

FILE SHARING APPLICATION USING LIFI

Sunil L. Bangare

Department of Information Technology, Sinhgad Academy Of Engineering, Pune

Ayush Srivastava

Department of Information Technology, Sinhgad Academy Of Engineering, Pune

Shirin Siddiqui

Department of Information Technology, Sinhgad Academy Of Engineering, Pune

Avinash Kumar

Department of Information Technology, Sinhgad Academy Of Engineering, Pune

Pushkraj Bhagat

Department of Information Technology, Sinhgad Academy Of Engineering, Pune

ABSTRACT

In the past we had the speed which was limited to only 56kbps wired ARPANET connection which was limited to only US military in 1960s, and now we have the speed of 100Mbps till 2010. But we can still cross the line and reach up unbelievable speed of transmission without using Radio frequency wave by using LIGHT FIDELITY. It is popularly known as LiFi. LiFi is the new upcoming technology where the medium of transmission is light, and provides super-fast speed of transmission of data with being eco-friendly to the environment without producing any harmful radiation to human and other living creatures. So with help of light as medium, by using LED we can easily transfer and receive any text, audio, image and video file.

Keywords: ARPANET, Radio Frequency, Light Fidelity, LiFi, LED.

I. INTRODUCTION

A. Motivation

The Wi-Fi technology uses RF spectrum which exhibits the harmful radiations. The LiFi Technology will overcome this effect as it uses visible light as a source which is non-hazardous. Since the frequency of Visible Light is much more than Radio waves the speed of data transfer is also increased to a considerable extent.

The main purpose of this project is to make an application that would enable file sharing from one device to another using light as a medium, live video streaming, audio, image, files, text, anything could be transferred using the LiFi Application that we propose to make.

B. Problem Statement

Implementation of File sharing System using LiFi, based on Internet of things (IOT) which includes transferring a file which can be in form of a text, audio, image, video file from one device/system to other which is possible with the help of light acting as a medium between both the devices without producing harmful radiation.

C. Background

LiFi is a revolutionary technology that uses modulation of visible light to transmit high volume of data .Visible Light Communication (VLC) is an umbrella that integrates all the technologies used for communication using visible light as the medium. Photo phone was a device that transmits speech using a beam of light wirelessly invented on February 19, 1880 by Alexander Graham Bell and his assistant Charles Summer Tainter. LiFi uses basic principles of VLC yet uses two way communication network protocol providing high connectivity speed. In the year 2006 Professor Harald Hass and his team of researchers started research on VLC technology. They demonstrated the usefulness of LiFi during a TED Talk in the year 2011. It was at that moment the term LiFi term was invented. The TED talk was entitled as Wireless Data from Every Lightbulb. LiFi was named in reference to previous technology Wi-Fi (Wireless Fidelity).

D. Existing System

- a. *SHARE It*** –ShareIt is a cross platform with over more than 500 Million users worldwide. It can be run on iOS, Android, PC and Mac allowing us to transfer data consisting of video, audio, files like contacts, word document, XML file etc from one device to another. It is 200 times faster than any Bluetooth inbuilt device with a speed of approx. 20 Mb/sec.
- b. *Super Beam*** -It makes sharing files (and entire folders) between Android devices a breeze. It uses Wi-Fi direct technology or whatever Wi-Fi connection available to transmit data at **very high** speeds.
- c. *Xender*** -It has an ability to transfer data of any size and format without using the cellular data or Wi-Fi between two mobile devices either Android or iOS. The Team has also worked on powerful feature “Connect to PC” that integrates devices to transfer files like mobiles to PC or to Smart TV.

