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LIFI (LIGHT FIDELITY) & ITS APPLICATIONS

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ABSTRACT

In this age of advanced science, a number of wireless connections are available to connect to the internet. It has become a very common tool to access wireless internet from a coffee shop to a conference hall. As the number of people accessing the wireless internet increases, the clogged airwaves make it extremely difficult to latch on to a reliable signal. LiFi is a label for wireless communication system using light as a carrier instead of traditional radio frequencies, as in Wi-Fi. LiFi should not be confused with the more general term visible light communications (VLC), which is the use of visible light portion of the electromagnetic spectrum to transmit information.

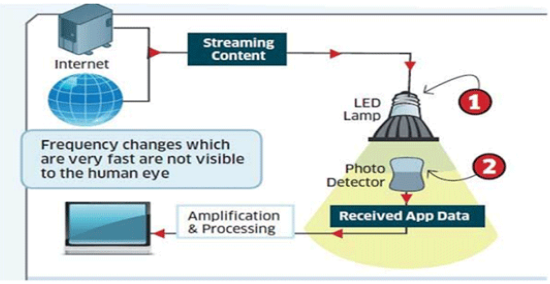
Keywords: *Light Fidelity, Transmission, Wi-Fi.*

I. INTRODUCTION

We know, now a day internet has become a huge demand. People are moving around here and there for WI-FI hot spots. Li-Fi technology uses light rays instead of radio waves to transmit information. The other name given to it is Optical Version of Wi-Fi .It is one of the latest technology in the present time related to technology that uses, LEDs .It's a 5G technology of visible light communication system. It provides us better security, bandwidth, efficiency & availability then WI-FI. It predict a future where the data for smart cell phones, tablets and laptops is transmitted and received through the light in a room & it would be highly secured that is if you can't see the light, you can't access the data. It can be used in highly security military areas.

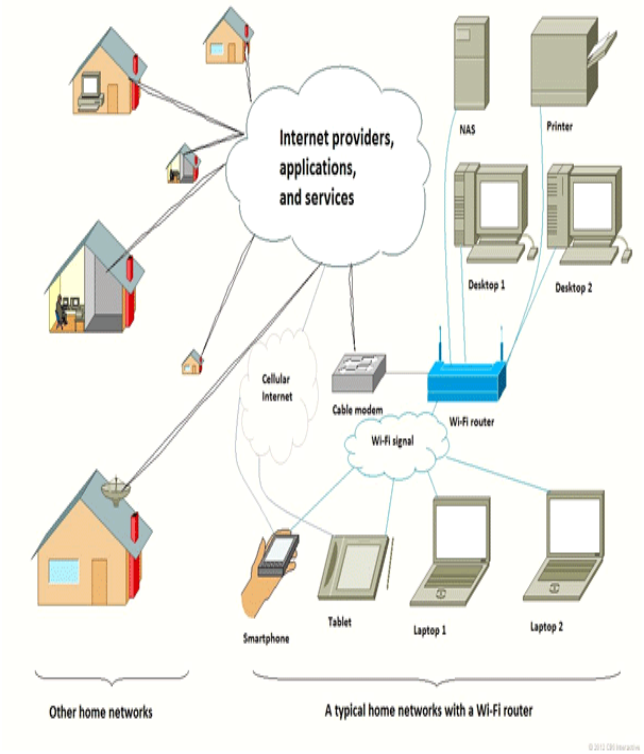
II. HOW LI-FI WORKS?

Li-Fi and Wi-Fi are much similar as both transmit data electromagnetically. However, Wi-Fi uses radio waves, while Li-Fi runs on visible light waves. Li-Fi is a Visible Light Communications (VLC) system. This means that it accommodate a photo-detector to receive light signals and a signal processing element to convert the data into 'stream-able' content. An LED light bulb is a semi-conductor light source means that the constant current of electricity supplied to LED light bulbs can be up and down at extremely high speeds, without being visible to the human eye. i.e, data is fed into an LED light bulb (with signal processing technology), it then sends data at high speed to the photo-detector. The small changes in the rapid dimming of LED bulbs are then converted by the 'receiver' into electrical signal. The signal is then converted back into a binary data stream that we would recognise as audio applications, web, video that run on internet-enabled devices.



How Wi-Fi (WIRELESS FIDELITY) WORKS?

The term Wi-Fi was invented by NCR Corporation in 1991. This technology has evolved and adapted itself to find way into all our bedrooms and offices. Wi-Fi is a very common term which many people think it to be just wireless internet. But the term Wi-Fi and wireless internet does not mean the same. When the internet started spreading all over the world they were all wired connection. We still use unwater cables to cover 99% of world since they are more reliable. But later the evolution of mobile phones etc. brought in the need of wireless internet. So at the delivering end of our internet we used Wi-Fi as shown in the picture below:-



As we can see each and every Wi-Fi signals needs a Wi-Fi router to send and receive data. These routers are again connected by wires to the internet provider through a modem. Wi-Fi works with the help of radio waves and so far every device that gets connected to the internet we need to provide and additional piece of hardware that could send and receive RF signals.

