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IMPLEMENTATION OF VISIBLE LIGHT COMMUNICATION IN 3D SIGNAL.

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ABSTRACT:

In recent years, there is a rapid development in the solid state light-emitting diode (LED) materials which gave way for the next generation data communication known as visible light communication. VLC has a promising future and it acts as a complement to the present RF communication by achieving larger bandwidth and high data rate. At present, the day to day activities use lot of LED based lights for illumination, which can also be used for communication because of the advantages like fast switching, high power efficiency and safe to human vision. The receiver circuit consists of photo diode connected with the amplifier and pc to recover back the amplified version of original video signal.Hence, our project presents about ecofriendly data communication through visible light which consists of the white LEDs that transmit video signals to the receiver.

Keywords: Visible Light Communication(VLC),Fragment System(FRVS)Algorithm.

INTRODUCTION:

The history of visible light communications (VLC) dates back to the 1880s in Washington, D.C. when the Scottish-born scientist Alexander Graham Bellinvented the photophone, which transmitted speech on modulated sunlight over several hundred meters. This pre-dates the transmission of speech by radio.More recent work began in 2003 at Nakagawa Laboratory, in Keio University, Japan, using LEDs to transmit data by visible light. A prototype of VLC had been presented by three undergraduate students atUniversidad de Buenos Aires in 1995, resorting to the amplitude modulation of a 532 nm laser diode of 5 mW and photodiodes detector. Since then there have been numerous research activities focussed on VLC. In 2006, researchers from CICTR at Penn State proposed a combination of power line communication(PLC) and white light LED to provide broadband access for indoor applications.[1]Data transfer by using the infra-red portion of the spectrum is already provided. Latest research activities have been focused on achieving data transfer simultaneously with enlightenment by means of using LED lighting equipment. These energy stingy and cost effective LED devices are desired to be used for data transfer without using RF signals, especially in short ranges. By using visible light, it is intended to

achieve wireless communication in the environments and situations such as airplanes,

hospitals etc, where it is not convenient to use RF waves. The idea of illumination and data communication simultaneously by using the same physical carrier is suggested by Nakagawa et al. in 2003 (Nakagawa Laboratory). Their studies [2- 6]pioneereed many following research activities. Later on, the Nakagawa Laboratory went into coperation with the famous Japan technology firms and they established the Visual Light Communication Consortium(VLCC).

Fig 1: Transmission of morse code signal.

1.VISUAL LIGHT COMMUNICATION:

VLC = ILLUMINATION + COMMUNICATION[8]
Imagine a flash light which you might use to send a morse code signal. When operated manually this is sending data using the light signal, but because it is flashing off and on it cannot be considered to be a useful illumination source, so it is not really VLC by our definition. Now imagine that the flash light is switched on and off extremely quickly via a computer, then we cannot see the data and the flash light appears to emitting a constant light, so now we have illumination and communication and this does fits our Short-Range Wireless Optical Communication Using Visible LightUsing Visible Light [7]. Though a standard of visual light communication has been released in 2011, prevalent usage of this technology will take further time.

2.LIFI:

2.a.DEFINITION: LIFIis a term often used to describe high speed VLC in application scenarios where Wi-Fi might also be used. The term Li-Fi is similar to Wi-Fi with the exception that light rather than radio is used for transmission. Li-Fi might be considered as complementary to Wi-Fi. If a user device is placed within a Li-Fi hot spot (i.e. under a Li-Fi light bulb), it might be handed over from the Wi-Fi system to the Li-Fi system and there could be a boost in performance.LIFI uses LED light bulbs to enable data transfer, boosting speeds upto 224 Gbits/s.

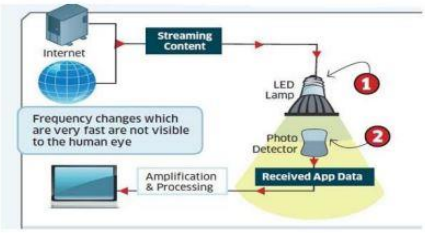

Fig 2: working module of LIFI.

2.b. EXISTING WIRELESS TECHNOLOGY - WHY DO WE NEED AN ALTERNATE TECHNOLOGY?

Radio waves cannot travel in some areas like under water, at top layers of atmosphere etc. In such places LIFI serves as a better source. Radio waves are strongly absorbed by sea water within feet of their transmission and this renders it unusable underwater but LIFI is suitable for underwater communication.Since WIFI is not safe to be used in hospitals and other various health care sectors because it penetrates human body but LIFI can be implemented and well suit in this sector.street lamps, light of vehicles can be used to access internet anywhere in footpaths, roads, malls, anywhere where light source is available.

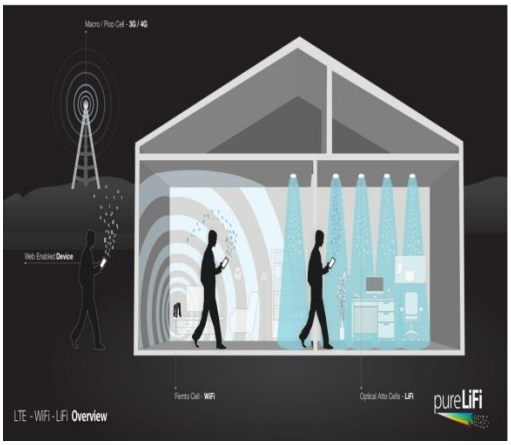

Fig 3: WIFI-LIFI overview.

