IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 6, April 2023

Image and Text Transmission using Li-Fi Technology

Omkar V. Zad, Pragalbha S. Rawool, Dr. Pramod Bhavarthe, Viral R. Makwana, Tejas H. Sawant
Department of EXTC
Vasantdada Patil Pratishthan's College of Engineering and Visual Arts, Mumbai, India

Abstract: *This research paper focuses on the use of LiFi (Light Fidelity) technology for the transmission of image and text data. LiFi technology is an emerging technology that uses visible light communication (VLC) for data transmission, providing a high-speed and secure wireless communication system. In this project, a LiFi system is developed using an LED (Light Emitting Diode) bulb and a photodiode receiver to transmit and receive data. The system is tested for its ability to transmit image and text data at a high speed and with minimal interference. The results show that LiFi technology can provide a viable alternative to traditional wireless communication systems for certain applications, such as indoor communication and data transfer, where security and high-speed data transfer are essential. Overall, this research demonstrates the potential of LiFi technology as a reliable and secure means of wireless data transmission.*

Keywords: LiFi technology

I. INTRODUCTION

Light Fidelity (Li-Fi) is a high speed, wireless communication using visible light. It falls under the category of optical wireless communications. Data transmission takes place through Light Emitting Diode (LED) bulbs whose intensity varies. Based on this variation, communication occurs digitally. This technology has vast applications where the use of Wi-Fi is limited or banned. It also takes out the adverse health effects of using electromagnetic waves. Unless light is seen, data can't be hacked and so data transmission is secure. Data transmission is typically in terms of Gigabytes per second. The use of light as a means to transmit data has been coined Li-Fi. The high-speed communication technology is similar to Wi-Fi but is faster, allowing you to send and receive more data in less time. By swapping incandescent bulbs with LEDs - which have electronic properties - Li-Fi could bring Internet access to more areas and could revolutionize the telecommunications industry. The speed of data transmission is about 10 Mbps, though it is aimed to improve up to 100 Mbps by 2025. Recently, wireless technology has bloomed to a great extent such that wireless technology requires a large amount of data to transmit every day. Nowadays, wireless communications have become important in the communication process. The main means of transmitting wireless data is by using electromagnetic waves i.e., radio waves. However, radio waves can support less bandwidth because of compact spectrum availability and intrusion. The solution to this is data transmission using Visible Light Communication (VLC). Wi-Fi deals with wireless coverage within premises, whereas Li-Fi is perfect for high compactness wireless data coverage in a defined area and for mitigating radio interference issues. Li-Fi basically focuses on transmitting multimedia data between two terminals using LEDs.