II. LITERATURE SURVEY

Table 1: Literature Survey

Sr. No	Reference Name	Seed Idea/ Work description	Problems found	Any other criteria
1	COMPUSOFT-2015	Huffman Coding Technique for image compression	<ul style="list-style-type: none"> The image compression and decompression in this paper is well suited for gray scale images and can be improved using adaptive Huffman coding technique that is an extension to Huffman coding. Requires extra memory space along with compressed data that increases Space complexity of data. 	<ul style="list-style-type: none"> This paper's work support the compression of BMP,ICO,WMF,GIF, JPEG etc image files. It is a minimal redundancy code.
2	IEEE 2016	Integrated LiFi(Light Fidelity) For Smart Communication Through Illumination	<ul style="list-style-type: none"> In this paper they are going to use DE-9 Serial RS232, but nowadays USB port is most used port for various kind of purposes. Prototype used is not bidirectional and is used for broadcast purpose. 	In this paper it is vividly specified how LiFi is Better than Wi-Fi.
3	IEEE-2017	Design of LiFi Transceiver	<ul style="list-style-type: none"> On-Off Keying encoding style is used to transmit digital data which is very time consuming in case of big files. Does not support Multi-user access. Speed achieved is 115,200 bps only. Prototype used is not bidirectional and is used for broadcast purpose. 	Limitations of the research can be removed by using better end devices.

4	IJFRCSCE-2018	Image Encoding and Decoding using Base64 technique and its wireless transmission using LiFi	<ul style="list-style-type: none"> • This technique increases the size of encoded data by more than 33%. • Max distance between transmitter and receiver implemented is 1 meter. • Line of sight is always required for successful transmission. • Interference of light sources can cause data loss. 	<ul style="list-style-type: none"> • Using high capacity LED's, transmission distance can be increased. • Not efficient in case of big file transmission. • Time complexity is high.
5	IJTRET-2018	Subaquatic Message Transmission Using LiFi	<ul style="list-style-type: none"> • Prototype used is not bidirectional and is used for broadcast purpose. • Inefficient information about Multi-user access. 	On-Off Keying Encoding style is used to transmit data which is time consuming in case of big files. Speed attainable in Gbps
6	IEEE 2018	Subaquatic Data Transmission using LiFi	<ul style="list-style-type: none"> • In this paper they have proposed a system which is useful for the underwater communication at a faster speed in Gbps .But the formation is not more secure over here 	Using this paper as a base we can improve the pace of transmission with more security
7	IJEEE 2018	Applicability of LiFi for Industrial Automation.	Some of the industrial parameters can be monitored continuously at regular intervals of time.	A new technology called LiFi is used to deliver uninterrupted output related to the maintenance officer located anywhere at any time.

III. PROPOSED SYSTEM

Our proposed system consists of an application which helps us to perform implementation of file sharing system using LiFi, based on IOT which will include text, audio, image and video files. Alongside LiFi the software application also focuses on compression of data using compression technique that efficiently reduces the size of data by approx. 70% to enhance to speed of transmission maintaining the quality of data unaltered. The use of

LiFi advances this application as it cuts off the use of radio frequency waves practiced under traditional methods of file/data sharing methods. Use of LiFi is very beneficial at places such as Hospitals as radio waves are harmful for human body thus avoiding use of radio frequency cultivated data transmission method. The speed of light plays a vital role in LiFi as light travels at a very high speed giving tremendous reduction in time required while transferring data. Also Light as of its nature cannot penetrate through opaque objects like walls, wooden furniture and many more which enhance the security of data and avoids chances of data getting any kind of unethical access without actually putting much efforts on the software application to maintain security of data. For Medical Image related work we have referred S. L. Bangare et al research work [9] [10] [11] [12]. P. S. Bangare et al and P. A. Kotwal et al work was also studied [13] [14] [15] [16] [17] [18].

Given below is the architecture of our system which includes pipeline of our proposed idea:

1. *Input data*

This input data can be in the form of text, audio, image or a video file which we have to transmit to the other device.

2. *Conversion to binary encoded information*

This file which we want to transfer gets converted to binary encoded information. In this process, pixels with same magnitude form clusters and we perform compression to those clusters using **Optimal Huffman Algorithm**. Advantage of using this compression is that it reduces error formation.

3. *LED Driver*

This LED driver is used to flash that binary information which can be sensed at the other end.

1 LED flash is digital equivalent to binary 1. 0 binary equivalent stands for when the LED does not flash.

4. *Photo diode receiver*

This photo diode receiver is used to sense the message which is sent by the LED driver and can be used for further processes.

