

Survey on Li-Fi Based Health Inspector

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ABSTRACT

Usually, Wi-Fi is used to monitor the patient's health parameters. Wi-Fi uses RF that causes health vulnerabilities. Some people claim they are hypersensitive to radio frequencies and are looking for an alternative. Generally in ICUs nurses are taking care of abnormalities and the health of the patient. but they may not be available for taking care of patient's health 24X7. Light Fidelity is a good solution to this problem. Li-Fi refers to 5G visible light communication systems using light from light-emitting diodes as a medium to deliver high-speed communication in a similar manner as Wi-Fi. It is used to update health parameters quickly and it can be viewed at monitor of the doctor. Simultaneously it also records the data of patient in the CPU. While consulting the patient, this information can be viewed through the internet for reference.

Keywords: Li-Fi, Wi-Fi, PWM, LOS, LED, ICU.

I. INTRODUCTION

Li-Fi also known as "light-fidelity". In this technology data can be transmitted through LED light whose intensity varies even faster than the human eye and received using photodiode. It reduces the cost enormously. Heart of this technology is the intensity of the light emitting diodes and light receiving capacity of the photodiode.

As many devices are coming up in day to day life's the signals are being blocked up due to heavy traffic, so there is a need for error free transmission technology. Li-Fi can work even under water which turns out to a great benefit for the military operations. The LED can be switched on and off very quickly, which is used to transmit data. The LED intensity is modulated using Pulse Width Modulation (PWM) technique.

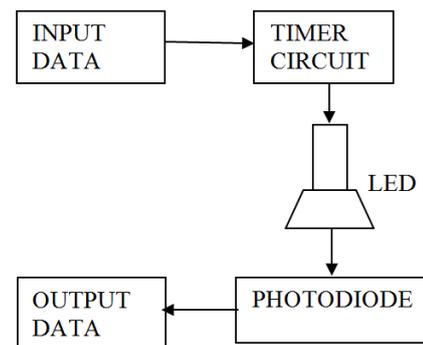


Figure 1. Working of Li-Fi

So the data can be transmitted rapidly that human eye cannot notice, so the output appears constant. By using this, data rate can be achieved more than 10 Gbps, theoretically allowing a high-definition film to be downloaded in 30 seconds. In operation theatres or in diagnosing places using machines which work on radio waves and simultaneously using Wi-Fi to monitor the patients are highly impossible. So in order to access the machine which is used to monitor the patients and also to use radio waves based equipments, light fidelity technology can be used. Li-Fi signals cannot pass through walls. so it is more secure than Wi-Fi.

II. METHODS AND MATERIAL

Literature Survey:

K. Sindhubala et al[5], VLC system for indoor environment is implemented in this paper. The transmitted data signal is received back at the receiver with reduced noise interference using the proposed transmitter and receiver circuit. This paper also explains the System design of proposed Indoor Visible Light communication system, the basic experimentation and its results. Then it concludes about the performance measures, its challenges and scope for future extension. Various modulation techniques are used for supplying electrical power to a load that has relatively slow response. Here On-Off keying modulation technique is used, which reduces the power consumption, compared to other modulation techniques. LM555 timer is used to produce carrier wave at 4.8 kHz. Phosphor based cool White LED of 1 Watt is used as a Light emitting source with the viewing angle as 90° , forward current of 0.35A/3.2W and power dissipation of 1.6 W. It will give about 80 lumens of light intensity. The proposed, VLC Receiver consists of photodiode (OPT101) as a Photo detector. It also includes electrical high pass filter, voltage amplifier, comparator and transimpedance amplifier (TIA) to recover back the original data. The output voltage and optical power decreases with respect to the increased transmission distance between the transmitter and receiver.

