LiFi Based Data Transmission Text and Image using IoT

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Abstract **-**The light fidelity technology refers to visible light communication that uses light as a medium to deliver high speed data which is much greater than that of WiFi. LiFi data is transmitted in several bit streams and the receiver side consisting of an IR detector decodes the message.

Keywords: Light fidelity, wireless fidelity, data transmission

I. INTRODUCTION

LiFi technology uses led‟s for transmitting data. It is derivative of optical wireless communication technology using light from Led to deliver high speed communication. Visible light communication works by switching the Led off and on at very high speed, it can‟t noticed by the human eye. The intensity of the LiFi LED emitter is kept low enough so that it cannot be seen by the human eye but high enough to carry out the communication easily. It is also very secure from hacking as the light cannot penetrate the walls.

2.RELATED WORK

The Li-Fi technology are being developed to improve the data rate, efficiency and low power consumption. LiFi is a bidirectional network system and provides a substantially similar experience as WiFi to the user. As we move toward the future, the connectivity demands are going to increase exponentially.[1] To cater to these demands we need higher spectral capacity network. LiFi is now providing unprecedented data and bandwidth. I t is a category of optical wireless communications, includes infra-red and ultra-violet communication as well as visible light [3].The working of LiFi is simple but powerful.

3. EXISTING MODEL

Most of the commercially used LEDs, are high brightness blue LED that has a phosphorus coating to create a yellow light. When the blue and the yellow light combine, they turn into white light. Data ratein this type of LED is up to 1Gbps

4. PROPOSED SYSTEM

Instead of using colour converting chemical, the usage of RGB LED as white light source can boost the date rate up to 5Gbps. The speed of the transmission for a single micro LED is of 8 Gbps. We are transmitting the two different data they are transmission of audio and text signal using Li-Fi. It is less cost than other. Speed of the data transmission is high compared to the existing model (Figure 1). Also fast than Wi-Fi and it is un-hackable. In audio segment

signal transmission was taken place through the phone which is placed at the transmitter end ,covert digital to analog signals this converted signal into

analog is now amplified and transmitted in the form of beam of led‟s which were connected in the breadboard. LED is provided with power supply.

LiFi is a Visible Light Communications system that can be used for Visible Communications system(VLC) for data transmission. VLC system has two main components:

One light source equipped with a signal processing unit and a device with a photodiode which is able to send and receive light signals. The VLS light source can be a fluorescent lamp or an LED bulb. However, LEDs are considered to be the ideal in these situations as the system needs a robust and extremely high rate of light emission.

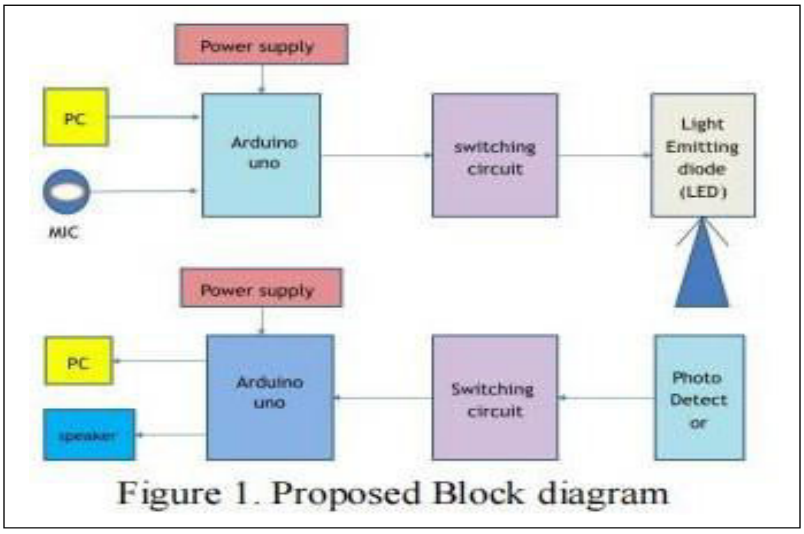

Figure 1. Proposed Block diagram

By changing Infrared light to visible light in a photo detector, the connected mobile device and send data back. Also, multi-colored RGB (Red/ Green/Blue) LED's at retina size could be engineered to send and receive a wider range of signals than single coloured phosphor-coated white LED's. In transmitter side we have connected three input devices like laptop, temperature sensor and voice recorder.