2.c. ADVANTAGES :

The LIFI technology provides higher bandwidth, low power consumption, high data rate, high switching speed. The data transmission is about 10000 times faster than WIFI. The spped of transmission is 10 Gbits/s. The following table explains the advantages of LIFI over WIFI.

S.NO.	BASIS OF COMPARISON	WIFI	LIFI
1.	Security	Not secured (can be hacked)	Secured (cannot be hacked)
2.	Data transmission rate	Slower (uses radio waves)	Much faster (uses visible light)
3.	Range	Small	Large
4.	Traffic control	Less (signal become weaker as traffic increases)	More (due to high speed & easy availability)
5.	Where can be used	Within a range of WLAN infrastructure , usually inside a building	Anywhere , where light source is present
6.	Cost	Costly	Cheap
7.	Working concept	various topologies	direct binary data serving

TABLE 1: LIFI over WIFI.

3. EXISTING SYSTEM:

WiFi is a technology that uses radio waves to provide network connectivity. A WiFi connection is established using a wireless adapter to create hotspots - areas in the vicinity of a wireless router that are connected to the network and allow users to access internet services. Once configured, WiFi provides wireless connectivity to your devices by emitting frequencies between 2.4GHz - 5GHz, based on the amount of data on the network.
The coverage of one or more interconnected access points (*hotspots*) can extend from an area as small as a few rooms to as large as many square kilometres. Like any radio frequency transmission, wireless networking signals are subject to a wide variety of interference, as well as complex

propagation effects that are beyond the control of the network administrator. Full security is difficult to achieve due to wifi connection being wireless in nature. It requires proper security authentication protocols and configurations.

4.DISADVANTAGES OF EXISTING SYSTEM:

In existing system use RF based communication, so the interference and noise of the signal is high.Power consumption of existing system is high compared to proposed system.Installation cost and environmental hazards are high. Uncontrolled radiation of RF affects pre-adolescent childrens, pregnant women, elderly humans, patients with pace

makers, small birds, flora and fauna, small insects etc. The hacker can hack the data which is transferred through the radio frequency and because of the interference the data cannot able to receive at receiver side. But in proposed system all the disadvantages are overcome by using lifi.

5.PROPOSED SYSTEM:

The proposed system can be used in situations where a household has many.appliances with video output such as TV, PC, Hi-fi radio and phone systems.It consists of transmitter, free space channel and the receiver.
The transmitter consists of power csupply, transformer, regulator-IC 7805. The transformer is connected to UART.Videos from pc is given to UART. A UART is usually an individual (or part of an) integrated circuit used for serial communications over a computer or peripheral device serial port.

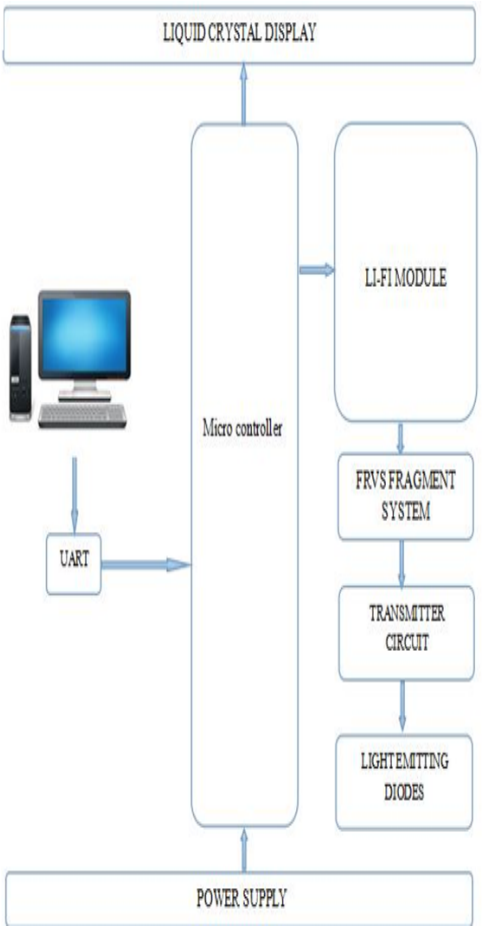

Fig 4: Block diagram- Transmitter side.

The Universal Asynchronous Receiver/Transmitter (UART) controller (MAX 232) is the

key component of the serial communications subsystem of a computer. The UART takes bytes of data and transmits the individual bits in a sequential fashion. At the destination, a second UART re-assembles the bits into complete bytes.Regulator 7805 is used to supply 5v . The pic controller has the coding to compress and send videos.
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In the receiver side, photodiode is used as they have the advantage of having a large surface area, which is used to target light easier. The photo diode can able to receive the light data from transmitter side PC and recover circuit used to retrieve the original data and the original data we can able to see in the receiver side PC. Thus, installation cost and environmental hazards are less in this proposed system.In addition, the timer-based schemes are classified into the two schemes: packet-based and FRVSs.

