

High Speed Data Communication using LiFi providing Security

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ABSTRACT

Data communication or transmission has become the most demanding need for the most of the computer users. Security is another more important concern when it comes to establishing communication between systems through the network. LiFi technology is focused on fulfilling these demands. LiFi basically uses Visible Light Communication(VLC) to establish connection and transmit data. The transmission rate of visible light is faster than all other available today transmission medias such as WiFi, ethernet, infrared, etc. Visible Light Communication has many features such as High speed, no radiation, easy to use, easy installation and management, etc. However exiting LiFi misses out some things such as two way communication, security. So in order to achieve the high speed of LiFi technology and provide transmission security, the proposed system provides the necessary information which can make the system usable.

General Terms

Visible Light Communication(VLC), High Speed Data Transmission, Data Transmission Security

Keywords

Arduino Microcontroller, Light Emitting Diode(LED), Photo diode, Wireless communication

1. INTRODUCTION

Data communication or the transmission among various systems is the most commonly used feature of the computer systems. There are various data transmission methods such as wired communication, wireless communication. Ethernet, WiFi, Bluetooth are the widely used data transmission protocols. With the increasing number of computer users, the data storage capacities and data requirements are increasing tremendously. The existing systems are facing various issues such as traffic overloading , data bottleneck, bandwidth overloading, etc. To overcome these issues, we require even

the higher bandwidth than existing systems. LiFi has the capability to fulfil this demand so, bringing the LiFi technology in use can solve many issues. Additionally, security needs to be maintained for data integrity and reliability. The basic idea of the project is to reduce bandwidth overloading, network traffic, communication restrictions in sensitive areas, etc. and provide secure, reliable and easy to use system for users.

2. EXISTING SYSTEM

The communication among various devices nowadays is done through various wired and wireless communication protocols. The LiFi system is currently least used due to some of its limitations, existing LiFi system is limited to one way communication. It does not provide any kind of security at the moment. The basic idea behind this project is to eliminate limitations of the existing LiFi System. The existing system currently acts as a broadcasting service only which does not have any method to take user input.

3. PROPOSED SYSTEM

The proposed system uses Arduino Uno R3-328 and MSP 430 G2 micro controllers. These micro controllers are capable of connecting to personal computers and can be programmed through programming languages. The primary goal of the system is to provide high data transmission rate and should also provide the data security. With the increased data traffic, the speed expectations also increase. LiFi has the ability to fulfil this expectation through its high bandwidth capacity. Adding security to this feature involves bringing forward the encryption method. A data encryption method is used to provide the proper data security. This makes sure that the data transmission in progress is not eavesdropped, stolen or tampered. Along with this users are provided with uninterrupted high bandwidth data transmission which is not limited to one way communication.

4. ARDUINO MICROCONTROLLER

Arduino is a microcontroller which is open-source electronics platform. It is based on easy-to-use hardware and software. Arduino



Fig. 1. Arduino Uno R3-328

is capable of reading input and turning it to some output. It is very much useful in most of the practical applications which require input through some sensing devices or manual user input. Arduino used in our system will be attached to LED devices and Photo diodes for performing data transmission. It can easily be programmed through the programming languages. The languages supported by Arduino are Object Oriented hence are easy to understand and program.

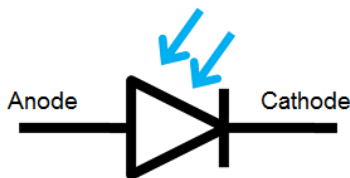
5. LIGHT EMITTING DIODE(LED)



Fig. 2. Light Emitting Diode

Light Emitting Diode is a device which is capable of producing light. This device can be controlled by the Arduino microcontroller. This device can manage high frequency turning ON or OFF of itself. The ON state of LED represents binary 1 and OFF represents binary 0. This device can withstand in many environmental states such as high temperature, high magnetic field, underwater, etc.

6. PHOTO DIODE



Photodiode symbol

Fig. 3. PhotoDiode

A photodiode is a semiconductor device that converts light into an electrical current. This device is able to absorb the falling light or the photons and convert it to electrical energy. A photodiode can also consist of optical filter. This device acts as a receiving device in our proposed system. A photodiode is connected with Arduino and Arduino passes it to the receiving computer. Photodiode is useful device as it is cheaper and easy to use. Installation of the photodiode is pretty easy as it can be directly connected to the microcontroller and does not require any additional device.

7. WIRELESS COMMUNICATION

The term wireless communication refers to the transmission of data among various devices without having connected by any physical medium. The existing wireless communication protocols are WiFi, Bluetooth, WiMax, etc. These protocols are not using any physical medium for interaction also these are not visible for human eyes. Visible Light communication is also a Wireless communication method but human eye can detect the light used for communication. Wireless communication methods are preferred as these are easy to install and usually are less costly than wired protocols.

8. COMPARISION AND ANALYSIS

Sr No.	Existing system	Proposed System
1.	One way communication.	Two way communication.
2.	No Data Synchronisation.	Data Synchronisation.
3.	No Full Control Over Transmission.	Full Control Over Transmission.
4.	No Data Transmission Security.	Data Transmission Security.

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