

DATA AND VOICE COMMUNICATION USING LI-FI

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Abstract: This paper deals about the developing technology Light-Fidelity (Li-Fi), which can transmit the data through light emitting diode, by using this technology one watt LED light bulb can provide net connectivity to four system. This emerging technology provides the connectivity to new localized wireless network environment. It is an optical version of Wi-Fi. The reason for introducing this is to overcome the faults in Wi-Fi like speed, security. Li-Fi is ideal for high density wireless data coverage in confined area and for relieving radio interference issues.

KEYWORDS: POWER SUPPLY UNIT, LI-FI TRANSMITTER AND RECEIVER, BUFFERS, DRIVERS, RELAYS.

I. INTRODUCTION

Nowadays Wi-Fi is used in many places such as office, public, home, etc. As the number of users increases, the speed of network decreases. The data rate transmitted through such a network is slow. The radiowaves are media to transmit the data. These radiowaves are hazardous to living things. Data transmitted through radiowaves has some security issues. Long range communication is difficult. In order to overcome this, Li-Fi came into existence. Li-Fi stands for Light Fidelity. Li-Fi is transmission of data through illumination by 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. Li-Fi is a wireless communication which allows as long range communication. The working of Wi-Fi is same as Li-Fi where we use Visible Light Communication which is used for high speed communication.

The idea of Li-Fi was introduced by a German Physicist Professor Herald Hass in TED Global Talk Visible Light Communication. He is from the university of Edinburg in UK. It can be explained very easily as, if LED is switched ON then we are transmitting digital 1 and if the LED is switched OFF then we are transmitting digital 0. Security would not be an issue. If you can't see the light, you can't access the data. As a result, it can be used in high security military areas, public places such as hospital, office, etc.

II CONSTRUCTION AND WORKING OF SYSTEM:

A. Block Diagram Explanation:

The explanation of the fig1 and fig2 is as follows:

1. **Power Supply Unit:** The supply units are two different voltage level, +12V and +5V. These voltages are supplied by specially designed power supply.

2. **Switches:** A switch may be directly influenced by human as a control signal to the system. Switches can be used to control the machineries.

3. **Buffers:** Buffers do not disturb the logical state of digital signal (logic 1 input results in a logic 1 output whereas logic 0 input results in a logic 0 output). Buffers are generally used to offer extra current drive at the output.

4. **Drivers:** Drivers are used to drive the relay where the output is complement of input which is applied to the drive.

