

TRIPLET Li-Fi

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INRODUCTION:

In the current generation communication plays an important role. Advanced researches have been done to improve the communication technology to obtain better speed and efficiency at a lower cost. This project deals with data transmission using the light source which provides greater speed when compared with the current technology in use. Hence the name Li-Fi.

It was July,2011, Dr. Herald Hass ,Professor , mobile communication ,University of Edinburgh, publicly demonstrated Light fidelity for the first time, a method of Visible light communication (VLC) technology. This technology can transmit the data through high illumination LED devices that varied the intensity is very faster than the human eyes can't follow the LED bulb can cycle OFF and ON millions of times per second. Li-Fi concept is similar to Wi-Fi. In Wi-Fi technology the radio spectrum available for communication is very congesting but the demand for this is increasing every year and interference is also high. To overcome these issues Li-Fi can be used. Li-Fi is transmission of data using properties of visible light i.e. by making use of visible spectrum which is the part of electromagnetic spectrum.

The working principle of Li-Fi is same as that of Wi-Fi except the fact that light is used instead of radio waves. The visible light spectrum is 10,000 faster than the radio frequency spectrum. The data is encoded and send to the light transmitting devices which is driven the high illumination LED. It is feasible to encode the data which the LED bulbs on and off to give different kind of strings of 1s and 0s . The LED bulb intensity is changing very faster that which the human eyes cannot be notice. This technology is advancement from optical fiber communication to optical wireless communication. In future the data for laptops, smart phones and tablets can be transmitted through Li-Fi in a room.

T-Li-Fi concept is similar to Li-Fi uses the concept of RGB multiplexing scheme to produce white light spectrum. Each color carries different data, so the speed is three times better than conventional Li-Fi.

OBJECTIVES:

1. To improve the bandwidth limitation problem in the RF spectrum.
2. Making three times efficient and faster communication than the existing LIFI.
3. Multipurpose and eco-friendly communication system for the future generation.
4. It allows three different high-speed channels for the Data transmission.

METHODOLOGY:

T-Li-Fi concept is similar to Li-Fi uses the concept of RGB multiplexing (Light multiplexing) scheme to produce white light spectrum. Each colour carries different data, so the speed is three times better than conventional Li-Fi.

This project is a technological demonstration of an industrial model. The project design is divided into seven sectional designs.

In this project overall three data are going to send serially. The USB-TTL will be the input source for the Li-Fi system and the first data is sending through it. The second and third data will be 2 kHz and 3 kHz pulse (50% duty cycle), which will generate from an astable design using 555 ic (section T.2 & T.3). The data will drive the driver circuit (section Tend) for controlling V-I for the RGB LED.

Receiver consists of three different sections. The data one and data two receiver designs is similar (section R.2, R.3). For data one, the receiver is designed for a high speed detection of 1.9Mbps (maximum).