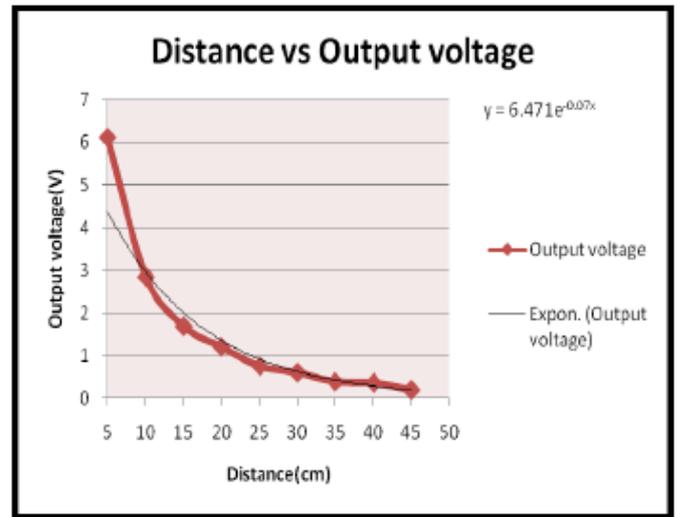


Figure 2, The graph of the vertical distance between the transmitter and receiver and the output voltage.

N.S. Poojashree et al[3], This paper explains the working principle of Li-Fi technology and its benefits. Li-Fi can achieve about 1000 times the data density of Wi-Fi and Very high data rate. Li-Fi is particularly used in various applications such as video and audio downloads, live streaming, etc. These applications place heavy demands on the downlink bandwidth, and minimal uplink capacity. By using this technology, majority of the internet traffic is off-loaded from existing RF channels, thus also extending cellular and Wi-Fi capacities. It explains the scope for wireless communication in the medical field. There are many devices that work on wi-fi such as infusion pumps, defibrillators, monitors, lung ventilators and anesthesia machine. But there are drawbacks in using wi-fi, when the two devices in the same place which Works on wi-Fi there results a frequency overlapping problem. Li-Fi technology in medical field makes diagnosis faster and allows to access internet along with the radio waves based devices.

ShubhamChatterjee et al[6], In this paper, various modulation techniques are explained such as OFDM, OOK, PWM, PPM, SIM-OFDM modulation techniques etc. It also explains the scope and challenges of this technology.

Table 1 : comparison between Wi-Fi and Li-Fi

| S.no | parameters | Wi-Fi | Li-Fi |
|------|---------------------|----------------------|------------------|
| 1 | SPEED | 54-250 Mbps | 1-3.5 Gbps |
| 2 | RANGE | 20-100 meters | 10 meters |
| 3 | NETWORK TOPOLOGY | Point-to-multi point | Point-to-point |
| 4 | TRANSMISSION MEDIUM | Light as a carrier | Radio spectrum |
| 5 | FREQUENCY BAND | 2.4 GHz | 100 times of THz |

M.Divya Reddy et al[1], This paper explains the design of the monitoring system which is used to monitor the patient health parameters and if any emergency is there it will send information to the respective doctors with the help of Li-Fi Technology. Here the patient Saline bottle and stress level will be monitored continuously, if that bottle becomes empty or stress level becomes high ,then it will detect that and it will activates the Encoder with the help of Multivibrator and Interfacing stage. Then that information will be transmitted to the receiver through LI-FI transmitter. At another side Li-Fi receivers will receives information from Li-Fi transmitter and after receiving it will decodes the coded signal with the help of DTMF Decoder, after decoding that information will send to the microcontroller. Then it displays the measured parameters like Saline Bottle Empty, Stress is high. By using this doctor can treat a patient when he is in emergency. Through this doctor can monitor a patient for (24*7) that a normal person cannot do if a patient is in abnormal condition controller detects that and display message on LCD to the doctor even if he is away from patient. So he can immediately give treatment to the patient. Li-Fi technology cannot create any hazardous to human health.

III.RESULTS AND DISCUSSION

From this paper, it is possible to transmit data using visible light as a medium. By doing same modifications in the basic circuit such as usage of 10w cool white LED as a transmitter, it will also be

possible to transmit higher quality of data such as videos and sound apart from just text or simple bits. By using this technology it is possible to use every bulb as a hotspot, which produces a safer environment. Mobile phones will be used as a receiver device. By using the ambient light sensor in the mobile phone, light signals will be received. This type of communication will also reduce the risks off radiation hazards and can be used almost anywhere even at places such as hospitals, nuclear power stations, etc where electronic devices are banned due to the fear of radiation. This technology can also be used to replace the existing Wi-Fi system to connect to the internet.

IV.CONCLUSION

Data transfer rate could be improved based on the intensity of light. Data can be received by using mobile phones with the help of ambient light sensor.

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