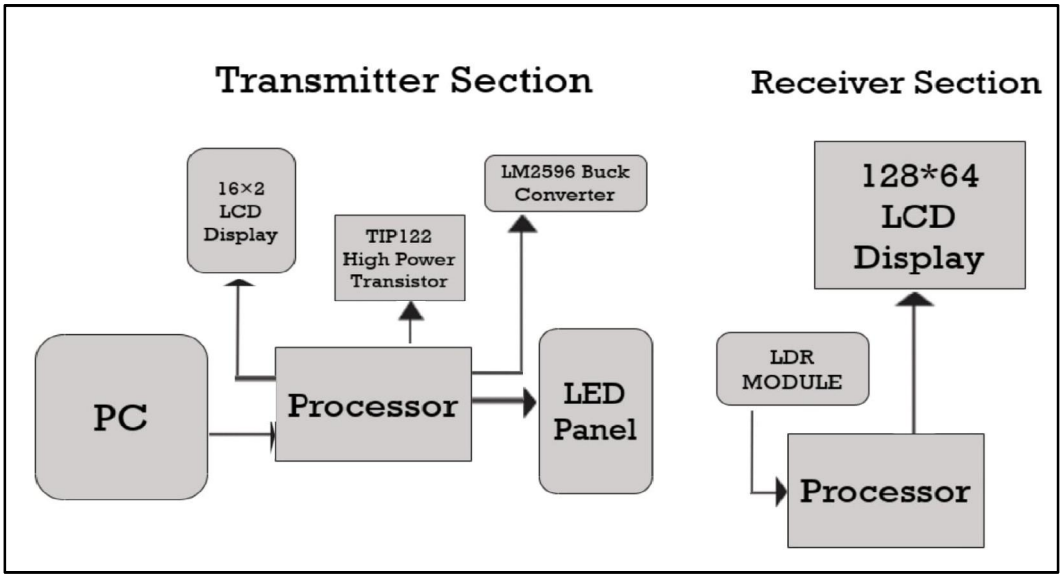
II. BRIEF LITERATURE SURVEY

As more and more people and their many devices access wireless internet, clogged airwaves are going to make it increasingly difficult to latch onto a reliable signal. But radio waves are just one part of the spectrum that can carry our data. What if we could use other waves to surf the internet? One German physicist, DR. Harald Haas, has come up with a solution he calls "Data Through Illumination"—taking the fiber out of fiber optics by sending data through an LED light bulb that varies in intensity faster than the human eye can follow. It's the same idea behind infrared remote controls, but far more powerful. Haas says his invention, which he calls D-Light, can produce data rates faster than 10 megabits per second, which is speedier than your average broadband connection. He envisions a future where data for laptops, smart phones, and tablets is transmitted through the light in a room. And security would be a snap—if you

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 6, April 2023

can't see the light, you can't access the data. Li-Fi is now part of the Visible Light Communications (VLC) PAN IEEE 802.15.7 standard. Li-Fi is typically implemented using white LED light bulbs. These devices are normally used for illumination by applying a constant current through the LED. However, by fast and subtle variations of the current, the optical output can be made to vary at extremely high speeds. Unseen by the human eye, this variation is used to carry high-speed data.

III. PROPOSED METHODOLOGY



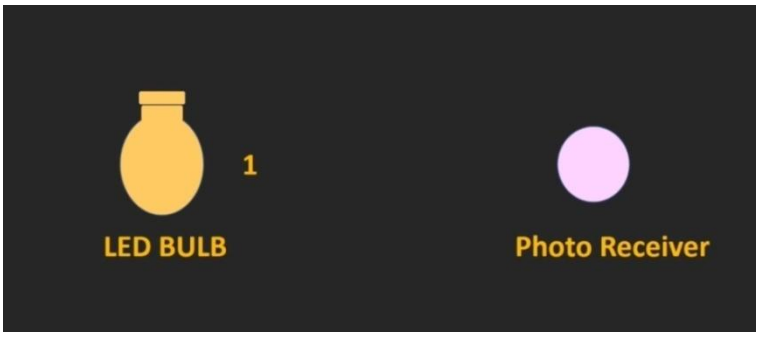
This block diagram describes the working of project 'Image & Text Transmission Using Li-Fi Technology'
Here processor process the data received from the PC.
The processor converts the digital data to binary data.
This processed data is transmitted by the LED panel.
The LDR Module then receives the light signals transmitted by the LED panel.
These received light signals are then send to the processor which then converts this received data into the desired format.
The final output is then displayed on the LCD Display.

IV. WORKING PRINCIPAL

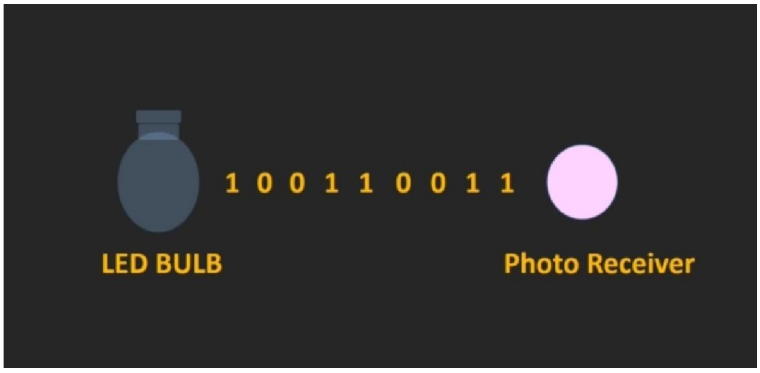
When a constant current is provided to an LED light source then it provides the constant illumination or constant brightness.
So, as we change the current that is flowing through the LED source, the illumination or brightness of this bulb will change.
So, this principle is used for transmitting the data wirelessly using this Li-Fi technology.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 6, April 2023

If no current or minimum current is flowing through this LED source then, the brightness of the LED source will be minimum. And that will be treated as a digital 0 which will be transmitted at the receiver side.

