

Li-Fi Technology-Data Transmission Through Led

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Abstract— Li-Fi means Light-Fidelity. Li-Fi technology, Introduced by the German Scientist—Harald Haas, It provide data transmission through LED. Variation in intensity of LED is faster and it can not be recognized by human eye. The moto behind this technology is focusing on Li-Fi system and compare its result with existing technology. Wi-Fi is used to cover small Geographical area with low data rate whereas Li-Fi is used for high data rate transmission in confined area and no radio interference issue. In this technology we achieved better bandwidth,security,efficiency and availability than Wi-Fi. .the cost of LED is low hence enhanced the system of Li-Fi technology. This technology is very important for future to transmit the data in a room for Laptops,Smart Phone and Tablets.

Key words: Li-Fi, Wi-Fi, high-brightness LED, photodiode, wireless communication

I. INTRODUCTION

Li-Fi is visible Light communication technology in which data is transmitted through light and hence there is no issue of radio interference. Variation in intensity of LED is faster and it can not be recognized by human eye. Transfer of data from one place to another place is very important activity in our day-to-day life.The current wireless technology are very slow for data transmission as compared to Li-Fi technology hence the requirements of 1G,2G,3G,4G and so on technologies development due to this we are running out of spectrum . As increases the number of devices to access the internet in other wireless technology .It become difficult to access high data transfer rate but in Li-Fi technology more Bandwidth is available hence speed of transmission of data is very high .When electromagnetic waves are banned in specific domain in that place we can use Li-Fi technology such as Petrochemical Industry.

II. OBJECTIVES

It used to give as an alternative or upgrade add-on to existing wireless technologies .To re established high speed connection quickly (in case of disaster problem).Li-Fi is used because it is fast and optical version of Wi-Fi which is very cheap.

III. PREVIOUS WORK

The following are the basic issues with radio waves:-

Capacity: By using radio waves transmission of data is limited and expensive.It has a limited Bandwidth with the rapidly increasing world required development technology like 3G,4Gand so on hence we are running out of spectrum.

Efficiency: More amount of energy required for cooling the radio base station instead of transmission in 1.4 million cellular radio base station.

Availability: Radio waves are not used in some specific area such as Aeroplanes,Petrochemical plants and Petrol

pumps.Radio waves can penetrate through wall. They can be intercepted and misuse of radio waves take place such as Frequency Jamming by terrorist.

Security : Due to misuse of radio waves security is major concern. For security purpose required some protocol in radio wave technologies.

IV. METHODOLOGY

The main important parameter in Li-Fi technology is high brightness LED (Light Emitting Diode) and light sensitive device (a photo detector) .The microcontroller provide data to LED Driving circuit in ASCII Value. Data transmitted through LED required operating speed is less than one micro seconds and operating speed is depend on LED Driving circuit in which the signal boosting with respect to amplitude and proper switching take place .Flickering of LED decide speed of data transmission but flickering in intensity of LED can not be properly recognized by human eye.Data transmission through LED in the form of binary code . At the receiver side the received light signal is converts it back into original data by using photodiode ,impedance matching circuitary and TTL to CMOS Convertor.

