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Overview of Light Fidelity

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ABSTRACT: Li-Fi is one of the recent and encouraging technologies which is used for short range and high speed data transmission. Li-fi is a segment of VLC (visible light communication which is customarily executed using white light emitting diode (LED) glowing bulbs. The VLC's are normally implemented for lightning and gleaming by applying animmutable current terminated by LED. Although, by sporty and subtle variation of current, the observed output probably produced to fluctuate at exceedinglyexpeditious speeds. Light fidelity is a cordless optical networking mechanization whichmanipulate light emitting diodes (LEDs) for data and informationcommunication. In this project a beneficial transmission and reception is done by using a VLC system where the evolution is done under the effect of natural light. When the transmission is done, the modulation amplifier enhances the data signal for clear and longer data transmission. The effect of transmission distance with respect to the optical power, photosensitivity is detected. The transmission and reception of data is done in this project by using amplitude, modulation and demodulation technique.

KEY WORD: (Li-Fi) Light Fidelity, (VLC) visible light communication, (NFC) Near Field Communication, (Wi-Fi) Wireless Fidelity, (LED) Light Emitting Diode.

INTRODUCTION

Communication is a terminology by which one user creates connection with the other user and Share data. wherein wireless communication is a communication in which the data or information is transferred between two or more points without any wire[1]. This is a wide expression that consolidate all cause of action and an arrangement of linking and interacting between more than two devices, which is done by using a codeless signal generated through wireless communication Technologies and devices. About"1.4"millions of digital radio wave central stations are envisioned with about 5 billion of cellular phones[2].

Basically cellular phones transfer and receive About 600 TB of data. Wireless communication which was used Previously were based on radio frequency wherein spectrum is one of the major parts of cordless transmission and receiving process, so with an advancement of technology and escalation in number of user Radio frequency spectrum break down to attain the needs of the user and Technology. there are mainly four modes of wireless communication such as Bluetooth, NFC (near field communication), Wi-Fi (wireless fidelity), and li-fi (Light Fidelity). But in this paper we mainly focus on wireless communication using Li-Fi technology which resolves the above problem faced with the radio wave spectrum.

Li-fi is a plagiarized version of an optical cordless Communication mechanism which exploit light from LEDs with intensity faster than human eye, which is an intermediate to transfer network, cellular, rapid communication which is closely resembling to wireless fidelity. Li-fi

is a Visible Light Communication Technology (VLC) developed by the professor Harald Haas, one who introduced the idea of "wireless data every light". Visible radiation or light communication is the sophisticated discernible cordless communication Technologywhere light is in the visible zone i.e. wavelength between 370nm to 780nm is utilized as an intermediate for signal modulation[3]. This signal modulation adds an additional security and achieves rapid data speed in comparison to an ordinary cordless communication technology as Bluetooth, Wireless Fidelity and many more.

Although operating cordless internet along with more number of other device connected with the same matrix the speed of the internet network slows down, to overcome this problem visible light has come with an advanced feature to transmit and receive data which can be postulate as data and information through fluorescence. It exploits a fraught pulse of light to transfer data and information without any wire. The essential element of the Visible light communication (VLC) system is, extravagant glaring with white LED bulb which behave as a communication reference wherein siliconphotodiode performs as a greeting factor. LEDs can interchange on/off to engender digital function of "1" and "0", so that data and information can be encrypted in the light to produce a contemporary data string besides fluctuating the quivering rate of the LED.

More particularly by regulating the LED light with a specific data and informationwave the LED illustration can be used as a communication fountainhead. As the quivering rate is so speedy the LED output emerges constant to the human eye. Data remuneration greater than 100 mbps is probable by using high-velocity LED with suitable multiplexing procedure. Visible light communication data and an information rate can be expandedby collateral data transmission applying LED light where all and sundry LED transfers independent data String. LED has respective advantages such as enormous and unobstructed bandwidth, sanction free performance, low cost electronics, no intervention with RF systems as well as It does not have health concerns. Therefore, it can be said that in subsequent time LEDs will displace the conventional illumination lighting such as luminescent lamps and numerous other light-bulbs[4].

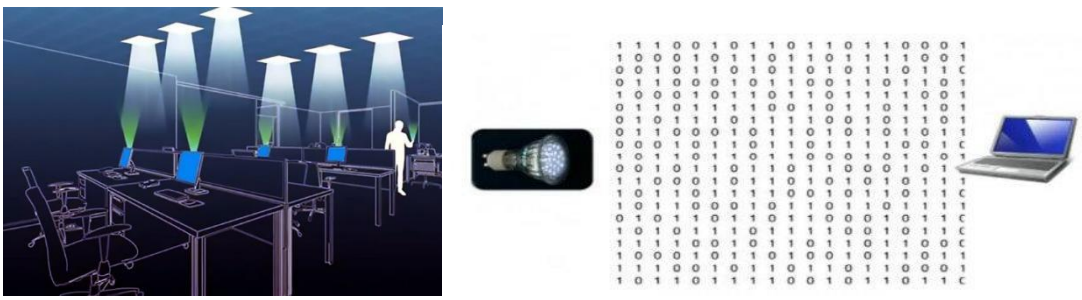

Figure 1: The figure shows the overview function of a Li-Fi technology. When the light falls on any device an automatic internet is connected to the device.