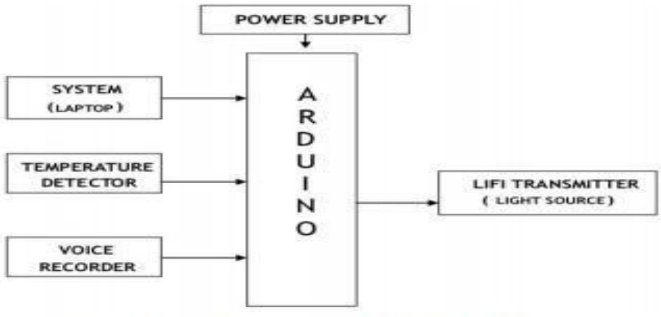

Figure 2. Transmitter Block diagram

In the above figure 2, the transmitter is a main component in the process. It has many components like LED, micro controller, and LED driver circuit. There are different possible

light sources used for illumination. However, Laser Diodes (LD) and LEDs are the two most popular ones among these especially preferred for optical data communication. This study is about the VLC, which deals with the concept of maintaining a continuous illumination and

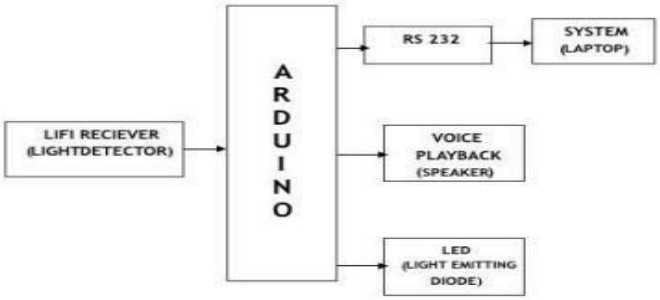

Figure 3. Receiver Block diagram

simultaneous transfer. In an LED structure, there is a spontaneous emission of photons which emit in different phases. However, in LEDs,a phenomenon called coherent radiation happens. This happens when an emitted photon stimulates an emitting photon resulting the emitting photon to be of the same phase as the emitted photon. The transmitter section primarily consists of the light emitting source.

Photo-detectors(Figure 3) are the receiving end of the OWC system. It absorbs the photons impinging on its front surface and over against generates electrical signal. The conversion of photonics energy to the electrical energy can be achieved in alternative way. Examples such as vacuum photodiodes or photomultipliers undergo the absorption of photons that created photoelectric effects and hence, free electrons emerge as a result that are used as carriers. Another way is that, by the falling of the photons into the junction area of semiconductor photodiode which leads to the release of an electron- hole pair.

4.1. Transfer of text

At first the text will be typed to the source like computer /laptop/palmtop/mobile, etc in order to keep the thing to be transmitted ready. Then the transmitting side will work in accordance with the text that is needed to be transferred. The text will be sent to the micro controller of the transmitter side in the above figure 4. The text will be coded in a form to proceed for the further processing. Once the code is ready, it will be transferred to the converter where the text that is in coded form is converted to the light form. Then the data‟s are transferred to the receiver side when it is being placed within the range of the light.

4.2. Transfer of audio

At first the voice will be recorded by the help of a voice recorder in order to keep the thing to be transmitted ready. Then the transmitting side will work in accordance with the recorded voice that is needed to be transferred. The voice will be sent to the micro controller of the transmitter side.

4.2. Transfer of detected temperature

At first the temperature that is detected will be recorded by the help of a temperature detector in order to keep the thing to be transmitted ready. Then the transmitting side will work in accordance with the recorded temperature that is needed to be transferred. The temperature will be sent to the micro controller of the transmitter side and the temperature will be coded.

