CHAPTER 1

INTRODUCTION

This chapter gives a brief description about Li-Fi and the problem faced by the developers and the users in adapting to this technology. It also compares the electromagnetic spectrum of both radio waves and visible light.

1.1 LIGHT-FIDELITY

People rely more on Internet for their day to day activities. It is impossible to think of a day in our lives not being connected to the 'Internet'. In scenarios where, one wants to transfer data quickly and efficiently, the low internet speeds can be quite annoying. In 2011, Professor Harald Haas from the University of Edinburgh in the UK, suggested an idea called "Data through illumination". Harald Hass used fibre optics to send data through LED light bulbs. With Li-Fi, one can connect to the internet simply by being within range of an LED beam.

1.2 PROBLEM DEFINITION

Light modulation is an existing concept, but adapting to the technology will take some more time because replacing Wi-Fi with Li-Fi is not an easy task since people have been adapted to Wi-Fi for years. People have become more comfortable with Wi-Fi technology so evolving to a world replacing Wi-Fi for people takes some

- To Developers - It is quite challenging for developers to make an existing device to adapt to a new technology with some improved software.
- To Users – Switching over to a new technology from an existing technology.

1.3 OBJECTIVE

The main objective of the project is to provide an efficient, low cost, secure, digitally controlled and fast data transfer technique which can be used as an alternative for conventional data transfer technique Wi-Fi. At the same time the project also lets us to use more efficient light source i.e., LED.

The prime objective of the project is to create an application that transmits data be it text, audio or video using Li-Fi technology for coping with the limited bandwidth problem we face in RF (Radio frequency) signals. One of the advantages of using Li-Fi over Wi-Fi is that it avoids radiation produced by Wi-Fi.

1.4 LITERATURE SURVEY

The most of the people are using Wi-Fi Internet devices, which will be useful for 2.4-5GHz RF to deliver wireless Internet access surrounded our home, offices, schools, and some public places also. Wi-Fi can cover an entire house, school, the bandwidth is limited to 50-100 megabits per seconds (Mbps) and Wi-Fi may not be the most efficient way to provide new desired capabilities such as precision indoor positioning and gesture recognition. The optical wireless technologies, sometimes called visible light communication (VLC), and more recently referred to as Li-Fi. On the other hand, offer an entirely new paradigm in wireless technologies in the terms of communication speed, usability and flexibility, reliability.

VLC is the possible solution to the global wireless spectrum shortage. The VLC is a data communication medium using visible light between 400THz to 375THz as optical carrier for the data transmission and illumination. The data is encoded in the light to generate new data stream by varying the flickering rate, to be clearer, by modulating the LED light communication source.

This is a whole new spectrum of possibilities as compared to the radio waves spectrum and is 10000 times more in size. Visible light is not injurious to vision and are a mandatory part of an infrastructure, therefore abundantly available and easily accessible. Comparing the number of radio cellular base stations (1.4 million) to the number of light bulbs (14 billion) installed already the ratio is coincidently same i.e. 1:10000

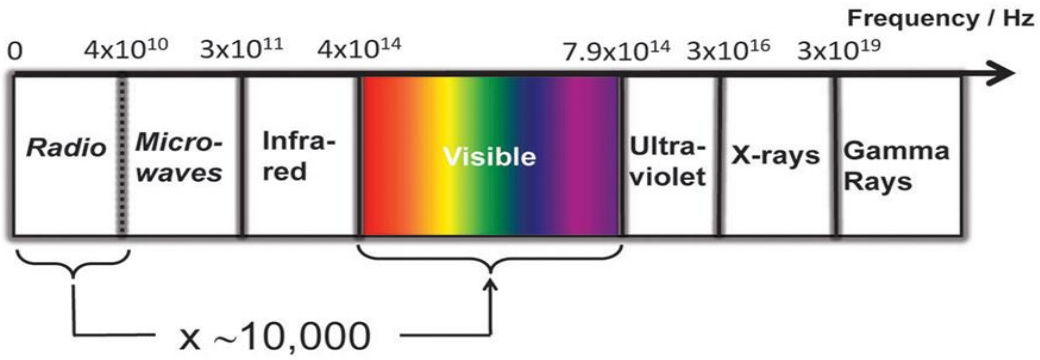

Figure 1.1 Electromagnetic Spectrum

1.5 DRAWBACKS OF WI-FI

- 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.
- Access points could be used to steal personal and confidential information transmitted from Wi-Fi consumers.
- The speed on most wireless networks (typically 1-54 Mbps) is far slower than even the slowest common wired networks (100Mbps up to several Gbps).
- Wi-Fi uses the unlicensed 2.4GHz spectrum, which often crowded with other devices such as Bluetooth, microwave ovens, cordless phones, or video sender devices, and among many others. This may cause degradation in performance.
- Wi-Fi networks have limited range. A typical Wi-Fi home router might have a range of 45m (150ft) indoors and 90m (300ft) outdoors.

1.6 EXISTING SYSTEM AND PROPOSED SYSTEM

EXISTING SYSTEM

Harald Hass showed a demo of streaming a HD video through Li-Fi at a rate of 10Mbps which is faster than average broadband connections.

PROPOSED SYSTEM

The project focuses on transferring the binary data using Li-Fi technology through android application and audio transfer using led and solar cell. The application gets the binary value from the user and sends the values through led available in the smartphones and it is received by another smartphone through the light sensor present in it. In audio transfer audio file is given as input and output is obtained through speaker.