5. *Double stage inverting amplifier*

Double stage inverting amplifier is the higher version of single stage inverting amplifier. It helps in retaining the signal without any loss, whereas if we use single stage inverting amplifier there are chances of fading away of signals and reduction in quality.

6. *Binary information to original message*

In this stage the binary information which was sent at the starting of the transmission, that binary information gets converted back into the original message which can be a text, image, audio or video. We decode with help of Huffman algorithm.

7. *Output signal*

This is the final stage where we get the message which was sent by the sender initially.

IV. WORKFLOW

The workflow of LiFi application is divided into 2 parts:

- 1) **Transmitter section**
- 2) **Receiver section**

i. Transmitter section

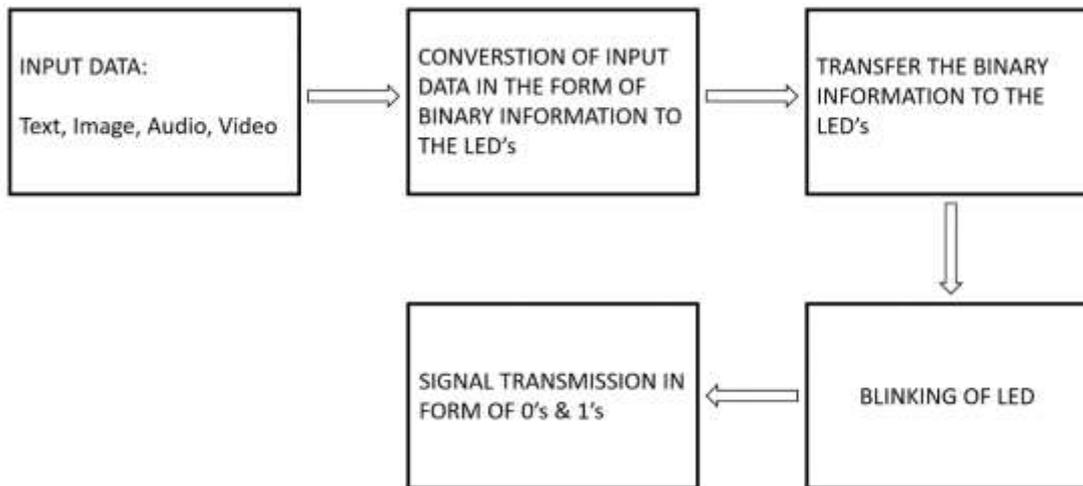


Fig 1: Transmitter side workflow

Here, we will be able to have the input in four forms that are text, image, audio, and video. These varieties of input get reborn into binary data that is hold on within the style of 0's and 1's. For a document, beginning is to compress the text. The most aim of text compression algorithmic rule is to scale back the degree of the info. The foremost ordinarily used compression algorithmic rule is Huffman secret writing, this algorithmic rule make sure of data on the frequency of characters to assign variable-length codes to characters.

Base64 encoding helps us to convert bytes which contains binary or text data to ASCII characters. By encoding the data, we improve the possibilities of it being processed correctly by different systems. Base64 arise from a specific Multipurpose Internet Mail Extension (MIME) content transfer encoding .Each Base64 digit in binary mean exactly 6 bits of data. Three 8-bit bytes which mean a total of 24 bits can that's why it's represented by four 6-bit Base64 digits.

ii. Receiver Section

1. **Signal reception:** The information which was sent in the form of LED blinks from the sender site gets received over here at the receiving end. Here the signal which was received was in the form of 0's and 1's which was nothing but ON blinks and OFF blinks, respectively.
2. **Photovoltaic module/ Solar panel:** Solar panel is used informally for a photovoltaic module. Photovoltaics are the transformation of light into electricity using semiconducting materials that manifest the photovoltaic effect. A photo-voltaic cell utilizes sunlight as a source of energy and generate direct current electricity. A photovoltaic system recruits solar modules, each encompassing a number of solar cells, which produces electrical power.
3. **Two stage inverting amplifier:** Inverting amplifier keeps the signal safe from any kind of distortion and immunes the signal which makes signal strong for transmission, so this the main motive behind using double stage inverting amplifier.
4. **Decode binary to original data:** After performing two stage amplification the binary signal which was in the form of binary representation i.e. in the form of 0's and 1's gets converted back into the information which sent by the authorized sender in the form of text, video, audio and image.