V. BLOCK DIAGRAM

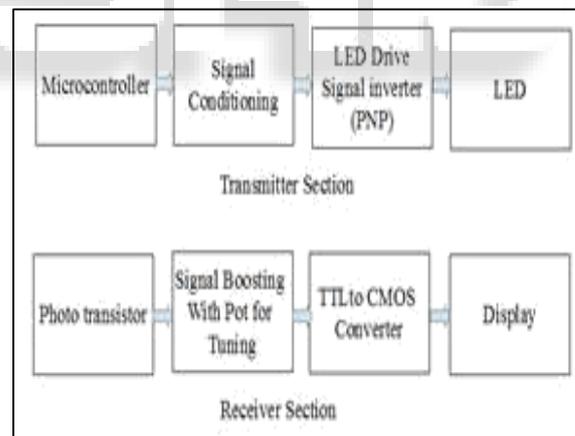


Fig.1: functional Block Diagram

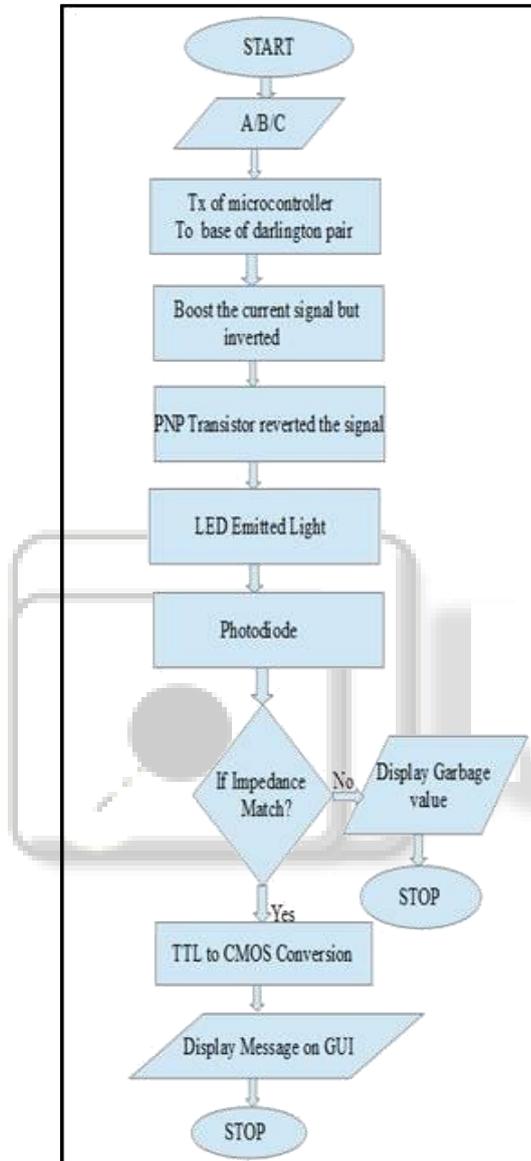
VI. TRANSMITTER SECTION

User will press a push button in order to select message type. that is message A or B or C A loop program will process the key press accordingly using c++ language. A stream of High and Low Pulse With respect to ASCII value will be send at base of darling-ton pair. Transistor will turn on and turn off on its DC Quiescent line that is amplification. The output of darling-ton pair will invert the ASCII signal with boosting the amplitude. A PNP transistor will revert the inverted data finally.LED will be connected in series with PNP transistor will transmit the data through LED.

VII. RECEIVER SECTION

Photo diode at receiver detect the light signal and its output given to impedance matching circuitry .The data received at output of matching circuitry will be given to TTL to CMOS converter .Received data will be given display Via com port respectively.

VIII. FLOWCHART



IX. COMPARISON WITH OTHER WIRELESS MEDIA

Li-Fi is acquired this name due to the similarity to Wi-Fi, only using light instead of radio frequency. So this technology can be used in the places in which Bluetooth, Wi-Fi infrared are banned. Wi-Fi is more compatible for general wireless coverage area within building; but many simultaneous users in one place lead to lesser speed. Li-Fi is used in confined area for give ideally high density data coverage. Moreover no one has to pay to use the radio bandwidth, as light is open to use anywhere. In this Li-Fi technology different colors of light can be used to communicate for secured data transmission, the advantage is you are doing Internet as well as decorate your places. In communication table 1 comparison of Li-Fi, Wi-Fi Bluetooth IrDA is shown.