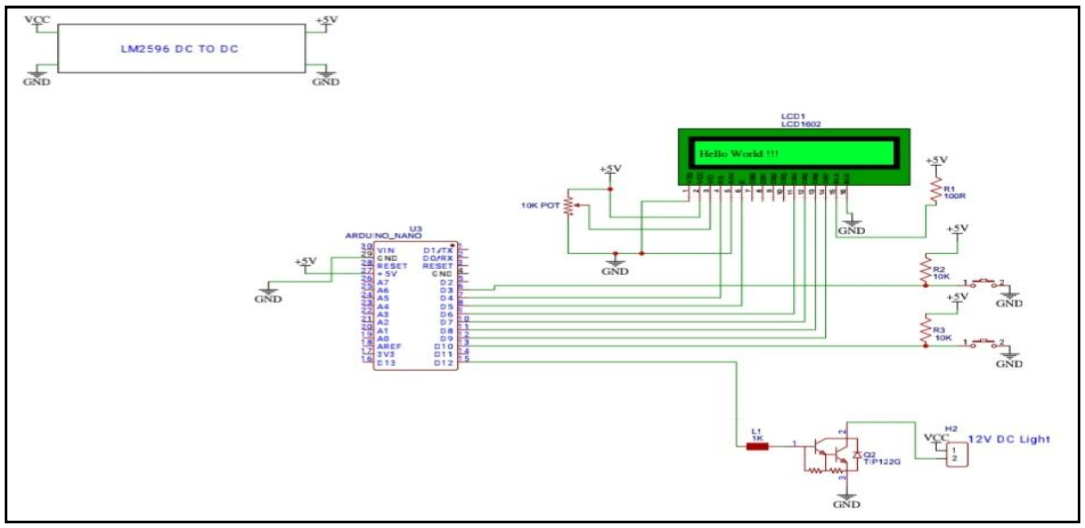


Similarly, when the light source is ON, or we can say that if the current is maximum flowing through the LED, then the illumination of the LED will be maximum. And it will be treated as a digital 1 which will be transmitted at the receiver side.



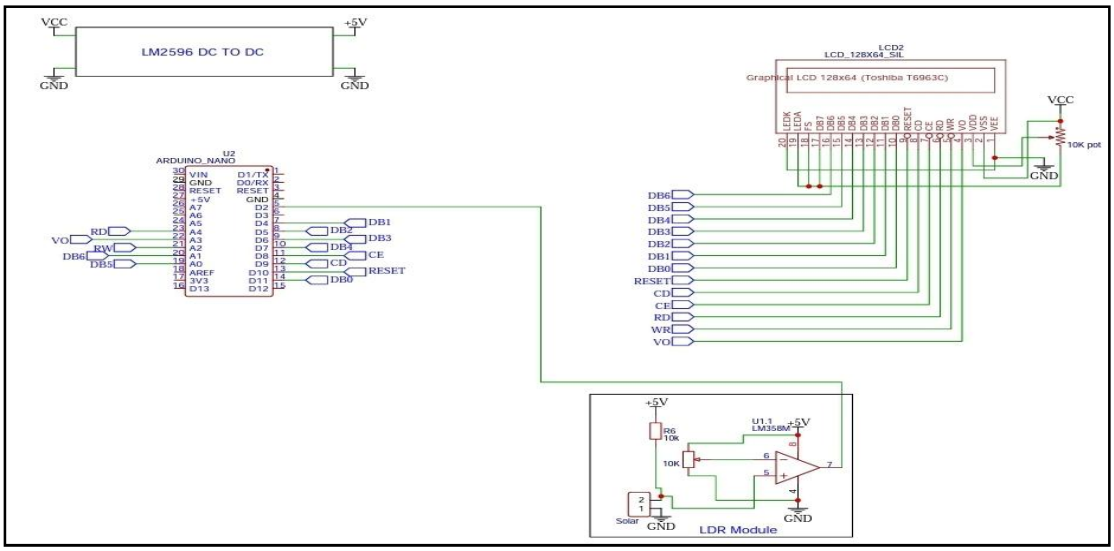
V. HARDWARE IMPLEMENTATION

Transmitter Section:



IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 6, April 2023

Receiver Section:



VI. RESULT AND CONCLUSION

The possibilities are numerous and can be explored further. If this technology can be put into practical use, every bulb can be used something like a Wi-Fi hotspot to transmit wireless data and we will proceed towards the cleaner, greener, safer and brighter future. The concept of Li-Fi is currently attracting a great deal of interest, not least because it may offer a genuine and very efficient alternative to radio-based wireless. As a growing number of people and their many devices access wireless internet, the airwaves are becoming increasingly clogged, making it more and more difficult to get a reliable, high-speed signal. This may solve issues such as the shortage of radio-frequency bandwidth and also allow internet where traditional radio-based wireless isn't allowed such as aircraft or hospitals. One of the shortcomings however is that it only works in direct line of sight.

