

Design and Implementation of Visible Light Communication (VLC) for Data Transmission

Subhash J¹, Harshitha V², Divya R³, Chaithra N⁴, Hema Varshini K⁵

Assistant Professor, Department of ECE, Adhityamaan college of Engineering, Hosur, Tamilnadu, India¹

U.G Student, Department of ECE, Adhityamaan College of Engineering, Hosur, Tamilnadu, India^{2,3,4,5}

ABSTRACT: The aim of the Li-Fi dongle and orator is to play audio through light. This approach overcomes the stressed out audio system that gets audio signals through wires. In Li-Fi any user can access and play music on his speaker. This reduces the problem of connecting speaker to audio systems that don't have USB port support, that's otherwise a tougher undertaking.

KEYWORDS: Li-Fi Dongle, Orator, Visible Light Communication, LED.

I. INTRODUCTION

Optical remote correspondence permits remote association utilizing infrared, noticeable or bright groups range. This band range incorporates highlights like high data transmission, low esteem and task in an unregulated range. Optical Wireless Communication frameworks for the most part works in the unmistakable band range (390– 750 nm) known as noticeable light correspondence (VLC). VLC framework exploit light transmitting diodes (LEDs) which can be beat at high pace. VLC might be normally together with Wi-Fi neighbour systems, Wi-Fi private district systems and vehicular systems among others .In quick developing present day period, the Li-Fi is forthcoming project. It is a remote systems administration innovation that utilizes light emanating diode (LED) for information transmission in a protected mode. The confused light transmitted from LED have varieties in wavelength and stage. At the point when the transmitted message flag is tweaked into the prompt optical intensity of the LED force regulation is performed. Driven's are favoured light sources because of the security directions, minimal effort, and vitality productivity. LEDs are supplanting radiant globules as the essential wellspring of light in private and open condition

II. RELATED WORK

D. Singh, A. Sood, G. Thakur, N. Arora and A. Kumar Proposed Automatic Toll Tax systems has reduced the heavy congestion caused at toll series inside the metropolitan town.. Here, we used the electricity of LIFI for wi-fi conversation to transmit person statistics from vehicle to toll. Each car may be having a microcontroller and a memory related to it.. The LIFI receiver is present in centre of road at tollbooth. An intelligent processor could be there at receiver side, in order to automatically manner the toll tax payment in line with the form of car via a wallet connected with automobile quantity. [8].

Hina.M, D.,Hongyu Guan, RamdaneCheriff,A.,& Nan Deng discussed An Android app that promotes safe and secured facts transmission. The motive force notification and alert messages are intended to keep the motive force safe from street injuries.Li-Fi makes the information secured due to the absence of radio wave interference with different users and the absence of electromagnetic interference makes it a green era[7].

D. Mohammed, D. K. D. Bourzig, M. Abdelkim and K. Mokhtardiscussed an implementation of the new digital communication , era that makes use of visible light , known as LIFI (light fidelity) or VLC (visible light

communication), and access it for vehicle-vehicle communication. This communication may additionally improve driver's safety by allowing the vehicles to communicate without difficulty (V2V communication)[6].

E. Pikasis and W. O. Popoola proposed a framework for investigating the results of various LiFi modulation techniques at the emitted light quality of LEDs is presented. It is a valuable device for designing LiFi system which might be compliant with lighting and data communication requirements [9].

III. PROPOSED SYSTEM

The proposed methodology makes utilization of Li-Fi system to transmit sound signs. The idea utilizes a Li-Fi dongle to transmit sound signs from a portable advanced mobile phone, and a speaker with sun powered board at the collector end to obtain sound flag without wires. This framework doesn't require blending and network demand to play sound. The proposed framework incorporates the transmitter, free space channel and the recipient. The crucial rule of the framework is to create the yield motion as same the transmitted information motion through light. The brilliance of the LED gets adjusted dependent on the sufficiency of the sound flag transmitted. The sunlight based board at the beneficiary side distinguishes the optical power transmitted through free space channel. The flag identified from the sun board is of couple of small scale watts. In this way, intensification is finished by utilizing power enhancer and the sound signs sustained to the speaker.

TRANSMITTER

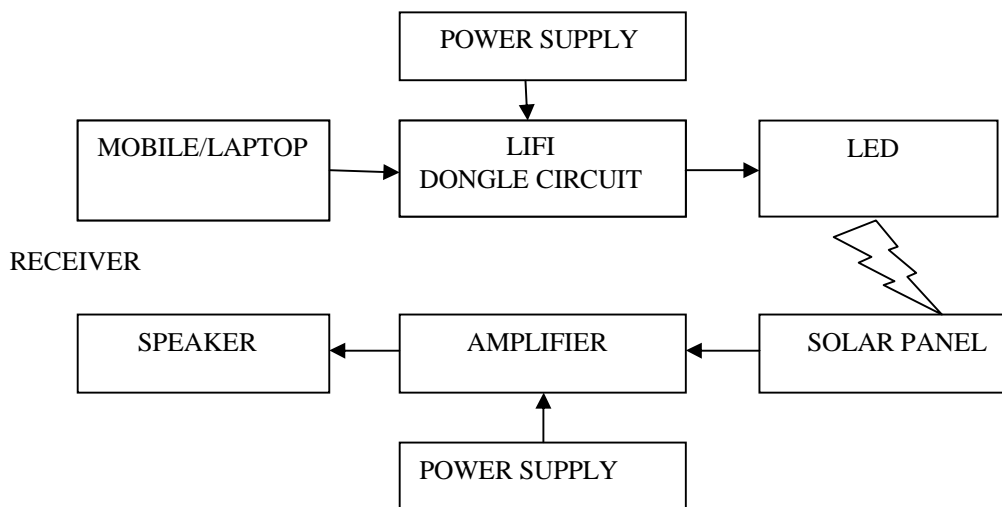


Fig.3.1 PROPOSED SYSTEM

IV. WORKING PRINCIPLE

The system consists of two sections

TRANSMITTER SECTION:

The Input analog signal, which is usually taken from the Audio output of the cellphone/ laptop or another Musical gadgets. The signal may be at low voltage which is not enough to drive an LED, So, to drive the LEDs we need to make the signal bigger using li-fi dongle circuit.