5. *Display the original message on the screen* and the successful transmission gets completed.

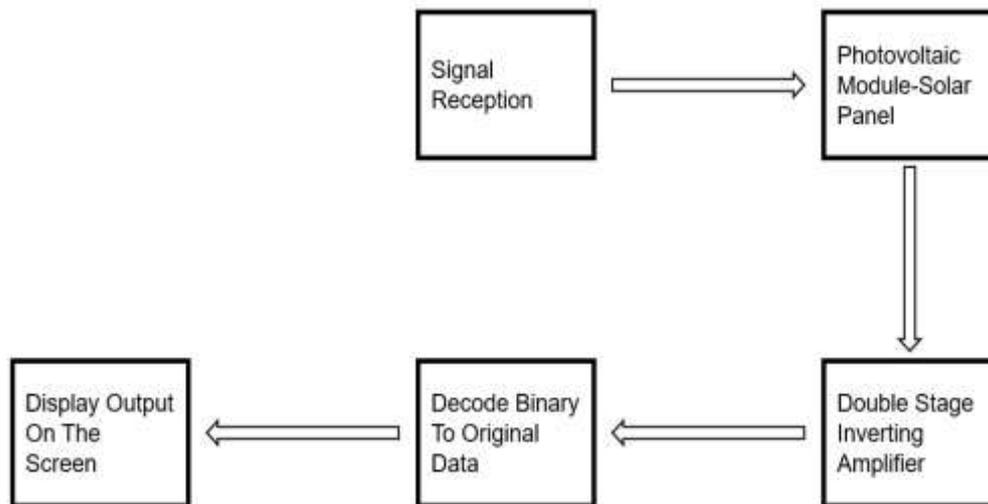


Fig 2: Receiver side workflow

V. SYSTEM FUNCTIONALITY

- 1) *Register-*
First the user has to register for the LiFi application before getting it started.
- 2) *Login-*
After registering is done, we need to login into the application. This login should be of type auto login. Once we are done with login, we don't need to login it again and do the same procedure, we stay in the application till we don't logout manually.
- 3) *Browse-*
This stage represents that we need to browse into our device to get the file which we want to send.
- 4) *Send-*
After selecting the file which we want to send, we send to other authorized device.
- 5) *Encode-*
In this stage, we convert the image into binary representation so that the binary representation can be sent to the receiver using LED.
- 6) *Receive-*
In this stage, whatever binary representation which have sent, that information gets received on the receiving device.
- 7) *Decode-*
This stage represents the process in which the binary representation gets converted back into the original format.
- 8) *Store in local memory-*
The message which was sent by the sender gets stored into the secondary memory of the device and gets accessed to the secondary memory.

9) *Help-*

This Help function is used if we encounter any problem during the transmission or any other error or problem related to the application. We can get help from the admin so that we could easily resolve the problem.

10) *Logout-*

This is the final stage where we can logout manually from the application and if we visit the application again we need to login into the application.

