

LI-FI: Data Transmission Using Light

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Abstract— In world of wireless technology, the no of devices access the internet growing by a second most of the devices use wireless communication far access internet far sharing data between devices, this has unfortunately led to an increase in network complexity, shortage of wireless radio bandwidth and increased risk of interference of radio frequencies put limitation on radio frequency which is used in Wi-Fi. Simply, Li-Fi is nothing but Wi-Fi using light by using light data can transmit. German physics DR.HARALD HASS was invented light fidelity (Li-Fi) Technology. The main principal of this technology is transmitting the data using light illumination by using light. Emitting diodes this is very much latest technology in which light emitting diode can transmit data much faster and flexible as compare to Wi-Fi technology. To enjoy high data transfer rates we use of Li-Fi is the future of high speed data transmission. In which data can transmit through LED and receiver by using photo diode.

Keywords: Light fidelity (Li-Fi), wireless fidelity (Wi-Fi) Light emitting diode (LED), Light Dependent Register (LDR). Microcontroller

I. INTRODUCTION

Li-Fi is used for enjoying high data transfer rates. Li-Fi is a fast & cheap optical version of Li-Fi. For wireless communication we use radio & microwave which is done by electromagnetic spectrum. It is based on visible light communication (VLC) which is used to transmit data using the spectrum of visible light. Data can be send by using fiber optic through an LED light bulb with varies intensity which is faster than human eye follow. If LED bulb is in ON state, it transmit the digital 1 & if in OFF state transmit digital 0. It can proceed very fastly as light will ON&OFF quickly. Data will be encode in light by working the rate of flickering period ON & OFF of LED light. Li-Fi is a framework for providing new capabilities to current & future services, application & end users. Li-Fi is based on visible Light Spectrum is which is, 10000 times faster in transmission of data, more secure & immune to EMI relative to radio waves.



II. WHAT IS LI – FI?

- LI-FI is transmission of data through illumination ,i.e. sending data through a LED light bulb that varies in intensity faster than human eye can follow Light based WI-FI
- Light is used instead of radio-waves to transmit information
- Transceiver fitted LED lamps acts like Wi-Fi modems
- LED lamps can light a room as well as transmit-receive information
- Provides illumination as well as data communication

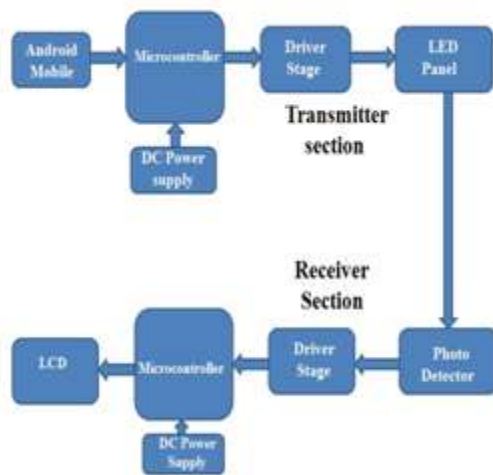
III. A PROVEN TECHNOLOGY

- Herald has demonstrated Li-Fi using an ordinary table lamp and a computer located below the lamp.
- He successfully transmitted data at speed exceeding 10Mbps using light waves from LED light bulbs.
- Also he periodically blocked the beam of light, causing the connection to drop.

IV. LITERATURE SURVEY

In Wi-Fi technology user depends upon the source like router but in case of Li-Fi it is not. Li-Fi consortium was formed in Oct. 2011 by a group of companies & industry groups of promote high - speed optical wireless systems & overcome the limited amount of radio based wireless spectrum. The Li-Fi technology uses light as a source for data transfer Wi-Fi uses a radio signal which is unable to use underwater for data transmission. The illumination of the receiving Surface for different distance between the LED & photodiode receiver was in communication distance, the illumination sharply reduced. We know light can pass through water. Hence Li-Fi is helpful for underwater data transmission, in Wi-Fi technology data can easily hooked because of radio waves can penetrate through the walls but in case of Li-Fi data are more secured as light cannot penetrate through the walls

V. BLOCK DIAGRAM



VI. WORKING ANALYSIS

There is two section one transmitter and other receiver section. The input android mobile is wirelessly connected to microcontroller using Bluetooth. After the voice signal is converted into binary format. If LED is ON, digital data '1' is transmitted and if LED is OFF, digital data '0' is transmitted. LED varies in intensity so fast that a human eye not detects it. In receiver section, for receiving signal there is photodiode receiver. Receiving signal is transmitted to transmitter LED driver stage. After this, signal is passed to microcontroller. Then microcontroller converts input voice in to text format and that display on LCD. For operating 5v power supply is required.

VII. ADVANTAGE

- High speed .
- Integrated into medical devices and in hospitals as it does not use radio waves.
- Li-Fi has low implementation and maintenance cost. High data transmission rates of up to 10Gbps can be achieved.
- It is safe for human since light.

- Efficiency :data transmission using Li-Fi is very cheap
- Li-Fi solve the issue as shortage range of radio frequency bandwidth.

VIII. APPLICATION

1. Smart Lighting

Smart buildings require smart lighting. Smart lighting with VLC provides the infrastructure for illumination, control and communications and will greatly reduce wiring and energy consumption within a building.

2. Mobile Connectivity

By pointing a visible light at another device you can create a very high speed data link with inherent security. This overcomes the problems of having to pair or connect and provides a much higher data rate than Bluetooth or WiFi.

3. Hazardous Environments

Communicating in areas where there is risk of explosions can be a problem (e.g. in mines, petro-chemical plants, oil rigs etc.) . VLC is inherently safe and provides both safe illumination and communications

4. Vehicle & Transportation

Many cars already LED lamps. Traffic signage, traffic lights, and street lamps are adopting the LED technology so there are massive applications opportunities here.

5. Defense & Security

The ability to send data quickly and in a secure way is the key to many applications. The fact that the visible light cannot be detected on the other side of a wall had great security advantages

6. Hospitals & Healthcare

There are advantages for using VLC in hospitals and in healthcare. Mobile phones and Wi-Fi's are undesirable in certain parts of hospitals, especially around MRI scanners and in operating theatres.

7. Wi-Fi Spectrum Relief

Wi-Fi's have got faster over but cannot keep up with demand for wireless data. VLC can provide data rates greatly in excess of current Wi-Fi and this can be done at low cost since the RF components and antenna system have been eliminated.

8. Aviation

VLC coverage inside aircraft, Radio is undesirable in passenger compartments of aircraft. LEDs are already used for illumination and can also be used instead of wires to provide media services to passengers. This reduces the aircraft construction costs and its weight.

9. Underwater Communications

RF does not work underwater but visible light can support high speed data transmission over short distances in this environment. This could enable divers and underwater vehicles to talk to each other. Navigation, Submarine and ship to ship communication.

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IX. LIMITATION

- Visible light cannot penetrate through solid objects and transmit back to transmitter.
- Interferences from external light sources like sunlight, in the path of transmission will cause interruption in the communication.
- Data transmission can be easily blocked by any object placed in A major challenge of Li-Fi is how the receiving device will front of LED source

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