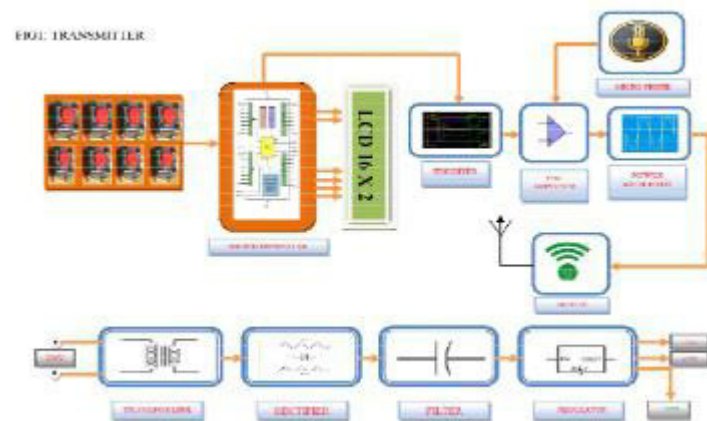


FIG:1 BLOCK DIAGRAM OF TRANSMITTER

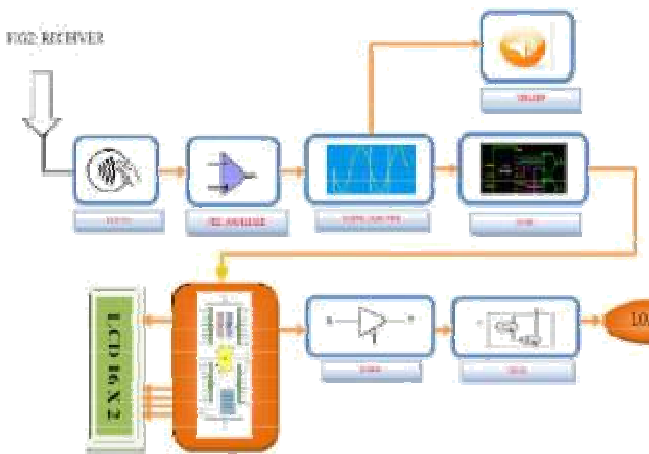


FIG:2 BLOCK DIAGRAM OF RECEIVER:

4. **Drivers:** Drivers are used to drive the relay where the output is complement of input which is applied to the drive.
5. **Relays:** Relays are a electromagnetic device which is used to drive the load connected across the relay and the output of the relay can be coupled to the controller for further processing.
6. **Li-Fi Transmitter:** Light Transmitter has two stages, Pre-amplifier and Power amplifier. The Pre-amplifier takes low signal and amplifies it to the sufficient voltage level. The sufficient amplified signal is transmitted to the receiver.
7. **Li-Fi Receiver:** The Li-Fi Receiver consists of Pre-amplifier and Power amplifier. In the pre-amplifier, it takes low level signal transmitted through LDR and amplifies it. The received signal from the transmitter is used to drive the U1 IC LM358.

III. ADVANTAGES AND DISADVANTAGES:

Advantages:

Availability: Availability is not an issue, as light source are present everywhere. They just need to be replaced with LED's for proper transmission of data.

Security: Light do not penetrate through walls so, they can't be intercepted and misused. Such that it provides high security.

No effect to human body.

No special installation cost, data can be transmitted through the existing sockets of light fixtures.

As the number of users increases, the data speed remains the same.

More number of channels available without interfacing with external source.

Disadvantages:

LEDs bulbs cannot penetrate into walls and other opaque materials.

Li-Fi is not fast as Wi-Fi in open space.

It does not Works in direct line of sight.

IV. APPLICATIONS AND FUTURE ENHANCEMENTS:

Application:

Education system: Provides fastest speed internet access so that all people can make use of Li-Fi with the same speed in confined area.

Medical application: WiFi cannot be used in operation theaters because of radiation concerns, Wi-Fi radiation may interfere with mobile and Pc which blocks the signals for monitoring equipment so to overcome this Li-Fi is replaced.

Cheaper internet in aircraft: The passengers in aircrafts access low speed internet at very high rate Wi-Fi is also not used because it may interfere with navigational system of pilots. So Li-Fi can be used there to avoid such issues.

Li-Fi does not need any radio frequency waves such that it can be mostly replaced by bluetooth, infrared, Wi-Fi.

Future Enhancements:

Underwater Applications: Li-Fi can even work underwater where Wi-Fi fails completely. So it is an endless opportunities for military areas.

Disaster Management: Li-Fi can be used as a powerful communication in times of disaster such as earthquake or hurricanes. Li-Fi provides the disaster information in every street corner.

Traffic Management: In traffic signals, Li-Fi can be used in very effective manner. Li-Fi can communicate with a LED lights of the car which can help in managing traffic in better manner. Accidents can also be decreased. LED Lights should alert the drivers when other vehicles are too close.

V. CONCLUSION:

The concept of Li-Fi is currently attracting a great deal of interest. If the technology is come to practical, then every LED light can be used to transmit the data at very high speed without any disturbance. So, it is an eco-friendly system it does not have any effect on nature as well as living things and no security issues. By using this technology, it is safer, greener, cleaner, etc. This can be used in hospitals and healthcare because data is transmitted through Visible Light Communication (VLC). So, there is no harm to human bodies. Even it can be used in underwater communication, military areas. As we are concluded this, the number of users increases, the speed of network decreases. So, we are using to overcome this problem. Research is going on to send the data in parallel by using multiple lights at various intensities.

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