Li-Fi : Data Transmission Via Light

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Abstract- *In the present context we are dealing with Light Fidelity (Li-Fi) is one of the future technologies in wireless communication sector. Li-Fi or new life of data communication is a better alternative to WI-FI in wireless communication. Most of the people using Wi-Fi internet devices which uses 2.4-5 GHz radio frequency to deliver wireless internet access to us in home , offices, schools, public places, etc. The optical wireless technologies sometimes called as visible light communication (VLC).*

Li-Fi. It offer an entirely wide range in wireless technologies in terms of communication speed, usability, reliability, etc. The Li-fi is a wireless communication system in which light is used as a carrier signal instead of radio frequency in Wi-Fi.

Li-Fi could transmit data at speed of 100 Gbps and possibly higher. The technology is being developed by several organization across the globe. It is efficient alternative to radio based wireless communication .The Concept of Li-Fi is data communication on fast flickering of light which is not detected by human eye but it is focused on photo detector which converts the on-off state into binary digital data.

I. INTRODUCTION

Li-Fi stands for Light Fidelity. It is transmission of data through illumination, i.e. Sending data through LED light bulb that varies in intensity faster than human eye can follow. Li-Fi can be thought of as a light based Wi-Fi. That is it uses light instead of radio waves to transmit information. And instead of Wi-Fi modems, lifi would use transreciever fitted LED lamps that can light a room as well as transmit and receive information. Wifi uses 2.4 5 GHz radio frequency to deliver wireless internet access and its bandwidth is typically limited to 50-100 megabits per second (Mbps).

Optical Wireless technologies sometimes called visible light communication (VLC) and more recently referred to as Li-Fi on the other hand, offer an entirely new paradigm in wireless technologies in terms of communication speed, flexibility and usability

Methodology

The Li-Fi system consists of mainly two parts, the transmitter and the receiver. LED light is used as signal source between two end systems. Data is carried by the modulated light from the LED. The microprocessor unit (MPU) system modulates and demodulates data at transmitter and receiver ends respectively. The transmitter part modulates the input signal with the required time period and transmits .The data in the form of 1's and 0's using a LED bulb. These 1's and 0's are nothing but the flashes of the bulb. The receiver part catches these flashes using a photodiode and amplifies the signal to produce the output.

Li-Fi is implemented using white LED light bulbs at downlink transmitter. An array of LEDs can also be used for parallel data transmission and different coloured LEDs to alter the LED frequency so that data are encrypted for different frequency.

II. LITERATURE SURVEY

Most of the people using Wi-Fi internet devices which uses 2.4-5 GHz radio frequency to deliver wireless internet access to us in home , offices, schools, public places, etc.

While Wi-Fi can cover an entire house, offices having bandwidth limited to 50-100 Mbps.

The optical wireless technologies sometimes called as visible light communication (VLC) and more recently referred to s Li-Fi. It offer an entirely wide range in wireless technologies in terms of communication speed, usability, reliability, etc. The Li-fi is a wireless communication system in which light is used as a carrier signal instead of radio frequency in Wi-Fi.

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III. COMPONENTS

a) One Audio signal Amplifier:-To amplify the weak signal into strong signal as per requirement.

b) 2 male 3.5mm Aux cable:-The Aux port is typically used for audio equipment that receives peripheral sound speaker.

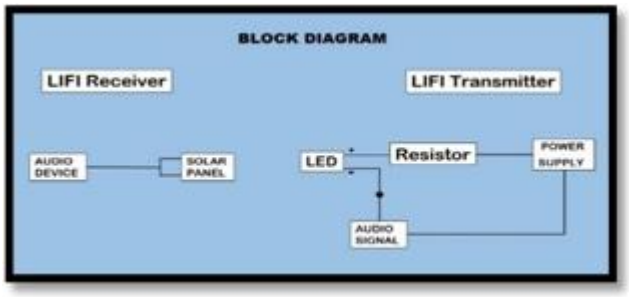
c) LED light:-To send audio signal lumens & Led is a semiconductor light source and releasing energy in the form of photons.

d) 220 OHM RESISTOR: - IT LIMIT FLOW OF ELECTRIC CURRENT.

e) SMALL SOLAR PANEL:-TO RECEIVE A AUDIO SIGNAL COMING FROM LED LIGHT.

f) 9-12 VOLTS BATTERY: - TO PROVIDE POWER SUPPLY TO THE TRANSMITTER SIDE TO GLOW LED LIGHT.

IV. BLOCK DIAGRAM



V. WORKING

- After all hardware setup is done, take the Li-Fi transmitter jack and connect it with the audio signal source through 3.5mm female jack.
- Take the Li-Fi receiver jack and connect it with pre-amplified speaker in the Aux input port.
- Place the Li-Fi transmitter and Li-Fi receiver face to face with each other at a distance of about 2 inches between them.
- Connect the battery to 9V battery connector in the Li-Fi Transmitter.
- The LED will light up, carrying audio signal in the lumens of LED

VI. APPLICATION

a) Used for modern medical instruments.
b) In aircrafts, it can be used for data transmission.
c) Used in petroleum or chemical plants, where other transmission of frequency can be hazardous.
d) In traffic signals, Li-Fi can be used which will communicate with the LED lights of cars and no. Of accidents can be decreased.
e) Underwater communication.
f) Li-Fi can be used effectively in the places where it is difficult to lay the optical fibre cable.
g) Submarine Communication Technique

ADVANTAGES

1) Larger Bandwidth
2) High efficiency
3) More availability
4) High security
5) Green Information technology
6) No license needed
7) Lighting spots can be used as hotspots

DISADVANTAGES

1) Li-Fi doesn't work in dark
2) Light can't pass through the objects
3) High installation cost of the VLC systems.
4) Interference from the external sources like sun light, normal bulbs and opaque materials in path of transmission will course interruption in communication.

VII. FUTURE REFERENCE

1) Light Fidelity is an exciting breakthrough in 5G visual light Communication system and the future of wireless Internet.
2) With Li-Fi information hitches a ride along a spectrum of visible light. Light emitting diode (LED) Bulbs, transmit data when they are switched on and off so rapidly in nanoseconds, that the human eye cannot see it.
3) Smartphones will soon be able to download traffic information from traffic lights or a program guide from a television.
4) In the future, shop will transmit advertisements to your phone as you pass by and bus schedule change will be transmitted to a screen at the stop.
5) Efficient alternative to radio based wireless communication.
6) Li-Fi is an emerging technology which quick and reliable.

VIII. CONCLUSION

Each of our device will be connected ton the internet as we move into Internet of Everything era. With the ever-growing demand for connectivity, Li-Fi would be able to combine illumination and wireless data transmission to accelerate the relay of data across the globe. It can be consider as incredible companion of wifi technology. It Overcomes the limitations of radio spectrum .High speed of 100Gbps can be achieved. The possibilities are numerous and can be explored further. If this technology can be put into practical use, every bulb can be used something like a wi-fi hotspot.

We will proceed towards the cleaner, greener and brighter future. This may solve issues such as shortage of radio frequency bandwidth.

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