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Li-Fi Based Data Transmission in Sensitive Areas

M.Bharathi^[1], R.Maheswari^[1], R.Pavithra^[1], M.I.Anju^[2]

UG Student, Dept. of ECE, New Prince Shri Bhavani College of Engineering and Technology, Chennai, India^[1]

Assistant Professor, Dept. of ECE, New Prince Shri Bhavani College of Engineering and Technology, Chennai, India^[2]

ABSTRACT: The main aim of the paper is to transmit the data through visible light communication. Power plants need fast inter-connected data system to monitor things like core temperature, humidity, gas and level. Li – Fi could offer safe, abundant connectivity for all areas of these sensitive location. For that we are using sensor to sense the data and it is transmitted through visible light it is received by photodetector and it is viewed in PC. If sensor detected value is exceeds the threshold value it is indicated by the buzzer and LED. Due to maximum utility RF interferences are getting more common to overcome this problem light fidelity technology was introduced. Data is transfer at the speed of light upto 10Gbps. This is the smart way of providing broad band access.

KEYWORDS: Li-Fi-Light Fidelity, Wi-Fi- Wireless Fidelity,LED-Light Emitting Diode.

I. INTRODUCTION

Light Fidelity is a new wireless communication technology which enables wireless data transmission through LED light. With this emerging technology we can use all the light around us to transmit data. Li-Fi association to promote the high speed wireless communication using VLC technique to overcome the shortage in spectrum distribution for the purpose of high speed wireless communication.

The data is send in the way of light rays that has been generated using LED light source the intensity of the light source as been increased by reducing the amplitude of the digital data that as to be transmitted.

The important segment of the Li-Fi technology is the high power LED lights, LED can be turned on & off quickly because the reaction time of the LED is lesser than 1 microsecond which cannot be detected by the human eye this will appear to be continues beam of light.

II. WORKING PRINCIPLE

Light emitting diodes (LEDs) can be switched on and off faster than the human eye can detect since the operating speed of LEDs is less than 1 μ s, thereby causing the light source to appear to be continuously on. This invisible on-off activity enables data transmission using binary codes. Switching on an LED is binary '1', switching it off is binary '0'.

It is possible to encode data in light by varying the rate at which LEDs flicker on and off to give different strings of 1s and 0s. Modulation is so rapid that humans cannot notice it. A light sensitive device (photodetector) then receives the signal and converts it back into original data.

This method of using rapid pulses of light to transmit information wirelessly is technically referred to as Visible Light Communication (VLC) transmission. On states '1' and off states '0' the data can be encoded and modulation techniques can be done faster than the human eye can detect it.

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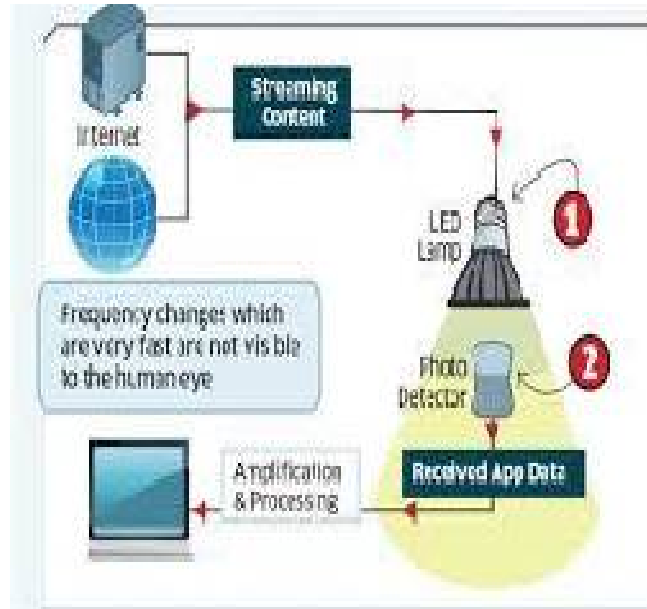
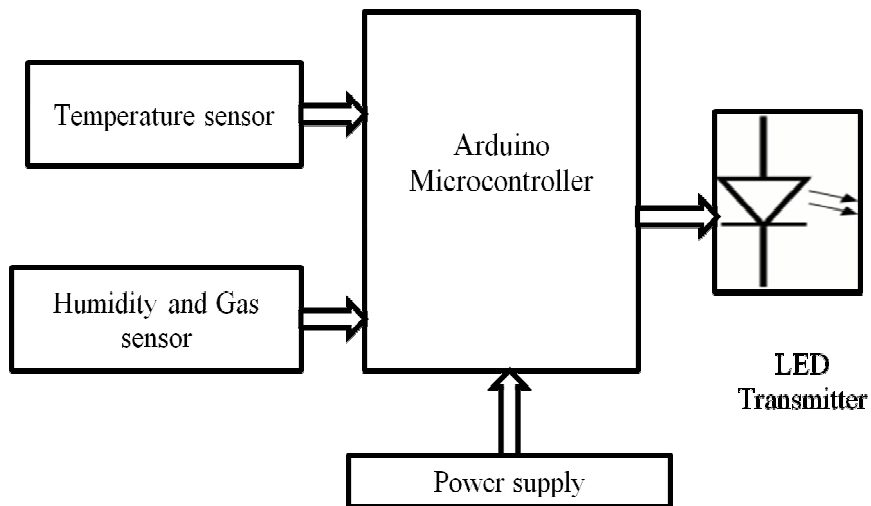