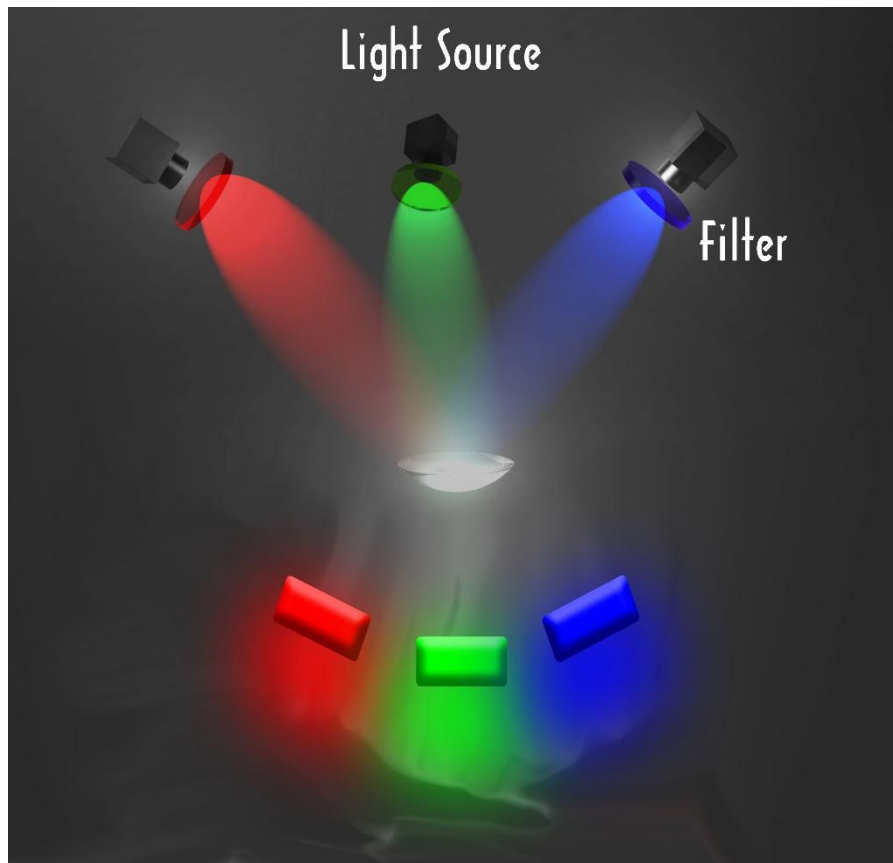


Fig 1 Outlook view

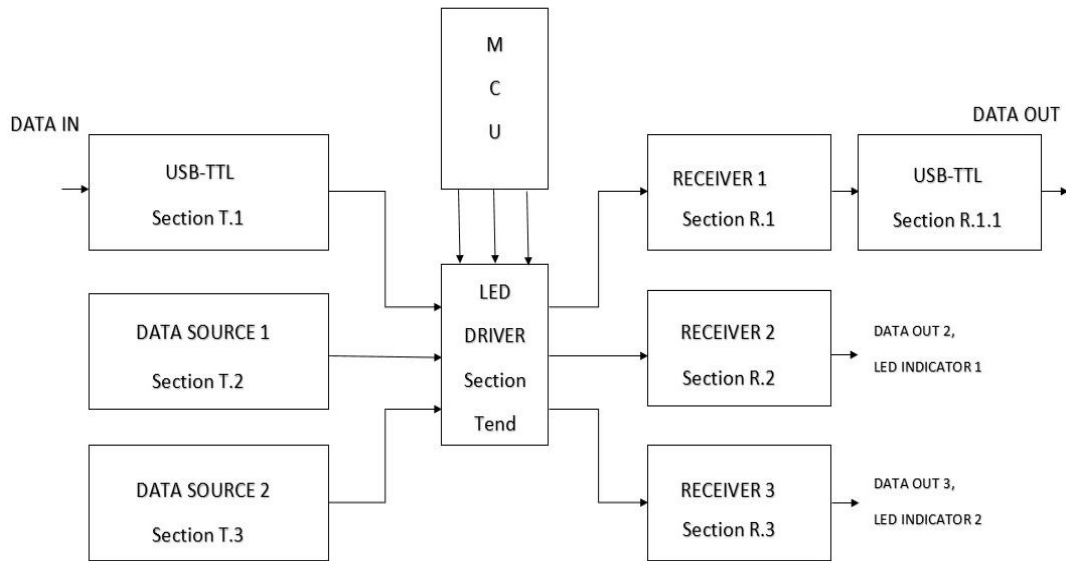


Fig2 Block diagram

RESULTS AND ANALYSIS:

The proposed design is developed and simulated using Multisim. Each and every section individually experimented in analog electronics lab (collage facility). The triplet Li-Fi consist of transmitter and receiver.

Transmitter

T-Li-Fi has three channels. In this, the first channel is able to send computer serial data using Hyper-Terminal and it is bidirectional. Second and third channels will be an experiment. A stable design will feed this channels as experimental sequences (2khz & 3khz).

