Bidirectional Video Transmission Using Li-Fi

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Abstract- **Our project aims at transmitting video from one computer to another computer and vice versa (bidirectional) in a fast, secure and better way. Visible Light Communication (VLC) is the term given to an optical wireless communication system that conveys information by modulating light that is not visible to the human eye. On the continuous improvements in wireless communication systems, e.g. 3G, 4G, etc., a coming crisis is expected due to the lack of sufficient Radio Frequency (RF) resources, this limitation in bandwidth can't support the growth in demand for high data rates and the large numbers of communication systems. So the new technology, Li-Fi came into picture working under the principle of VLC. In this paper, we proposed a real time prototype which broadcasts video using commercially available LED which has longer lifetime.**

Index Terms- Li-Fi, Wi-Fi, transceiver, LED, photodiode, wireless communication

I. INTRODUCTION

PC to PC communication refers to the sharing of information between systems. This includes a transmitter and a receiver to transmit and receive data. Integrating both the transmitter and the receiver makes the system capable of transmit and receive the data. This integrated model is called transceiver. This transmission between computers can be done in many ways. Based on the medium the transmission takes place it can be separated as wired communication and wireless communication. Ethernet cable, telephone port are some examples of wired communication. Bluetooth, Wi-Fi, Li-Fi are some examples of wireless communication. But radio frequency communication provides reasonable spatial coverage which is a limiting factor. In day today life high speed data transmission plays an important role. Everyone needs multimedia information to be available at any time at any place. For all these reasons we move on to a new technology which uses light to transmit data. It does not require any licenced bandwidth. It uses LED light that transmits the data as 1's and 0's by flashing at a very high speed unnoticeable to the human eye and a photodiode to receive the transmitted data. It is highly secure and transmits data faster than Wi-Fi. This modulation technique is used to transmit data between two computers with minimal data loss.

II. LITERATURE SURVEY

[1]Wireless data rates and the number of devices accessing Internet increased exponentially in the last decade resulted in increase in network complexity. Li-Fi is the solution to this problem of radio frequency crises. The processing is used as front end software coded in java which has many inbuilt functions to read the files in hard disk of a computer and to convert it into corresponding binary logic. The code present in the Arduino instructs the led to on and off. LDR present in the receiver side detect the variations present in the transmitting led. The code dumped on the receiver converts the binary logic to transmitted data using processing software. Line of sight is required for error loss propagation of file. [2]The best alternative for high speed data transmission is Visible Light Communication (VLC). The data is transmitted from one place to another with the help VLC transceiver .The data from the pc are transmitting via UART to the controller and can be received in the receiver section. The current status is viewed in the LCD. The data transmitted via MAX232 is used to synchronise the voltage levels. The transmitted light received by the photodiode is converted into electrical pulses to voltages. The obtained signal is given to the microcontroller for reframing it .The data received can be seen in the receiver side pc hypoterminal window.

III. NEED FOR LI-FI

At present Wi-Fi is the technology that is commonly used by everyone. The increased number of users has caused Wi-Fi to lose its efficiency. Limited bandwidth problem have already arose in the usage of RF technology. Further the transmission of data is less secure in the case of Wi-Fi as radio waves can pass through pretty much all the objects which makes is susceptible to the theft of data. The increased number of users has reduced the speed of Wi-Fi. Wi-Fi is more expensive than Li-Fi. Li-Fi overcomes all these drawbacks of Wi-Fi. Since Li-Fi is based on the principle of Visible Light Communication there will be no bandwidth problem and as it is applicable for line of sight transmission alone, it is more secure than Wi-Fi.

IV. OBJECTIVES

- To effectively use light as a medium for wireless communication
- To allow simultaneous transfer of video between computers
- To enable transmission using transceivers without any data loss

## V. SYSTEM ARCHITECTURE

A. System Description

Studying the previous works in the fields of Li-Fi it is visible that transmitting content using Li-Fi with visible light as the transmission medium ensures fast, secure, and reliable transmission. In this project we propose to transmit a video file from one computer to another computer using Li-Fi. This video can be saved in the computer and played anytime.

Software installed in the computer converts the video file into sets of images then into data, in the form suitable for transmission. RS 232 cable is used to connect the computer to the microcontroller. The data are sent to the receiver port of the PIC microcontroller, which again transmits the data to the LED. This LED transmits the data in the form of 1's and 0's by the blinking of LED representing ON as '1' and OFF as '0'. This blinking is so fast that it cannot be noticed by our human eye.

An LDR fixed on the receiving side of the transmission catches this light with data contained in it. It transmits the data to the PIC microcontroller which receives the data and further transmits it to the computer through the RS 232 cable. Again the

software at the receiving computer converts the data to sets of images and back to video. This video can be saved by creating a folder in the computer and can be viewed anytime.