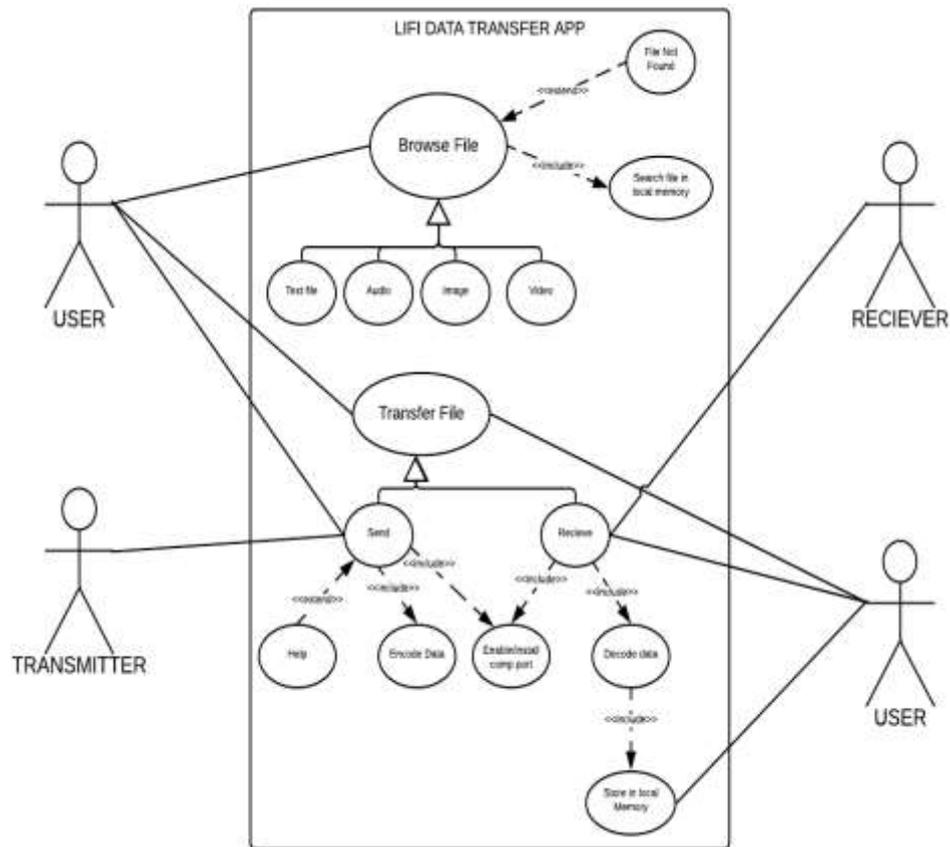


Fig 3: Use case diagram

VI. CONCLUSION

The LiFi Technology will overcome these drawbacks and disadvantages because it uses visible light so that it don't not produce and harmful radiation to the environment. This study has found that LiFi is way better than Wi-Fi because LiFi does not use radio waves and provides larger bandwidth. It is totally based on VLC. It cannot be hacked and faster than Wi-Fi. From all these advantages of LiFi over Wi-Fi, file sharing would become safer and faster. With the dynamic increase in LiFi technology, there is a lot of scope for development with the above demonstrated projects. LiFi within an indoor facility can be used for multiple screens sharing instead of stage performance which make it difficult for people sitting at back to see it properly. With the evolution LiFi can cover many aspects of technological issues that involve indoor navigation system also, as demonstration above in the paper. With the use of proper hardware and efficient integration the cost can achieve even lesser cost then our project claims at the moment. Improvement in compression algorithm can also be made by doing some complex changes but that might increase the cost of product. The File sharing application implemented can be made platform independent (i.e., OS, Device like computer or mobile Independent) by open sourcing the application with few other technical implications.

