals and health sectors Wi-Fi cannot be used since is not safe to be used because it penetrates human body. So Li-Fi can be used and implemented in the health sector.

Under Water:

Since Radio waves are absorbed by the sea water it cannot be used under water as this renders it unusable underwater. The solution to the above problem is Li-Fi which can be used for communication under the water.

VI. CONCLUSION

Li Fi is a quick and modest remote correspondence framework. The expanding interest for higher transfer speeds, quicker and increasingly secure information transmission just as ecological and without a doubt human cordial innovation proclaims the beginning of a significant move in remote innovation, a move from RF to optical remote advancements. The potential outcomes are various and research can give us numerous arrangements. This innovation can be utilized to make each LED bulb into a Li-Fi hotspot to transmit information remotely and will continue to give us a more secure, quicker and a greener system.

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