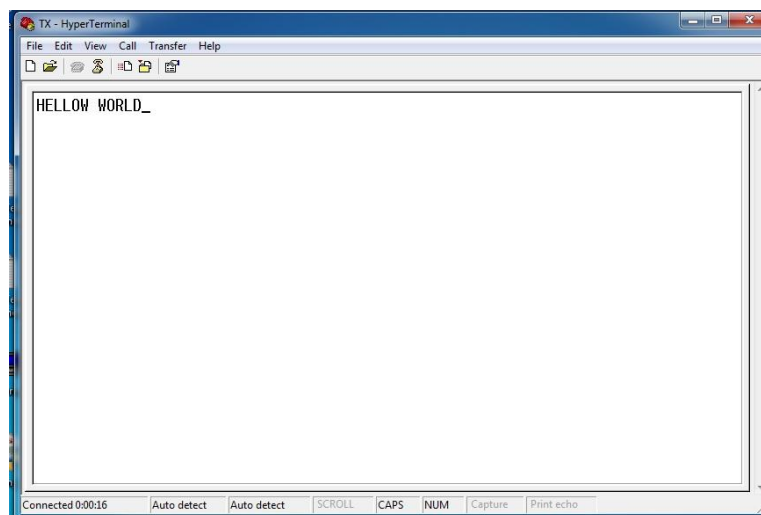


Fig 3: Tx using HyperTerminal

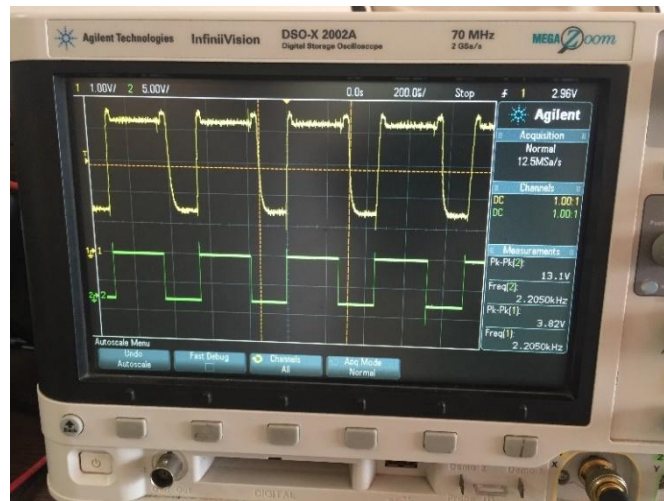


Fig 4 Data 2 reception

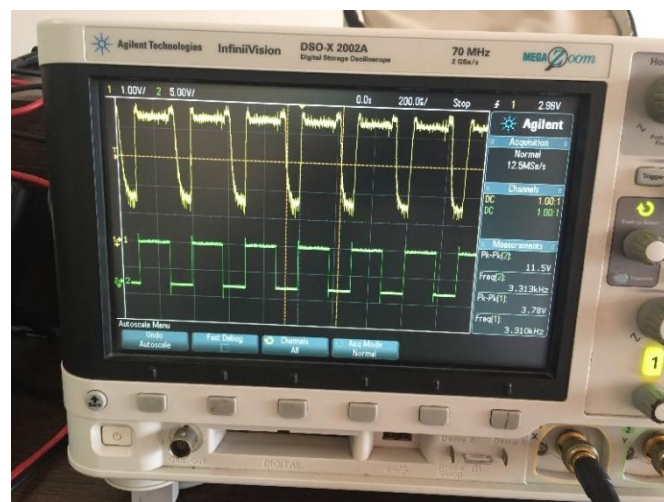


Fig 5 Data 3 reception

CONCLUSIONS AND FURTHER WORK:

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 Triplet Li-Fi is going to attract 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 is not allowed such as aircraft or hospitals. We are able to develop this technology into a T-LiFi Hub, which is nothing but a new feature in laptops where the hard disks or mobile can directly get the data from the laptop. One of the shortcomings however is that it only work in direct line of sight. It is a major problem faced by this technology for that it needs a further research and developments for optimization.