

Advanced LI-FI Technology for Voice and Data Transmission with Device Control

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Abstract

Now a days, Data transmission without using any network is very tedious job to do. In this paper, data and audio is transmitted and received through visible lights and control the devices. The data is generated by microcontroller (tx) then transmitted through LED, these data can be received by photo detector and displayed on microcontroller. It is an advanced technology and the accuracy is more. In this paper data communication, controlling the devices and as well as transmission of audio through visible light is achieved. Now a day, Wi-Fi is commonly used technology but the radiations are hazardous for human health so Li-Fi is the one which eliminated the wireless technology like Wi-Fi and transmits the data by using light.

Keywords: Data transmission, microcontroller, Li-Fi

1. INTRODUCTION

Light Fidelity that refers to visible light communication technology which devices high speed communication in manner similar to Wi-Fi using light as medium. Visible light communication which referred to as the method of using rapid pulses of light to transmit information wirelessly. In this era, usage of wireless technology is increasing. So the wireless data rates and the number of devices accessing the internet increased exponentially.

Nowadays Wi-Fi is widely used for data transmission medium. Radio frequency is getting blocked day by day to this, simultaneously usage of wireless data is increasing

exponentially every year. Everyone is increased to use wireless data. Hence the capacity is going down, wireless radio frequencies and complexities are increasing and RF interferences continue to grow. In order to overcome this problem, light fidelity (Li-Fi) technology came into existence since 2011.

Light is used as a communication medium instead of radio waves for accessing and controlling of electronics devices. Li-Fi (light fidelity) is a light based Wi-Fi that basically uses light communication instead of radio waves. As light travels faster than radio waves, it can be used to transfer the data around 250 times than the high speed broadband. This technology uses only light bulbs in order to transmit data.

Using the frequency spectrum of electromagnetic radiations, high speed achievements of Li-Fi can be explained. The frequency band of the visible light is in between 430THz to 770THz and that of radio frequency band is in between 1Hz to 3THz. Hence the radio frequency bandwidth is about 400 times lesser than the frequency bandwidth of the visible light. Therefore, more number of bits can be transferred through visible light bandwidth than in the radio frequency bandwidth. Hence data rate will be higher in the Li-Fi and higher speed can be achieved. Instead of using the conventional Wi-Fi network, we can transmit data using Li-Fi. Images, audio, video, internet connectivity, etc. can be transmitted. The advantage of Li-Fi over the Wi-Fi network are high speed, more security, more number of connected devices, and less cost. In coming years, number of devices that support Li-Fi will hit the market. It is estimated that the compound annual growth of Li-Fi market will be of 82% from 2015 to 2018 and to be worth over \$6 billion per year by 2018

2. LITERATURE SURVEY

With the invention of LED (Light Emitting Diode), the idea of victimisation light-weight as a communication medium has started once more. VLC uses white Light Emitting Diodes (LED), which send knowledge by flashing light-weight at speeds undetectable to the human eye. One major advantage of VLC is that we will U.S.A.e the infrastructure around us while not having to create any changes thereto. LEDs' ability to transfer information signals over light-weight (lightweight that is between 400THz to 800THz of frequency and whose wavelength is between 400nm to 700nm) makes it a terribly sensible communication medium. Now the light-weight we tend to use in our way of life can't solely be used for providing lightweight however conjointly for communication. Upon Detailed investigation of VLC analysis, it was found that not lots of research has been done to develop this technology for commercial use. But as a result of analysis

into VLC is comparatively new, the possibilities are wide open. A lot of analysis is being done to create this technology out there for business use in varied fields, including web access and vehicle-to-road communication, victimisation, traffic signal lights. From our review of the literature, it became evident that work should be done to appear into the chance of planning a replacement model that would work the current infrastructure for indoor application.

The market of localization based service (LBS) is increasing. The acquisition of physical location is the fundamental basis for LBS. GPS, the de facto commonplace for out of doors localization, does not work well in indoor setting because of the block of signals by walls and ceiling. To acquire high accurate localization in indoor setting, many techniques have been developed. The vision based localization involves camera and portable computer vision technologies that increase the value. Accelerometer primarily based mostly localization will accumulate the error created by each localization prediction. Firstly, we compare the wireless technologies that have been used for localization in recent literature. The wireless technologies are divided by the distance of coverage. They vary in frequency band and recognition which make sure their distinctive characteristics once used for indoor localization. After that, we justify the mathematical techniques sq. live utilized in wireless based localization. Proximity primarily based technique can alone offer approximate location supported link or connect information. Triangulation can be accustomed make sure angle or distance information retrieve from the received signals from three or further beacon stations to urge user location. Fingerprint assumes the signal property in each purpose is whole completely different, the location are usually found by comparison with pre-built radio-maps. In the end of the paper, we have summarized four trends among the researches in wireless based indoor localization. Incorporating multiple mathematical methods can scale back the error and increase the accuracy. The advent of mobilephones also provides a ideal device as user device for indoor localization.

