INTER-VEHICLE COMMUNICATION USING LI-FI TECHNOLOGY

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ABSTRACT

Communication between vehicles, we present the blueprint and outcome of a small-scale mock-up using light fidelity (Li-Fi) technology, a new technology that was founded in the last January 2010 to January 2012, which still needs more organized inquiry on its sustainability for communication between vehicles. Inter-vehicle communication is an effective method with productive results that we have used in order to communicate between two vehicles and maintain safe distance between vehicles to prevent accidents. In Li-Fi technology, for communication between two vehicle data is transmitted using bulb and at receiving end we use photo detector to receive the data. In this technology there is no protocol used so it reduce the complexity.

Keywords: RFID Card, Reader, VLC, LED.

[1] INTRODUCTION

In this paper, 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, Li-Fi would use transceiver fitted LED lamps that can light a room as well as transmit and receive information. Since simple light bulbs are used, there can technically be any number of access points.
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This technology uses a part of the electromagnetic spectrum that is still not greatly utilized - The Visible Spectrum. Light is in fact very much part of our lives for millions and millions of years and does not have any major ill effect. Moreover there is 10,000 times more space available in this spectrum and just counting on the bulbs in use, it also multiplies to 10,000 times more availability as an infrastructure, globally. It is possible to encode data in the light by varying the rate at which the LEDs flicker on and off to give different strings of 1s and 0s. The LED intensity is modulated so rapidly that human eyes cannot notice, so the output appears constant.

More sophisticated techniques could dramatically increase VLC data rates. Focusing on parallel data transmission using arrays of LEDs, where each LED transmits a different data stream. Other groups are using mixtures of red, green and blue LEDs to alter the light's frequency, with each frequency encoding a different data channel.

Li-Fi, as it has been dubbed, has already achieved blisteringly high speeds in the lab. Researchers at the Heinrich Hertz Institute in Berlin, Germany, have reached data rates of over 500 megabytes per second using a standard white-light LED. Haas has set up a spin-off firm to sell a consumer VLC transmitter that is due for launch next year. It is capable of transmitting data at 100 MB/s - faster than most INDIA broadband connections.

[2] LITERATURE REVIEW

Dr Haas amazed people by streaming HD video from a standard LED lamp, at TED Global in July 2011 and thereby coined the term Li-Fi. Li-Fi is now part of visible light communication (VLC) PAN IEEE 802.15.7 standard. It can be very easily explained as, if the LED is ON, you are transmitting the data means you transmit a digital 1; and if the LED is OFF you transmit a digital 0, or null, or simply no data transfer happens. As one can switch them on and off very frequently one can transmit data easily because the LEDs intensity is modulated so rapidly that human eye cannot notice, so the output in form of light appears constant and hence offering permanent connectivity. Professor Haas has meanwhile showed that the spectrum has got enough capacity to hold data and is yet has 10,000 times more availability as an infrastructure globally. There lies a great potential in this technology to change everything that we used for accessing the data today over internet, or streaming videos, receiving mails etc.

At TED global demonstration by Haas, where he achieved 10 mbps transfer rate increasing it further to 123 mbps after a month, he successfully demonstrated it by blocking the light source to block the video Content received by the projector. Depleting bandwidths and faster data rates are major factors leading to further exploration of this utilitarian technique.


Content: In this paper comprises mainly light-emitting diode (LED) bulbs as means of connectivity by sending data through light spectrum as an optical wireless medium for signal propagation. In fact, the usage of LED eliminates the need of complex wireless networks and
protocols.

"Vehicle Communication System Using Li-Fi Technology" International Journal Of Engineering And Computer Science ISSN:2319-7242 Volume 6 Issue 3 March 2017, Page No. 20651-20657

Content: In this work, the concept of Li-Fi had been introduced along with existing techniques and classical trends used for vehicle to vehicle communications. The proposed system has a cost effective solution to reduce accidents.

Viability of LiFi as the Future of Wireless Communication

Content: This paper focuses on LiFi as a feasible complement to the existing RF based communication. For this purposes, we thoroughly analyzed the difference between VLC and LiFi, the issues in RF based communication that can be addressed by LiFi, the working mechanism of LiFi, its pros and cons and finally we studied the application of LiFi.


Content: In this paper Li-Fi had been introduced along with existing techniques and classical trends used for vehicle to vehicle communications purpose. As this project aims to propose a cost effective solution to reduce accidents, the design guidelines and details of system components were thoroughly explored.

"DESIGN AND IMPLEMENTATION OF A VEHICLE TO VEHICLE COMMUNICATION SYSTEM USING Li-Fi TECHNOLOGY" International Research Journal of Engineering and Technology (IRJET) Volume: 03 Issue: 05 — May- 2016

Content: This paper is determined to enhance the quality of Intelligent Transportation System (ITS) with the help of Visible light communication technology using a Li-Fi transmitter and receiver kit. The V2V communication system consisting of the Li-Fi transmitters placed on a leading vehicle and the Li-Fi receiver is placed on a following vehicle.