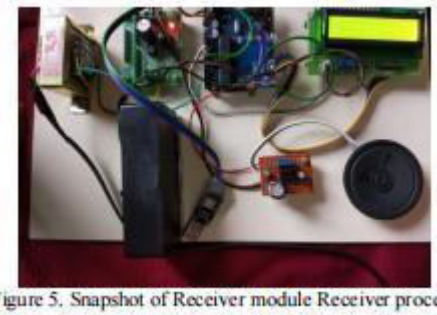

Figure 5. Snapshot of Receiver module Receiver process

The text data which is optical signal transmitted from the LED is fall on the photodiode, it detects the optical signal and detects the flickering led which represents the data in binary code. The data will be send into the micro controller of the receiver module(Figure 5). It will transferred to the converter where the light form to text form. Then the data gets decoded shows in the display or computer. The recorded voice is coded into the light in the transmission side and it is transmitter in the form of light, it falls on the receiver called photodiode. Here the light is decoded into the voice and the sound is heard from the speaker,

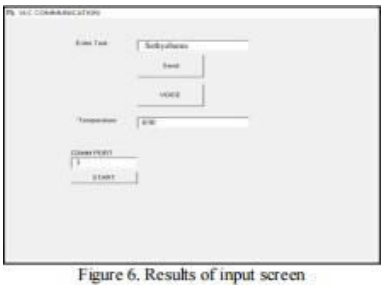

Figure 6. Results of input screen

which is been displayed in the

The arduino is connected to the computer we use visual basic run time software for simulation. We to check the port number which arduino is connected, the port number is entered in the comm port box and start. The temperature is shown, Enter the text message to be send to receiver and click send. For the audio signal transmission the voice is already recorded that can be send by clicking voice send. Then the audio signal is also transmitted through led which is been displayed in the above figure

Figure 7. Results of output screen

Arduino of the receiver side is connected to the another computer and check the port number. Enter the port number in the common port and click start. Then the data is displayed on the screen in the above figure 7. Here we use the visual basic run time software.

5. CONCLUSION

We have been able to transfer the text, temperature recorded voice on the receiver side through the help of light source which is present on the transmitter side. A proper audible sound is heard on the speaker, the temperature is detected accurately and the text is displayed exactly. The future scope of this technology is very bright. The solution of the problem dealing with the integration of visible light with a communication system is demonstrated here. This system can be used with the present infrastructure, without undergoing major changes. . The VLC is still in its beginning stage, but with the rapid improvements being made in this technology stage by stage, it will be used in our daily life soon. In spite of the research problems, it is our belief that VLC system will become one of the most promising and prominent technologies in the field of wireless communication for the future generations.

REFERENCES

[1]. Ashmita Shetty, 2016 "A Comparative Study and analysis on Li-Fi and Wi-Fi", International Journal of Computer Applications Vol 150, no.6, September.
[2]. Luis Bica Oliveira, Nuno Paulino, João P.Oliveira, Rui Santos, Nuno Pereira and João Goes, 2016 "Undergraduate Electronics Projects Based on the Design of an Optical Wireless Audio Transmission System", IEEE, 0018- 9359 ©
[3]. Priyanka M, Anisha S and Sakthi Prabha R. 2016 " VLSI Design For A Pso-Optimized Real Time Fault-Tolerant task allocation algorithm in Wireless Sensor Network," ARPN Journal of Engineering and Applied Sciences Vol. 11, no. 13, July 2016 ISSN 1819-6608
[4]. Zashi P. Choudhari and Satish R. Devane, 2016" High sensitivity universal Lifi receiver for enhance datacommunication" Online Int. Conf. on Green Engineering and Technologies(ICGET) 978-1-5090-4556-3/16/$31.00 © IEEE [5]. Gurpinder Singh,2015 "Li-Fi (Light Fidelity) - An Overview to future Wireless technology in Field of DataCommunication", Journal of Network Communications and Emerging Technologies (JNCET) Vol 5, issue 1, November
[6]. R.Sakthi Prabha, 2019 "Channel aware reputation system with adaptive detection using AODV protocol during forward attack in wireless sensor network", IOP Conf. Series: Materials Science and Engineering 561 (2019) 012121 DOI:10.1088/1757-899X/561/1/012121
[7]. Xu Bao, Guanding Yu , Jisheng Dai and Xiaorong Zhu, 2015 "Li-Fi: Light fidelity-a survey", January
[8]. F Ciprian G. Gavrincea, Jorge Baranda, and Pol Henarejos,2014 " Rapid Prototyping of Standard-Compliant VisibleLight Communications System" IEEE Communications Magazine, July.