III. APPLICATION BASED ON LI-FI

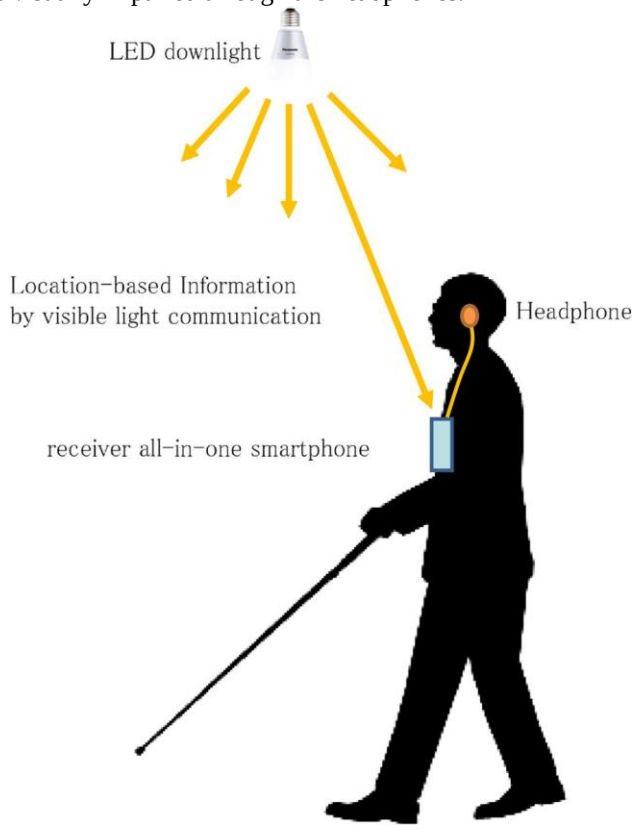
1. Underwater communication system

Data is transmitted from one point to another via modulation. Modulation is forming on the basis of communication which is the process of transmission of low frequency data signal with high frequency carrier signal. We need two signals for modulation process. These data's signal (map, music, voice and video) to transmit and high frequency carrier signal. For two reasons modulation is a necessity. First one is low frequency data signal has not that much energy to travel long distances. Second, if low frequency data signal were not set on carrier signal, in other words if not modulated, the dimension of the antenna would be inefficiently long. It is because the dimensions of the antenna are inversely proportional to frequency.

2. Indoor navigation system

Indoor navigation is convenient for the visually impaired persons. We can project such a navigation system for the visually impaired as shown in Figure. LED light emits visible light with location data and embedded system or

smartphone with a visible light receiver receives the data. The smartphone or other device calculates the optimal path to a designation and speaks to the visually impaired through the headphones.



3. LI-FI wireless optical communication

LI-FI wireless optical communication is the advanced optical wireless communication technology, which works in the light visible area (is used as a medium for data transmission is more secure and achieves high data rates as compared to old wireless technologies like Wi-Fi, Bluetooth etc., which use radio waves for communication. While using wireless internet, when more than one device is connected into the network, then bandwidth got lagging at the slow speed. To reduce the shortage of bandwidth we can use light to transfer the data which can be known as "DATA THROUGH ILLUMINATION". The idea behind is that is infrared remote is slightly modified for example LED light bulb that varies in intensity which can't be followed by the naked eyes. It is possible to encode the data in the light by varying the light at which the LEDs flicker off and on to give different strings of 0s and 1s.While using mixtures of green, red and blue LEDs to alter the light frequency encoding a different data channel. If you cannot see the light then you cannot access the data so the security would be snapped.

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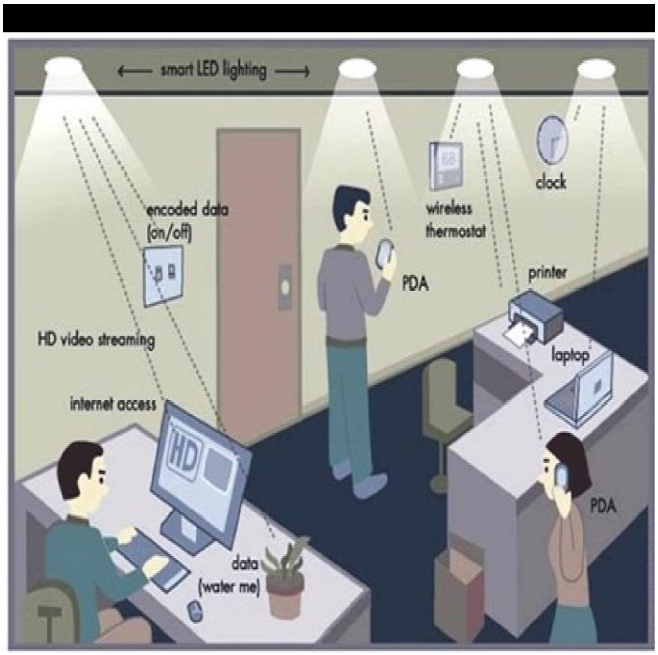

IV. CONCLUSION

As the number of internet users is increasing day by day, this concept is very reliable and efficient alternative to RF communication system. The visible spectrum of light is used that's better than the radio frequency and also prone to interference. By using this technology, information can be received and transmitted at very high rate with simply turning off and on of the LEDs. This technology is very much secured compared to Wi-Fi.

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