Fig.1 Li-Fi Technology, source: newtecharticles.com

III (a). Transmitter section



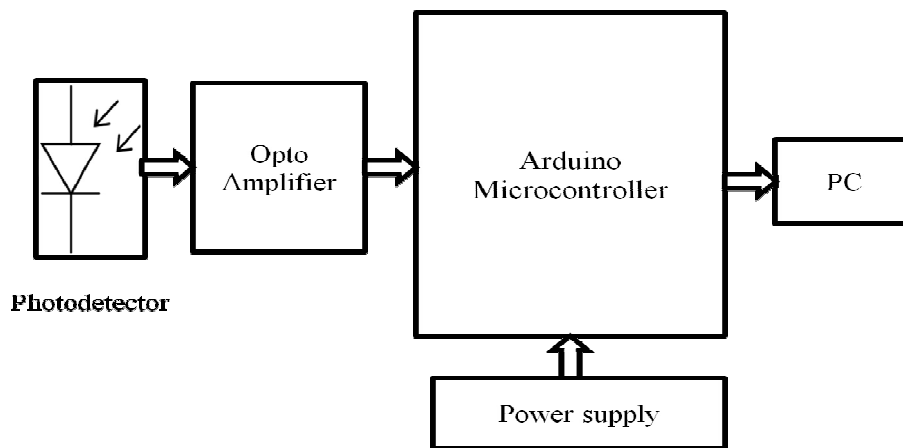
When the power supply is given all the sensors sense the value and it is transmitted to arduino. From the arduino the data is given to LED.

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III (b).Receiver section



The data is received by the photodetector through visible light from the LED. From the photodetector the data is transferred to opto amplifier to receive the original data, then it is viewed in PC.

IV. APPLICATION

Li-Fi technology can find application in a wide variety of fields.

Medical and Healthcare:

Operating rooms do not allow Wi-Fi over radiation concerns and there is whole lack in radiation spectrum. Li-Fi solve this problem.

Airlines and Aviation:

Wi-Fi is often prohibited in aircrafts. since aircrafts already contain multiple lights, thus Li-Fi can be used for data transmission.

Power Plants and Hazardous Environments:

Wi-Fi is not suitable for sensitive areas like power plants. Li-Fi offers a safe alternative to electromagnetic interference due to radio waves in environments such as petrochemical plants and mines.

Underwater Explorations and Communications:

Underwater communication will be possible between deep sea drivers and explorers.

RF Spectrum Relief:

Li-Fi networks can be used to relieve the radio spectrum off of excessive capacity demands of cellular networks.

RF Avoidance:

Li-Fi can be used as a solution to any situation in which hypersensitivity to radio frequencies is a problem and radio waves cannot be used for communication or data transfer.

Indoor Wireless Communication:

Li-Fi is very well suited for indoor wireless communication and data transmission. Li-Fi makes use of a free, unlicensed spectrum and is not affected by RF noise.



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V. ADVANTAGES

High speed connectivity of the rate of 1Gbps.

- Li-Fi uses light rather than radio frequency signals so are intolerant to disturbances.
- VLC could be used safely in aircraft without affecting airlines signals.
- Integrated into medical devices and in hospitals as this technology doesn't deal with radio waves, so it can easily be used in all such places where Bluetooth, infrared, Wi-Fi and internet are broadly in use.
- Under water in sea Wi-Fi does not work at all but light can be used and hence under sea explorations are good to go now with much ease.
- There are billions of bulbs worldwide which just need to be replaced with LED's to transmit data.
- Security is a side benefit of using light for data transfer as it does not penetrate through walls.
- On highways for traffic control applications like where Cars can have LED based headlights, LED based backlights, and they can communicate with each other and prevent accidents.
- Using this Technology worldwide every street lamp would be a free data access point.
- The issues of the shortage of radio frequency bandwidth may be sorted out by Li-Fi.

VI. CONCLUSION

Li-Fi is still in its incipient stages and thus offers tremendous scope for future research and innovation. Li-Fi is very broad in the manner of power plants can be used in the places where it is difficult to lay the optical fiber. Li-Fi may solve issues such as the shortage of radio-frequency bandwidth and is aimed at creating new communication channels with the use of existing equipment. If Li-Fi technology can be put into practical use, every bulb used to transmit a data and will lead toward the cleaner, greener, safer and brighter future.

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