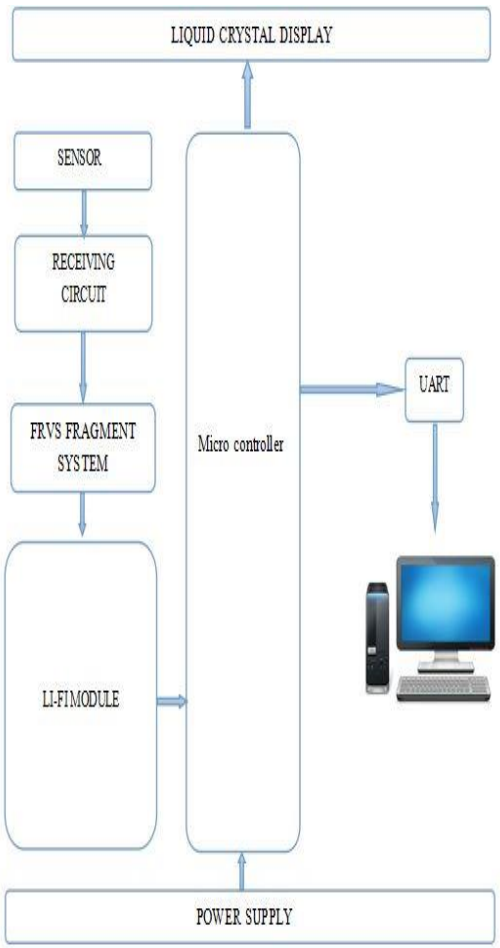

Fig 5: Block diagram – Receiver side

7.FRAGENT ALGORITHM (FRVS) AND WAVEFORM

Every packet based network has an MTU (Maximum Transmission Unit) size. The MTU is the size of the largest packet that that network can transmit.
Packets larger than the allowable MTU must be divided into smaller packets or fragments to enable them to traverse the network.

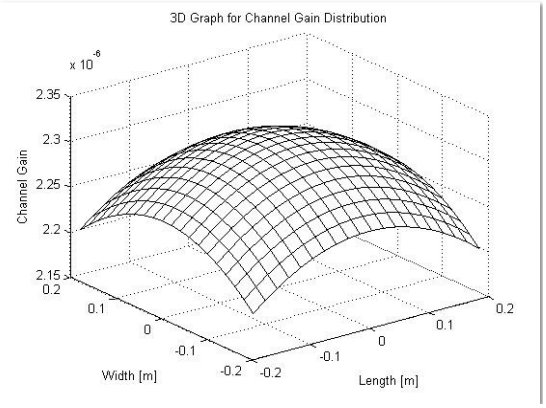

Fig6:Frvs waveform

8. HARDWARE:

Fig 7: Transmitter side.

Fig8: Receiver side

SIMULATION:

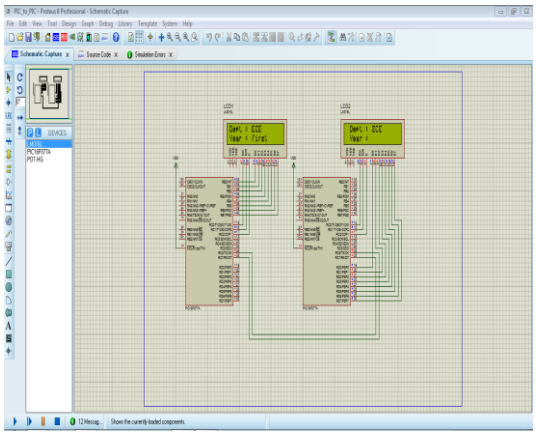

Fig 8: working of hardware in proteus

APPLICATION:

Finding the location of a person : Our project uses visible light and this property can be exploited in finding the location of people. Suppose if a child is misplaced and he/she is wearing an earing which is made of Led's. this led can constantly communicate with the visible light available and reveal the location of the
child.

Navigation System : since visible light is present everywhere, we can create internal navigation systems for the bigger areas to create automated machinery/ automatic navigation for the visitors.

7.CONCLUSION:

In this paper, we proposed new reliable transmission schemes for VLC data packets over LED-based lighting control networks. video is converted into fluctuating light output and send via LED lamp. This video transferring length is 10m. Transmission speed is 10 Gbits per second. Transmission is secure and reliable.
In the proposed schemes, differently from the existing timer-based
retransmission schemes, the VLC server initiates the error detection and data retransmission to reduce the delay required for identifying an error. Hence, after a single VLC data transmission is
completed, the VLC server sends control message to identify which data packet or fragment is lost. If some fragments are lost,the VLC server performs the retransmission procedure. If it does not happen, the VLC server starts the next VLC data transmission.The proposed schemes are classified into the packet-based and FRVSs.From the performance analysis by simulation, it is shown thatthe proposed reliable transmission schemes can effectively perform the error recovery operation in networks with packet losses.

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