[3] EXISTING SYSTEM

Wireless connectivity, often known as Wi-Fi, is the technology that allows a PC, laptop, mobile phone, or tablet device to connect at high speed to the internet without the need for a physical wired connection. Wi-Fi (pronounced “Why-Fy”) is a term that was coined by a branding company in 1999 as a name which would be easily recalled, due to its similarity to the then well-known term “hi-fi”.

The technology uses radio signals to transmit information between your Wi-Fi enabled devices and the internet, allowing the device to receive information from the web in the same way that a radio or mobile phone receives sound.
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3.1 Advantages:
One key advantage of having Wi-Fi enabled devices is that they will allow you to connect to other Local Area Networks (and thus to the internet) when you are out and about, as well as to your home network. Whilst many phones will allow connection to the internet through the phone signal, this can be patchy, and sometimes costly depending on your phone tariff. When travelling abroad, for example, the ability to use a local LAN for free can be preferable to paying roaming charges for internet connection via a phone network.

Wi-Fi Support in Applications and Devices
Wi-Fi is supported by many applications and devices including networks, PDAs, mobile phones, major operating systems, and other types of consumer electronics. Any products that are tested and approved as "Wi-Fi Certified" (a registered trademark) by the Wi-Fi Alliance are certified as interoperable with each other, even if they are from different manufacturers. For example, a user with a Wi-Fi Certified product can use any brand of access point with any other brand of client hardware that also is also "Wi-Fi Certified".

3.2 Disadvantages:
• To combat this consideration, wireless networks may choose to utilize some of the various encryption technologies available. Some of the more commonly utilized encryption methods, however, are known to have weaknesses that a dedicated adversary can compromise.
• The typical range of a common 802.11g network with standard equipment is on the order of tens of meters. While sufficient for a typical home, it will be insufficient in a larger structure. To obtain additional range, repeaters or additional access points will have to be purchased. Costs for these items can add up quickly.
• Like any radio frequency transmission, wireless networking signals are subject to a wide variety of interference, as well as complex propagation effects that are beyond the control of the network administrator.
• The speed on most wireless networks (typically 1-54 Mbps) is far slower than even the slowest common wired networks (100Mbps up to several Gbps). However, in specialized environments, the throughput of a wired network might be necessary.

[4] PROPOSED MODEL
The transactions should take place in a secured format between various clients in the network. In simple terms, 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, Li-Fi would use transceiver fitted LED lamps that can light a room as well as transmit and receive information. Since simple light bulbs are used, there can technically be any number of access points. This technology uses a part of the electromagnetic spectrum that is still not greatly utilized- The Visible Spectrum. Light is in fact very much part of our lives for millions and millions of years and does not have any major ill effect. Moreover there is 10,000 times more space available in this spectrum and just counting on the bulbs in use, it also multiplies to 10,000 times more availability as an infrastructure, globally.
Li-Fi is typically implemented using white LED light bulbs at the downlink transmitter. These devices are normally used for illumination only by applying a constant current. However, by fast and subtle variations of the current, the optical output can be made to vary at extremely high speeds. This very property of optical current is used in Li-Fi setup. The operational procedure is very simple—, if the LED is on, you transmit a digital 1, if it’s off you transmit a 0. The LEDs can be switched on and off very quickly, which gives nice opportunities for transmitting data. Hence all that is required is some LEDs and a controller that code data into those LEDs. All one has to do is to vary the rate at which the LED’s flicker depending upon the data we want to encode.

The proposed system will overcome these disadvantages,

1) No interference on radio frequency signals as this communication totally depends on light.
2) It is based on a simple technique of illumination cum communication.
3) Moreover data speed of this LIFI is extremely fast when compared to other means of communication.
4) Since the communication is based on visible light which is the most used part in electromagnetic spectrum for communication.
5) As, data transmitted through light so health problems will takes place.

[5] SYSTEM ARCHITECTURE

According to the condition, user will give the input to the microcontroller using keypad switches. Microcontroller will convert the input into ASCII & then the ASCII value is given to output pins of microcontroller on which Li-Fi transmitter is connected. Li-Fi converts ASCII value into visible light spectrum. Now at the receiver side, Li-Fi receiver will receive the message sent by LED and decode the information and gives it to the output display device.

![Fig. 1 system architecture](image-url)
5.1 Li-Fi Transmitter:
It receives the information from the microcontroller according to the condition and it converts the data to light signal and transmits to the receiver section. 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. Modulation of light cannot be detected by human eyes making data secure.

![Fig.2 Li-Fi transmitter](image)

5.2 Li-Fi Receiver:
It receives the modulated signal send by Li-Fi transmitter and demodulates the signal to recover the original signal. The receiver part detects these flashes using photodiode and then sends demodulated signal to microcontroller.

![Fig.3 Li-Fi receiver](image)

[6] CONCLUSION
We have presented an Inter-Vehicle Communication system consisting of a Li-Fi transmitter and receiver that is targeted at communication between vehicles, Li-Fi can be used to communicate with the LED lights of the cars and number of accidents can be prevented. Li-fi is ideal for high density coverage in a restricted region. It is believed that the technology can yield a speed more than 10Gbps.It is the fastest and cheapest wireless communication systems which are suitable for communication. Li-Fi will make all our lives more technology driven in the near future.
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