Visible Light Communication for Li-Fi Technology

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Abstract - *Light based communication system is that the backbone of the end of the day of the communication system. Li-Fi could even be a wireless technology that uses light emitting diodes (LEDs) for transmission of knowledge. The term Li-Fi states to light communication (VLC) technology that uses as medium to deliver high-speed communication in a fashion almost like Wi-Fi. With the innovation in technology and thus the quantity of users, the existing radio-wave spectrum fails to accommodate this need. To resolve the problems of scalability, availability and security, we have come up with the concept of transmitting data wirelessly through light using light communication (VLC) technology.*

Keywords - Li-Fi, Wi-Fi, LED.

1. INTRODUCTION

With continuously growing needs of telecommunication world, there's an increased thrust for higher bandwidth that facilitates faster and secure data transmission. Present telecommunication industry relies on radio waves of spectrum for data transmission. Inappropriately, the radio emission spectrum has certain key limitations: Capacity, Efficiency, Availability and Security. So using the sunshine Emitting Diodes that has within the transmission of knowledge much faster and reliable than the information which might be transmitted through Wi-Fi. Li-Fi could even be a wireless communication system during which light is employed as a carrier signal rather than traditional frequency as in Wi-Fi. Li-Fi technology communicates with the assistance of actinic ray Communication (VLC) spectrum and has no side effect, as we all know the sunshine is extremely much a part of our life then much faster Moreover, Li-Fi makes possible to possess a wireless Internet in specific environments, where Wi-Fi is not allowed because of interferences or security considerations.

Fig1: LiFi in work place.

1.1 OBJECTIVES/PURPOSE OF THE STUDY:

One of the main objectives of Li-Fi is to provide efficient data transfer. It is also essential to manage cost of Li-Fi Hardware and software. The speed of Li-Fi is also essential since the life nowadays goes fast and nobody wants to waste time. The other objective of Li-Fi is to remove flaws in previous research. We also need to upgrade the spectrum of Li-Fi transmission. The goal is also to give Li-Fi optical reflectors so that light can pass by opaque objects.

1.2 . Related work/ Literature Survey

Many people in today's world use Wi-Fi. The speed of Wi-Fi is about 2.5GHz average. This speed is useful for basic works for household or individual. However, when it comes to big organizations this speed does limited work. So the Li-Fi can Play big role in this matter.

The Li-Fi transfers data on basis of light amplitude. As we all knows that light amplitude is faster than radio waves, so it can remove the internet speed issues for big organizations. The spectrum of Li-Fi is 10000 times greater than that of Wi-Fi radio waves.

2. Problem Definition

Every technology could also be results of valuable time and research has the pros and cons of it. Once we humans, a creation of God aren't perfect how the technology that is our invention can be perfect. The invention of Li-fi can be considered as an upgrade to current Wi-Fi shortcomings, but it also has some shortcoming of its own. Following are these shortcomings of the technology: -

Li-Fi would be difficult to work in harsh weather or harsh lighting conditions. As photo, detectors will not be ready to detect modulation of sunshine waves by the sequence or combination of which data is transmitted. So on efficiently function Li-Fi requires ambient lighting.

The Li-Fi requires line of sight, which can be problematic if the receiver device is not within the Li-Fi source. If you are using the web in your living room and need to travel in your bedroom, you would possibly need another LED bulb to use the online otherwise you would possibly run out of luck.

Our internet usage would depend on the sunshine source, it the source of sunshine malfunctions we lose the access to the online.

The different categories of LED's (Laser LED, Larger LED and Smaller LED) would have an instantaneous impact on the speed of the internet.

This technology would require reinvestment in lighting and thus the wiring to place within the LED.

2.1. Methodology

Li-Fi is usually implemented using white LED light bulbs at the downlink transmitter. These devices are normally used for illumination only by applying a continuing current.

By subtle and fast variations of the light amplitude, the optical output are often made to vary at extremely high speed. This varying property of optical current is employed in Li-Fi setup.

The operational procedure is straight forward, if the LED is on, we transmit a digital 1, if it's off you transmit a 0. The LEDs are often switched on and off very quickly, which provides nice opportunities for transmitting data.