In this paper, we investigate and compare the performance of single- and multi-carrier modulation schemes for indoor visible light-weight communication (VLC). Particularly, the performances of single carrier frequency domain equalization (SCFDE), orthogonal frequency division multiplexing (OFDM) and on-off keying (OOK) with minimum mean square error exploit (MMSE) are analyzed in order to mitigate the results of multipath distortion of the indoor optical channel where non-one dimensionality distortion of sunshine emitting diode (LED) transfer operate is taken into thought. Our results indicate that SCFDE system, in contrast to OFDM system, does not suffer from high peak to average power magnitude relation (PAPR) and should beat OFDM and OOK systems. We any investigate the impact of semiconductor bias purpose on the performance of OFDM

systems and show that biasing junction rectifier with the optimum price will considerably enhance the performance of the system. Bit-interleaved coded modulation (BICM) is also thought of for OFDM and SCFDE systems to any compensate signal degradation as a results of lay to rest image interference (ISI) and semiconductor nonlinearity.

3. EXISTING METHODOLOGY

- 1) As far terrestrial application, the underwater wireless communication is not a straight forward process.
- 2) In most of existing system Acoustic signal is most preferred signal used as carrier by many applications, because of its low absorption characteristic underwater .This has a drawback, as it cannot be used for large distance communication because of signal deterioration.
- 3) Some existing system use Electromagnetic waves at higher frequency and bandwidth for underwater communication. The limitation is due to high absorption/attenuation that has significant effect on the transmitted signals.
- 4) Due to absorption of Sea water ultrasound is not used for underwater communication.
- 5) Some existing systems use only the Li-Fi technology because of its high speed. The limitation here is, it cannot be transmitted for large distances. Therefore it is appropriate to use satellite communication along with Li-Fi technology to minimize their limitations.

In underwater acoustic communication has low data transmission, smaller range and multipath reflection. The high speed communication in the underwater acoustic channel is challenging due to limited bandwidth and severe fad.

3. PROPOSED METHODOLOGY

High-speed underwater optical communication has now become an enabling technology that has many prospective employments in a range of environments from the deep sea to coastal waters. This development effort has enhanced infrastructure for scientific research and commercial use by providing technology to efficiently communicate between surface vessels, underwater vehicles and sea floor infrastructure [Farr et al., 2]. There has been a rising need for automating the underwater research applications. The proposed work is motivated by the idea of many works such as [Bales &

Chrissostomidis, 3] in which the author proposed an underwater optical system using LEDs that is able to communicate at 10 Mbps over the range of 20m. In [Smart, 4; Giles & Bankman, 5],