B. System Block Diagram
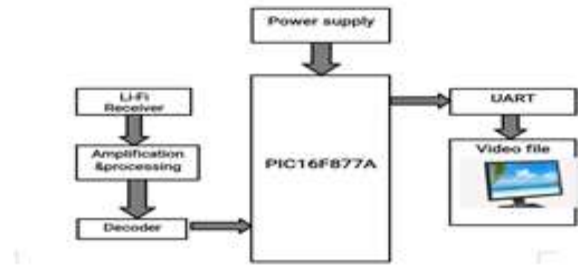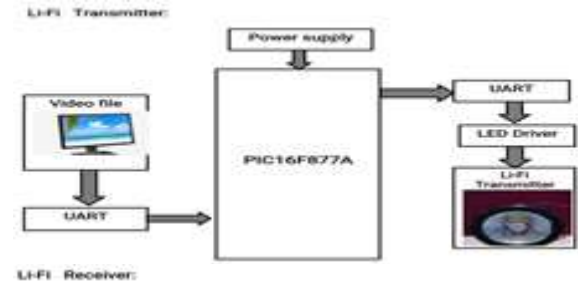
C. Circuit Diagram
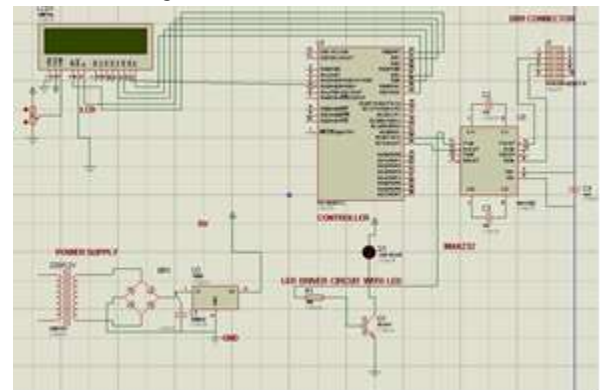
D. Result

Video will be successfully transmitted and received between the computers.

V. ADVANTAGES

Li-Fi applications are varied as a result of its key features, such as directional lighting, energy efficiency, intrinsic security, high data rate capability, signal blocking by walls and integrated networking capability. This computer to computer communications has the following advantages,

A. Security

In a meeting room environment, the access area of each channel is the width of the light pool, and can be accessed by multiple users. Each user can receive higher data rates than in the case of Wi-Fi. In Wi-Fi each user or group of users directly competes for access to bandwidth. The net result is that the more connections there are, the slower the speed of transmission will be. By contrast, in the case of Li-Fi with its greater number of available access points, each pool of light provides full channel data rates with fewer simultaneous users. This results in greater speed of transmission. Further the light cannot pass through the walls so data can be safely transferred. It helps the users to transmit and receive the data in a room very easily and fast using their computers.

B. Connectivity

Our homes already have lighting widely installed. The use of Li-Fi enabled lighting will transform the applications that can be envisaged, not only the interconnection of devices such as televisions, computers and Hi-Fi, but also connecting ordinary domestic appliances such as fridges, washing machines, microwaves and vacuums.

C. Replacement For Other Technologies

Li-Fi doesn't work using radio waves. So, it can be easily used in the places where Bluetooth, IR, Wi-Fi etc. are banned.

VI. APPLICATION

A. Dense Urban Environment

Dense urban environments by its nature tend to have complete artificial lighting coverage. This lighting infrastructure can provide always available high data rate access for users as they move through that environment. High speed wireless communication would be available in every room since the light waves do not propagate through walls. So the data can be transferred to any other device with high security if this technology is installed.

B .Under water communication

Radio waves are quickly absorbed in water preventing under water radio communications, but light can penetrate for large distances. Therefore Li-Fi can enable communication from diver to diver, diver to mini-sub, diver to drilling rig etc.

C. Intelligent Transport System

Car headlights and tail lights are steadily being replaced with LED versions. This offers the prospect of car to car communication over Li-Fi, allowing development of anti-collision systems and exchange of information on driving conditions between vehicles. Traffic lights already use LED lighting, so that there is also the prospect offered of city wide traffic management systems. This would enable car systems to download information from the network and have real time information on optimal routes to take and update the network regarding conditions recently experienced by individual vehicles.

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VII. FUTURE SCOPE

In future this can be developed by making transceivers in all the directions to transmit data without any data loss when the device is in motion. In addition to that when the system is fully developed, each light source can be used as Li- Fi access point, meaning where there will be a LED bulb, we can expect to have data communication facility. We can expect to have data communication facility. Further the transmission of data will be more secure.

VIII. CONCLUTION

Li-Fi has provided a step forward invention in the world of growing hunger communication, this is safe to all biodiversity including humans and progressing towards a greener, cheaper and brighter future of technologies. In this project, video is transmitted between two computers bidirectional using two transceivers. Experimental results show that video can be transmitted up to 100 cm. Successful transmission of video between computers is achieved.

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