Li-Fi dongle circuit: fig 5.3 shows the Li-Fi dongle circuit. The Li-Fi dongle circuit gets information from cell phone/laptop and the data will be encoded inside the Li-Fi dongle circuit. Based in this encoded information the LED will flicker at a very high pace that can't be observed by the human eyes.

LED: Thus, audio signal is converted into optical signal.

RECEIVER SECTION:

Solar panel: The transmitted signal from the LEDs must be detected, demodulated. So in order to detect the message signal from the blinking LED light, we use a solar panel (which contains huge no of solar cells connected in series). The sun solar cells detects the variation of the light and output of the solar cells will be in the analog form.

Amplifier: The voltage level of the received audio signal will be low. So it is amplified to the required voltage level using power amplifier. This is because of the fact that if any phase error occurred, it will be cleared at this stage.

Speaker: The demodulated audible signal is transmitted from speaker to its destination. So that the audience can pay attention to the music that has been transmitted from the source.

V. EXPERIMENTAL RESULT

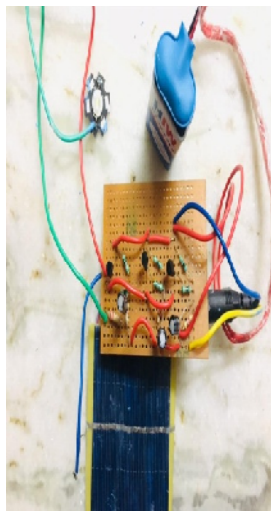


Fig.5.2 Outer View of Li-Fi Dongle

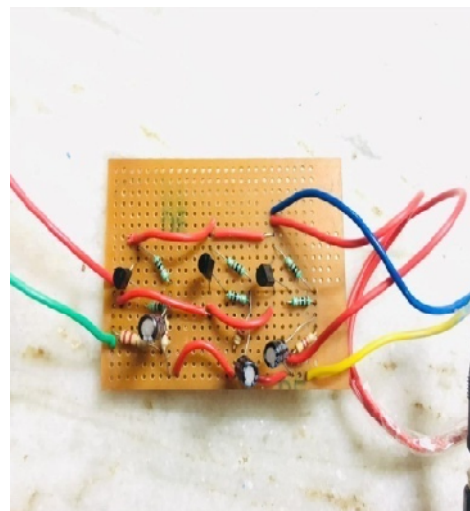


Fig 5.3 Li-Fi Dongle Circuit

VI. CONCLUSION

The message signal is passed from source to destination through light. This approach makes use of unused light source for transmission of data .Thus data transmitted at higher speed and making environment greener ,safer.

REFERENCES

- [1]S. Nakamura, "Present Performance of InGaN-Based Blue/Green/Yellow LEDs", Proceedings of SPIE Conference on Light-Emitting Diodes: Research Manufacturing and Applications, vol. 3002, pp. 26-35, 1997
- [2] X. Liu, H. Makino, K. Mase, "Indoor Location Estimation Using Visible Light Communication: practicality and expandability", International conference on Indoor Positioning and Indoor Navigation, pp. 407-408, 2013.
- [3] Ye-Sheng Kuo, Pat Panutto, Ko-Jen Hsiao, Prabal Dutta, "Indoor Positioning with Mobile Phones and Visible Light", International Conference on Mobile Computing and Networking, pp. 231-237, 2014.
- [4] Singh Vikash, "A New Era in Wireless Technology using Light-Fidelity", International Journal of Recent Development in Engineering and Technology, vol. 2, pp. 46-49, June 2014

- [5] D. Khandal, S. Jain, "LI-FI (Light-Fidelity): The Future Technology In Wireless Communication", International Journal of Information & Computation Technology, vol. A, no. 16, pp. 1687-1694, 2014.
- [6] D. Mohammed, D. K. D. Bourzig, M. Abdelkim and K. Mokhtar, "Digital data transmission via Visible Light Communication (VLC): Application to vehicle to vehicle communication," 2016 4th International Conference on Control Engineering & Information Technology (CEIT), Hammamet, 2016, pp. 1-5.
- [7] M. D. Hina, Hongyu Guan, A. Ramdane-Cherif and Nan Deng, "Secured data processing, notification and transmission in a human-vehicle interaction system," 2016 IEEE 19th International Conference on Intelligent Transportation Systems (ITSC), Rio de Janeiro, 2016, pp. 1277-1284.
- [8] D. Singh, A. Sood, G. Thakur, N. Arora and A. Kumar, "Design and implementation of wireless communication system for toll collection using LiFi," 2017 4th International Conference on Signal Processing, Computing and Control (ISPC), Solan, 2017, pp. 510-515.
- [9] E. Pikasis and W. O. Popoola, "Understanding LiFi Effect on LED Light Quality," 2018 IEEE Photonics Conference (IPC), Reston, VA, 2018, pp. 1-2.