All has to do is to vary the speed at which the LED's flicker depending upon the info we would like to encode. The optical bulb flashes at a very high speed, which can't be detected by human eyes. Hence, it appears constant and no changes can be seen in LED bulb.
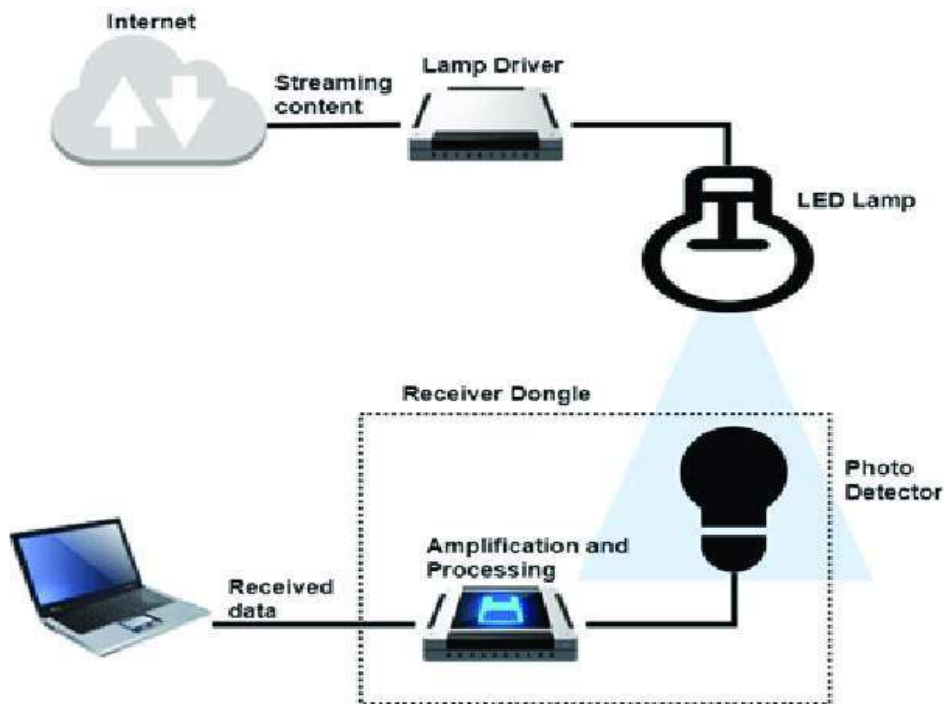
Fig2: Working of Li-Fi

The LED lamp will hold a microchip which will do the work of processing the info. On one end all data on the web are going to be streamed to a lamp driver.

When LED is ON microchip convert digital data in somewhat light. On the opposite end, the photo detector detects this light.

Then this light is amplitude and fed to the device. If the LED is ON, transmit a digital one, if it is OFF you transmit a digit 0.

2.2. Existing Technologies:

1. WIFI:

Wi-Fi is a popular wireless networking technology. Wi-Fi stands for "wireless fidelity".

We can exchange the information between two or more devices with help of Wi-Fi.

Wi-Fi can be used in both high end devices such as computers and laptops and low end devices such as mobile, iPads and digital cameras.

Fig3: Wi-Fi

2. Wired Connection:

A wired network uses cables for configuration. It mostly uses Ethernet cables for data transmission for all connected devices

A single router may be used for data transmission in a small network. Larger network mostly use two or more routers and switches for data transmission.

Fig4: Wired Connection

3. LAN:

A LAN is used foe connection around small and specific location. LANs can be found at homes, offices, educational institution, or other areas.

A LAN can be wired or wireless, or a hybrid of the two. A wired LAN uses Ethernet cables to connect multiple devices together. A wireless LAN mostly uses routers. In some case, the LAN uses both routers and Ethernet cables.

3. SCOPE OF THE STUDY

As we know, Light bulbs can be found in all corners of the world, so we can say that Li-Fi can be infinitely used in future. It can be used in Hospitals, as it does not transmit any radio waves.

It can also be used in large organizations has its speed is 10 times that of Wi-Fi. It can also have underwater uses such as in submarines. It can also be used for daily life and for private use. It can also be used in street lights so that we can access internet outside our home.

4. Limitations

The greatest limitation of Li-Fi is its range since it need direct source of light for its working. It also cannot penetrate opaque objects so its limited to a single room if another room does not have a light source.

It cannot be used without an light source. It can be inferred by other light sources. The light needs to be always ON so that Li-Fi keeps running which can be problem if user doesn't need light.

5. CONCLUSION

In conclusion, wearable technologies have gradually & rapidly evolved in parallel with technological advancements such as electronic chips, GPS systems, Wi-Fi systems, the internet, computers and sensors. We believe the future of telemedicine is extremely promising. On the physician's desktop, in small, rural clinics, in large, inner-city clinics, in the patient's home, or wherever medical information is needed, the technologies to connect patient with provider are rapidly becoming a reality. In this paper, it is proposed that wearable technologies will ease the life for the people that will enable the doctors to monitor the health indicators of the people continuously via Telehealth Technology.

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