VII. REFERENCES

1. Prof. A. A. Shaikh1 ,Prof. P. P. Gadekar, P. Dr. V. Vikhe Patil Institute of Technology and Engineering (polytechnic), Pravaranagar , COMPUSOFT, An international journal of advanced computer technology, 4 (4), April-2015 (Volume-IV, Issue-IV) **“Huffman Coding Technique for Image Compression”** ISSN:2320-0790.
2. R.Mahendran PG Scholar, Embedded SystemTechnology S.A Engg College., Chennai, 2016 International Conference on Advanced Communication Control and Computing Technologies (ICACCCT) **“Integrated LiFi(Light Fidelity) For Smart Communication Through Illumination”**doi:10.1109/icaccct.2016.7831599.
3. Pavas Goswami, Manoj Kumar Shukla Department of Electronics, School of Engineering, HBTU, Kanpur, India , October 31, 2017 **“Design of a LiFi Transceiver”** DOI: 10.4236/wet.2017.84006.
4. Ms. Bhagyashree M. Meshram, Dr. V. M. Deshmukh, April 2018 , International Journal on Future Revolution in Computer Science & Communication Engineering **“Image Encoding & Decoding Using Base64 Technique and It’s Wireless Transmission Using LiFi”** ISSN: 2454-4248.
5. Divya Kiran Xalxo , V. Muralidharan, International Journal of Trendy research in Engineering and Technology(IJTRET) Volume 2 Issue 2(2) April 2018 **“Subaquatic Message Transmission Using LiFi”**.
6. Mehmat Fatih Isik , Mustafa Rasit Haboglu , Busra Yatrasi , International Journal of Electronics and Electrical Engineering,February 2017,**“Applicability of LiFi for Industrial Automation”**,DOI: 10.18178/ijeee.5.1.21-25.
7. Proceedings of the 2nd International Conference on Inventive Communication and Computational Technologies **“Image Transmission Using LiFi”** (ICICCT 2018) IEEE Xplore Compliant - Part Number: CFP18BAC-ART; ISBN: 978-1-5386-1974-2.
8. Divya Kiran, Murulanilini International Journal of Trendy research in Engineering and Technology (IJTRET), **“LIFI: An Emerging Technology for Health Care”** Volume 2 Issue 2(2) April 2018.
9. S. L. Bangare, S. T. Patil, **“Reviewing Otsu’s Method For Image Thresholding”**, International Journal of Applied Engineering Research (IJAER),Vol.10, Issue.9, ISSN 0973-9769, pp. 21777-21783. 2015.
10. S. L. Bangare, G. Pradeepini, S. T. Patil, **“Regenerative Pixel Mode and Tumor Locus Algorithm development for Brain Tumor Analysis –A New Computational technique for precise Medical Imaging”**, International Journal of Biomedical Engineering and Technology (IJBT), Vol.27, Issue.1-2, ISSN 1752-6426, pp.76-85.March 2018, Inderscience Pub.
11. S. L. Bangare, G. Pradeepini, S. T. Patil, **“Neuroendoscopy Adapter Module Development for Better Brain TumorImage Visualization”**, International Journal of Electrical and Computer Engineering (IJECE), Vol.7, Issue.6, ISSN 2088-8708, pp.3643-3654. 1/12/2017.
12. S. L. Bangare, G. Pradeepini, S. T. Patil, **“Implementation for brain tumor detection and three dimensional visualization model development for reconstruction”**, ARPN Journal of Engineering and Applied Sciences (ARPN JEAS), Vol.13, Issue.2, ISSN 1819-6608, pp.467-473. 20/1/2018.
13. P. S. Bangare, S. L. Bangare, **“Implementing Separable Reversible Data Hiding In Encrypted Image Using CLM RC4 Method”**, *International Journal of Engineering Research and Technology (IJERT)*, Volume 3, Issue 04, 2014/4/26.
14. S. L. Banagre, P. S. Bangare, **“Automated API Testing Approach”**, *International Journal of Engineering Science and Technology*, Volume 4, Issue 2, Page(s) 673-676, ISSN: 0975-5462, 2012.
15. S. L. Bangare, P. S. Bangare, **“Automated Testing in Development Phase”**, *International Journal of Engineering Science and Technology*, Volume 4, Issue 2, Page(s) 677-680, ISSN: 0975-5462, 2012
16. P. S. Bangare, S. L. Bangare, **“The Campus Navigator: An Android Mobile Application”**, *International Journal of Advanced Research in Computer and Communication Engineering*, Vol. 3, Issue 3, March 2014, Page(s) 5715-5717, ISSN (Online) : 2278.
17. P. A. Kotwal, S. L. Bangare, **“A Location Tracer With Social Networking Services”**, *International Journal of Engineering and Technology (IJET)*, Vol 4 No 1 Feb-Mar 2012, Page(s) 19-23, ISSN: 0975-4024.
18. P. S. Bangare, Y. S. Petare, A. P. Chaudhari et al.,**“Developing Accident Monitoring System Using Wireless Application,”** *International Journal of Information and Computing Science*, vol.6, no.4, pp. 1-7, April 2019.