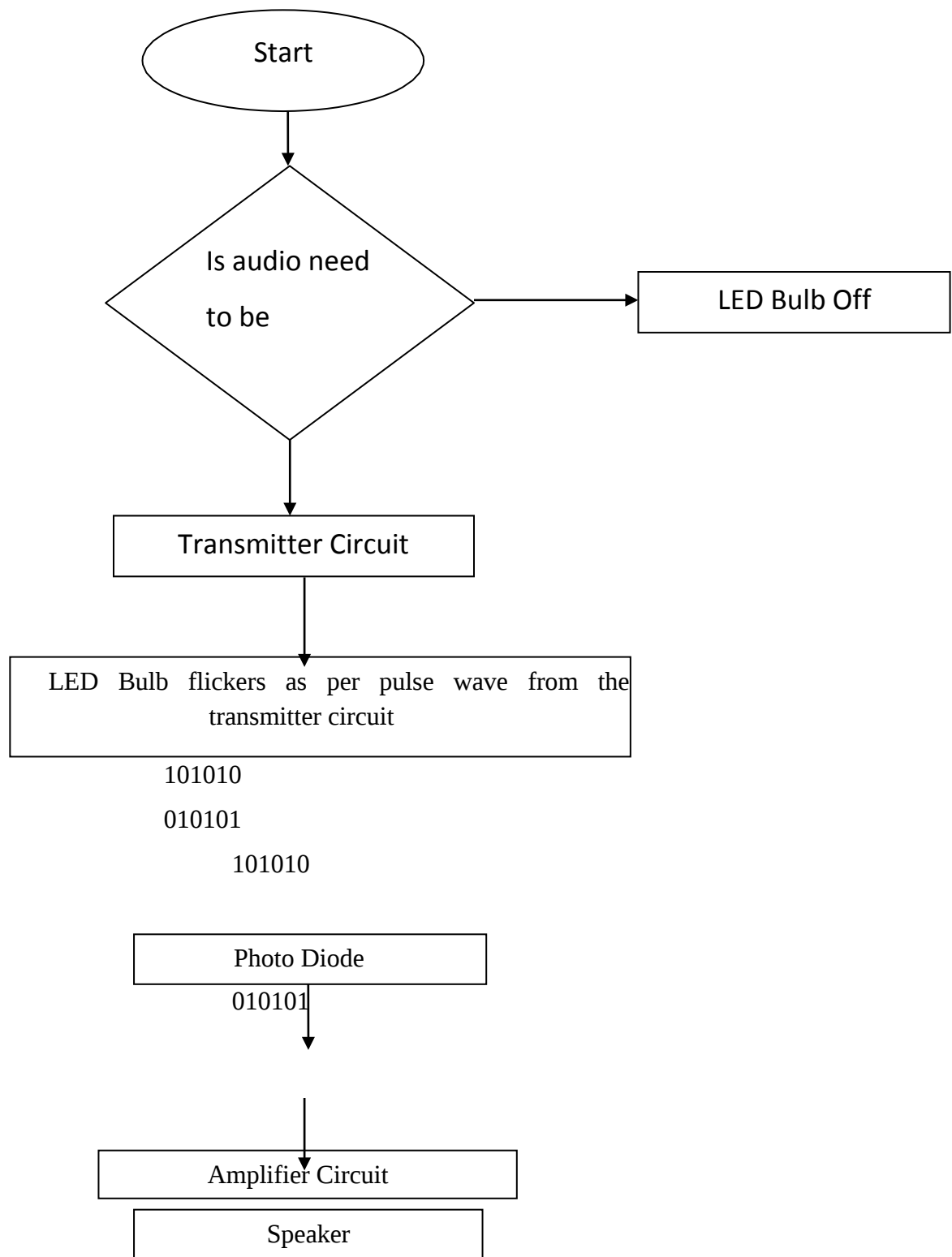


Fig 1: Work Flow of Audio Transmission Using Ili Technology.

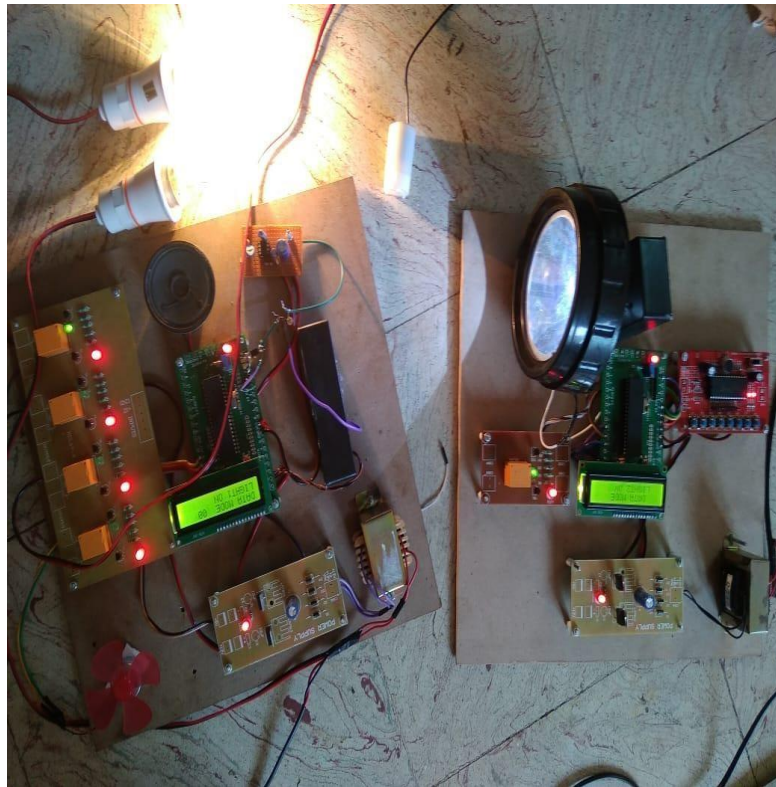


Fig 2: Hardware of proposed method

CONCLUSION

The performance of wireless underwater optical communication in varies water types and at different range is studied using simple exponential attenuation model. We have used LED light bulbs to transmit the data. Traditional incandescent light bulbs are too slow. The best at the moment is LED, though this may change in the future. All Pure Li-Fi is doing is tapping a form of light transmission that is already readily available and widely accessible, which makes their barriers to entry far more surmountable. The proposed method is convenient in all aspects than existing methods.

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