VII. FUTURE SCOPE

Integration with IoT: Li-Fi technology can be integrated with the Internet of Things (IoT) to provide high-speed and secure communication between connected devices. This can lead to more efficient and effective IoT systems and applications.

Integration with AI: Artificial intelligence (AI) is also rapidly expanding, with more applications becoming available every day. Li-Fi technology can be integrated with AI to create more intelligent and efficient systems. This could include the use of AI to optimize data transfer rates and reduce energy consumption.

Enhanced Security: Li-Fi technology can be further developed to enhance security features, such as encryption algorithms and authentication protocols, to make it even more secure for sensitive data communication.

Increased Range and Coverage: Li-Fi technology can be developed to increase its range and coverage area, making it more practical for use in larger spaces and outdoor environments.

Hybrid Communication: Li-Fi technology can be combined with other wireless communication technologies, such as Wi-Fi and 5G, to create hybrid communication systems that leverage the advantages of each technology

REFERENCES

[1]. D. Ghosh, S. Chatterjee, V. Kothari, A. Kumar, M. Nair and E. Lokesh, "An application of Li-Fi based Wireless Communication System using Visible Light Communication," *2019 International Conference on Opto-Electronics and Applied Optics (Optronix)*, Kolkata, India, 2019, pp. 1-3

[2]. Kabir, M. T. Ahammed, C. Das, M. H. Kaium, M. A. Zardar and S. Prathibha, "Light Fidelity (Li-Fi) based Indoor Communication System," *2022 International Conference on Advances in Computing, Communication and Applied Informatics (ACCAI)*, Chennai, India, 2022, pp. 1-5

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 6, April 2023

[3]. Saha, S. Chatterjee and A. Kundu, "Analysis on Data Transmission using LIFI," *2020 IEEE 1st International Conference for Convergence in Engineering (ICCE)*, Kolkata, India, 2020, pp. 352-356

[4]. J. M. Abraham, H. Kumar and G. J. Bala, "Li-Fi: Illuminating the Future of Internet," *2020 IEEE 15th International Conference on Industrial and Information Systems (ICIIS)*, RUPNAGAR, India, 2020, pp. 550-554

[5]. K. T. Swami and A. A. Moghe, "A Review of Li-Fi Technology," *2020 5th IEEE International Conference on Recent Advances and Innovations in Engineering (ICRAIE)*, Jaipur, India, 2020, pp. 1-5

[6]. S. Dinesh and B. Chourasia, "Light Fidelity (Li-Fi) Technology: Will It Be an Eco-Friendly for Monitoring the Covid-19 Patients in Hospital," *2021 International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE)*, Greater Noida, India, 2021, pp. 234-238

[7]. M. Leba, S. Riurean and A. Lonica, "Li-Fi — The path to a new way of communication," *2017 12th Iberian Conference on Information Systems and Technologies (CISTI)*, Lisbon, Portugal, 2017, pp. 1-6

[8]. Gowri Predeba, M. Bala Subramaniam, U. Jishnu, S. Gowtham, 2020, Integrating Li-Fi Technology with in Urban Street Lighting, INTERNATIONAL JOURNAL OF ENGINEERING RESEARCH & TECHNOLOGY (IJERT) ECLECTIC – 2020 (Volume 8 – Issue 07)

[9]. Palani Raj, P. FreshtonJebastin, M. NaveenKumar, K.K. Rusheyandhaar "TEXT, VOICE AND IMAGE TRANSMISSION USING VISIBLE LIGHT COMMUNICATION" International Research Journal of Engineering and Technology (IRJET), 2020, Volume: 07 Issue: 09

[10]. Anoop Kiran A., Seshachalam D." Data Transmission using Visible Light Communication", International Journal of Engineering and Advanced Technology (IJEAT), 2020, Volume-9 Issue-3

[11]. K. Majumder and S. Ghosh, "Visible Light Communications for Autonomous Driving: A Survey," In IEEE Communications Surveys & Tutorials, vol.21, no.2, pp. 1617-1651, Second quarter 2019