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Review on Various Applications of Visible Light Communication

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Abstract

In the current scenario, there is an increased usage of Radio Frequency (RF) for wireless communication, that there is a major problem of bandwidth allocation. In order to overcome this problem a new technology called Visible Light Communication (VLC) is introduced which uses visible light whose data rates are higher than radio waves. Visible Light requires fewer components than radio technology, hence cost effective. Data transmission requires LED light sources which consumes less power. The data transmitted is more secure and can be used in electromagnetic sensitive areas. This transmission technique can also be used in aircraft cabins, hospitals and nuclear power plants without causing electromagnetic interference.

Keywords: *Visible Light Communication (VLC), Light Emitting Diode (LED), Light fidelity (LiFi), Power Line Communication (PLC)*

INTRODUCTION

VLC can be used for transmission of information from source to destination using visible light which is a part of Electromagnetic spectrum. Visible light lies in 400-800 THz frequency range which is unlicensed and unstructured. Since radio waves produces electromagnetic radiations which is harmful, visible light is certainly safer than radio waves. Visible Light Communication does not face the problem of leaking out when the light becomes obscure from which better security can be obtained when compared to wireless LAN. Cost of implementation of VLC is comparatively lower because of abundant availability of visible light.

LiFi is a technology of VLC which uses LED to transmit data between devices. LiFi technology was first proposed by Harald Haas in 2011. LED lights which are present at homes, offices and other places can be used efficiently to transmit data wirelessly. Binary data can be sent by switching ON and OFF of LED lights. When the LED light bulb is ON, bimary 1 will be transmitted and when LED bulb is OFF binary 0 will be transmitted.

REVIEW ON PREVIOUS WORK

Eduardo B. Adoptante, Jr Kristine Abegail D. Cadag, Valeria Jean R. Lualhati, Mark Lorenze D.R torregoza and Alexander C. Abad; [1] "Audio Multicasting by Visible Light Communication for location information for the visually impaired". This paper deals with transmission of data using Light Emitting Diodes (LEDs) which acts as a medium. A binary code is transmitted through LEDs as light pulses and these light pulses are received in the form of a code which is then translated to corresponding audio data. Here, ON-OFF keying modulation technique is used to represent digital HIGHs and LOWs of binary code. This technology is mainly useful for visually impaired where the indoor location based system instructions guide them with help of Light Emitting Diode (LED) light sources. Here a central

device is used which transmits digital codes using light pulses that corresponds to specific audio location information. An end device is used which acts as a receiver and smart device to translate the code and hear the audio location information. The recorded audio information can also be stored and secured in a memory card. This technology has the capability of transmitting fast light pulses since it makes use of LEDs. It also works in both dark and bright lighting environments.

C Periasamy, K Vimal and D Surender; [2] Lamp Based Visible Light Communication in Underwater Vehicles. This paper deals with the use of LED lights for communication between vehicles underwater. This paper also proposes the utilization of new visible light communication technology with the existing Wifi technology. Visible light communication has a few noted advantages like it can transmit data at much higher speeds as compared to WiFi. It also provides security by transferring data directly to the preferred destination. The driver module drives the LED depending on the data. The light pulses carry the data that has to be transmitted. The receiver segment detects these pulses and converts it into electrical signals.

Krishna Prasad Puja panda; [3] “Lifi Integrated to Power lines for Smart Illumination cum Communication”. This paper describes about VLC which is an eco-friendly technology operating in THz range of visible light spectrum delivering the features of wireless access and lighting. Here power lines are used as a medium for Power Line Communication. The advantage of using power lines gives provision for illumination cum communication with the help of existing wiring infrastructure. The data is transmitted from PC through RS-232 cable to PLC transmitter which consists of PLC module, Automatic Voltage Regulator and level shifter. The trans conductance amplifier present in the PLC receiver will convert the signal that is received through the power line to current signal form. Then the current signal is biased with DC source and fed to LED array which acts as VLC transmitter. VLC receiver uses simplex master to client communication which can be implemented by modulating the current on the power line. The integration of VLC with PLC fulfills broadband access for home networking which provides efficient and low cost lighting.

Zubin Thomas, Nikil Kumar and D. Jyothi Preshiya ; [4] "Automatic Billing System using Li-Fi Module". This paper deals with automatic billing system in large super markets, where a great variety of goods are available. Processing of data is done between the products and the mobile phone where every product is attached with LiFi transmitter and stores the encoded data like product id, cost of product and quantity. A trolley consists of a LiFi module that is integrated with LiFi transceiver for transmission of product details which is stored in the microcontroller. The customer mobile section which is connected to LiFi module will retrieve the details of products purchased. After completion of the purchase, payment is processed by the mobile via mobile banking system. It also calculates the cost and quantity of the product. Once the payment is done the mobile LiFi will send the purchase details to the gate. If the payment is done correctly gate will open else it will alert the owner. This system will help to overcome the difficulty of customers to stand in queue which is time consuming [5, 6].

CONCLUSION

The usage of Radio Frequency has a few disadvantages like less security and the radiations emitted through this communication are harmful to health. Hence Visible Light Communication is used where the data is more secured,

provides less interference and high data rates can be achieved. The LEDs used are easily available, cost effective and does not require a complex circuitry.

REFERENCES

1. Eduardo B. Adoptante, Jr, Kristine Abegail D. Cadag, Valerie Jean R. Lualhati, Mark Lorenze D.R. Torregoza and Alexander C. Abad, "Audio Multicasting by Visible Light Communication for location information for the visually impaired",8th IEEE Conference on Humanoid Nanotechnology Information Technology Communication and Control Environment and Management, 2015.
2. C.Periasamy, K.Vimal, D.Surender, "LED Lamp Based Visible Light Communication in Underwater Vehicles".
3. Krishna Prasad Pujapanda, "Lifi Integrated to Power lines for Smart Illumination cum Communication", International Conference on Communication Systems and Networking, 2013.
4. Zubin Thomas, Nikhil Kumar and D Jyothi Preshiya "Automatic Billing system using Lifi Module", International Conference on Communication and Signal Processing, 2016.
5. Cheng Chen, Rui Bian and Harald Haas "Omnidirectional Transmitted and Receiver Desisn for Wireless Infrared Uplink Transmission in Lifi" IEEE International Conference on Communication Workshop, 2018.
6. J.Singh, Vikash, "A New Era in Wireless Technology using Light Fidelity", International Journal of Recent Development in Enginnering and Technology,Vol.2 , PP.46-49, june 2014.

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