Parameter	Li-Fi	Wi-Fi	Bluetooth	IrDA
Speed	>1Gbps	150 Mbps	3 Mbps	4 Mbps
Data Density	High	Low	Low	Low
Security	High	Medium	Low	High
Power usage	Low	Medium	Low	low
Ecological impact	Low	High	Low	Low
Cost of material	High	Medium	Low	Medium
Market maturity	Newest (2011)	Old (1990)	New (1998)	Old(1917)

X. RECENT ADVANCEMENTS IN LI-FI

Using high brightness white light LED researchers at the Heinrich Hertz Institute in Berlin, Germany, have achieved data rates of more than 500 Mbps .Using a Casio smart phones, the technology was conveyed at Electronics Show in Vegas to transmit the data using LED of varying intensity given off from their screens, invented by the distance of up to ten meters. A Consortium was formed by group of companies and industry group in Oct 2011 to enhance high density data rate in optical wireless communication system and outflank radio based wireless spectrum. According to the Li- Fi technology, we can achieve greater than speed of 10 Gbps, a high-definition motion picture can be download in 30 seconds. Researchers at the University of Strathclyde in Scotland started high speed omnipresent Li-Fi technology to market.

XI. ADVANTAGES

- A free band which does not require license.
- Cost of maintenance is low as compared to cost of installment.
- Li-Fi technology is cheaper as compared to Wi-Fi.
- We can achieve the speed up to 1 Gbps theoretically.
- Less energy and time consumption.
- Bill of monthly broadband is less.
- Reduce electricity bill.
- Life span of LED is more which saves money.
- The secure data access takes place because light can not penetrate through wall.

XII. LIMITATIONS OF LI-FI

- Only works if there is direct line of sight (LOS) between the transmitter and receiver.
- Data transmission can be easily blocked by obstacles.
- The use of high frequencies that is between 400-800THz limits it to very short distances and point to point communication only.
- Interruption will be occurred in communication due to Interference from sun light, normal bulbs in the path of transmission.

- A high speed moving object and to provide data in a remote area where there are trees and walls is unreliable to use this technology

XIII. APPLICATION

- Hospital and Healthcare: In Li-Fi technology there is no issue of electromagnetic interference hence medical instruments give precise output as well as interference do not take place with the MRI scanner's.
- Underwater Communications: Radio wave is strongly absorbed in water, so using this is impractical. Marine life will be disturb due to acoustic waves because it has very less bandwidth. Li-Fi technology is used for a short range communication in under water.
- Cheaper Internet in Aircrafts: The passengers in aircraft can access very high data rate using Li-Fi. Wi-Fi create interference with the navigation systems of the pilots. Insteade of Wi-Fi in aircrafts Li-Fi can be used transmission of data.
- Disaster management: If disater probleme occure such as earthquake or hurricanes then Li-Fi technology can be used because quick connection and high speed data transmission .
- Traffic management: To decrease the number of accident Li-Fi technology can be used which gives aleart to the driver if other vechicals are too closed by using LED car lights

XIV. FUTURE SCOPE

To increase the communication distance using bunch of LED bulb. Communication distance can beincreased by using reflector surfaces. Since this technology isuse in the places where radio waves are bnned such as petro chemical and aircraft.Further improvement can be important using this method, likeor paralal data transmission we can use array of LEDs. Using RGB LEDs to alter frequency with each frequency encoding a different data channels. Such advancementsincrease the speed near about therotically10Gbps which gives downloading of film in only 25 seconds.

XV. CONCLUSION

If LI-FI technology can be put into practical use, every bulb used to transmit a data and will lead toward the cleaner, greener, safer and brighter future. LI-FI may solve issues such as theshortage of radio-frequency bandwidth and is aimed at creating new communication channels with the use of existing equipment. Currently, the LI-FIconcept is attracting a great deal of interest, because it provides anauthentic and very efficient alternative to wireless device which used radio spectrum.By using LI-FI technology most of the disadvantages of WI-FI can be eliminated and hence Li-Fi technology is not only very high speed but also very secured technology.So that by using this technology we get simplex,duplex communication technology with very high speed data communication.Efficiency obtained by Li-Fi technology is greater than Wi-Fi technology.The problems in currentwireless technology channel capacity,availability security,efficiency are overcome in this technology.

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