OVERVIEW OF Li-Fi

Light Fidelity (li-fi) was developed by Herald Hass and promoted in 2011. Herald Hass had given the presentation on LED light bulbs to transmit data with the speed 10 times faster than

any other technology[5]. With the fastest and increase in speed of light, the data transmission speed of light is also very high. Nowadays data transmission has become one of the most important activities in our day to day life, so when the Multiple number of people connect their devices to the internet then the internet speed becomes very much slower[6]. This is why because when the number of devices increase in a fixed bandwidth which is available for data transmission then this Limited Bandwidth Make a problem to transfer data with the high speed. To resolve this problem, the use of li-fi has been proposed wherein li-fi is a transmission of data through the LED light which is even faster than the human eye[7].The ASK signal is generated by applying incoming binary data and the sinusoidal carrier signal to the product modulator that is a balanced modulator then the resulting output we obtain will be the binary ASK waveforms[8].

AMPLIFIER

an amplifier is the process of increasing the lower data signal into a higher data signal. The signal is represented by a voltage variation when passes through an amplifier then we get an amplified signal i.e. signal with a higher amplitude. It is very much required in a wireless communication because when the signal or wave travel through a longer distance the signal become weaker, so to resolve this problem an amplification is done[9].

WHITE LEDs

Shuji Nakamura was the one who is known for blue and white LEDs wherein white light is the next big thing in the light obtain by using multiple layer of light emitting phosphor or semiconductor. In the early times LEDs was just used for the basic application such as indicator, emergency lighting or display, but the white light is being used in large amount of application such as indoor light, street light and many other[10].

PHOTODIODE

Photodiode is a diode which always operated in a reverse-bias mode. On account of reverse bias,the photodiode has a very broad depletion region, while applying the photodiode light is made to incident on the intersection. The Photons occurrence on the intersection generate electron hole pairs. Remaining in the reverse bias mode the holes get enamored in the direction of p-region by the negative terminus of the artillery and electrons get enamored in the direction of n-region by the positive terminus of the battery. Simultaneously we know that in reverse bias mode reverse saturation current flow through diode, thus escalation in the charge carrier leads to extension in the reverse congestion current this current is called photocurrent. With increase in the light intensity additional electron hole pairs are introduced and the photocurrent extended. Thus photocurrent is proportional to light intensity. During reverse bias only reverse saturation current flows through the diode which is in micro ampere range. The photocurrent that is generated is also in micro ampere range thus we can easily identify the change in in the diode current after generation of a photocurrent. On the other hand, if we operate a diode in the forward bias then the diode current is in the range of mile ampere. Thus a photocurrent of few micro amperes would not creates any effect on the diode current thus we operate a photodiode in the reverse bias mode always. By using photodiode,sensitivity of the light can be increased and there will be high speed in the operation[11].

APPLICATION OF LI-FI

As far as the LED base system is concerned the domain is very versatile, ranging from materialistic purposes to scholastic and manufacturing experimentation, from spacecraft to martial purposes, from hospital to aircrafts, from lighting to automobile LEDs are very immeasurable[12]. It is used foe lighting in smart buildings. Since is LEDs is in inherent stage and contribute both safe elucidation and communication, this automation can be used for communication in precarious area like miles, petrochemical plants and many more. Cellular phones and Wi-Fi are unacceptable in indubitable places in hospital certainly around the MRI scanners and operating theater so using VLC in hospital and industrial areas is an advantages. Since Li-Fi uses light it can be used safely in any places like aircraft, hospitals,Traffic management, Education system, Medical application, Aircraft application, Under water application etc. where the Wi-Fi is band.

CONCLUSION

The world is leading to lighting and with this increase in lighting the revolution of data transmission through light also increases. Li-fi is one of the fastest technology which can transmit and receives the data 10,000 times faster than any other technology. Sometime we face a huge problem when numbers of user get connected to the single internet module but Li-Fi resolves this problem of internet speed. As light can travel in any medium, so when the light reflected on any device then a binary code in the form of “0” and “1” is generated and the device will then automatically have connected to the internet. For the future purpose it can be used in many applications for fast data transmission and receiving.

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