Visible Light Communication For Video Transmissions

Sakthi Saravanan S[1], Santhosh Kumar J[2], Santhosh Kumar M[3]

[1]Sakthi Saravanan S, Department of ECE, Meenakshi Sundararajan Engineering college, Chennai, Tamil Nadu, India

[2]Santhosh Kumar J, Department of ECE, Meenakshi Sundararajan Engineering college, Chennai, Tamil Nadu, India

[3]Santhosh Kumar M , Department of ECE, Meenakshi Sundararajan Engineering college, Chennai, Tamil Nadu, India

Mrs.B.Saraswathy, Assistant Professor, Department of ECE, Meenakshi Sundararajan Engineering college, Chennai,Tamil Nadu, India

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Abstract - *With the large technological advancements being made per annum, the requirement for better and faster data rates increases and improved security measures is being given high importance within the research community. Therefore, open space communication has become a hot topic within the recent years of which Visible Light Communication (VLC), is one among the highly researched areas. The rationale for its high popularity is thanks to its ability to supply high data rates, high bandwidth and a really secure medium of transmission because it cannot penetrate walls. This paper investigates the impact of Visible Light Communication on video transmissions. A true experimental test-bed is setup to check the performance of video transmission over VLC under various conditions like distance from the source, interfering lighting etc..,*

1. INTRODUCTION

Visible light communication (VLC) is that the term given to an optical wireless communication system that conveys information by modulating light that's visible to the human eye. Continuous improvements in wireless communication systems, e.g. 3G, 4G, etc.., a coming crisis is anticipated because of the shortage of sufficient frequency (RF) resources, this limitation in bandwidth can't support the expansion in demand for high data rate and also the high numbers of communication systems, the extension of wireless services and other being increased in user demand for these services, but the available RF spectrum for usage is extremely limited. Therefore the new technology of Li-Fi came into picture.

Light fidelity (Li-Fi) is a brand new short range optical wireless communication technology which provides data transmission like text, audio, video by using Light-Emitting Diodes (LEDs) to transmit data relying on the light illumination properties. In this technology, LEDs are used to transmit data within the visible light spectrum. This technology are often compared therewith of Wi-Fi and offers several advantages like increased accessible spectrum, efficiency, security, low latency and much higher speed. Communication is achieved by switching LED lights on and off at a speed above what's perceptible to the human eye. This concept promises to resolve issues just like the shortage of radio-frequency bandwidth and boot out the disadvantages of Wi-Fi. Li-Fi is that the upcoming and on growing technology acting as competent for various other developing and already invented technologies. Hence the long run applications of the Li-Fi are often predicted and extended to different platforms and various walks of human life.

2. EXISTING SYSTEM

Wi-Fi is a technology which is used for an electronic device to exchange data or remain wirelessly connected to the internet by using radio waves. The Wi-Fi stands for Wireless Local Area network communication technology. Which is related to the IEEE802.11 of wireless networking standards. Optical wireless technologies called visible light communication (VLC) are more recently referred to as Li Fi, offers an entirely new paradigm in wireless technologies in terms of communication speed, flexibility and usability. LEDs (Light Emitting Diodes)

are recognized in the terms of green lighting resource because they are very energy efficient and contain no hazardous materials such as mercury emitted by fluorescent lamps. The LEDs are the source of light that are used in equipment, electronic devices, and consumer products. Their uses variants in terms of signaling, signage and illumination. These are used because of their small size, versatility and most important feature is that it is the high energy efficiency over other illuminating sources. Recent emerging advancement in LED technology made LED to be the preferred choice for indoor and outdoor lighting applications. The feature of LEDs is the ability to switch on and off thousands of times per second. This switching is at very high ultra-speed that a human eye can detect, that the light appears to be constantly on. This capability makes it suitable for many purpose. This technology can also be used to transmit a signal even when the light is off. These signals are emitted from the LEDs in the form of binary code off means 0 and on means.

3. LITERATURE SURVEY

This paper uses [1] that, indoor localization using short-range wireless communication techniques has gained popularity over the Global Positioning System due to the latter's limited capability to provide indoor positioning information. This paper reports the implementation of a multi-transmitter visible light communication based indoor localization system that offers a moderate data rate and indoor positioning with sub-meter accuracy. The work includes a prototype of the proposed system with four transmitters and a receiver module mounted on a stationary base. The transmitted data was Manchester encoded, and Binary Amplitude Shift Keying modulated Multiple Access technique. The receiver module used a PIN photodiode to detect the light signal and indoor positioning or localization was implemented using received signal strength technique.

On the other hand it also uses [2] that, there has been an increasing number of information technologies utilized in buildings to advance the idea of "smart buildings". Among various potential techniques, the use of Wi-Fi based indoor positioning allows to locate and track smartphone users inside a building, therefore location-aware intelligent solutions can be applied to control and of building operations. These location-aware indoor services (e.g. path finding internet of things, location based advertising) demand real-time accurate indoor localization, which is a key issue to guarantee high quality of service in smart buildings. This paper presents a new Wi- Fi based indoor localization technique that achieves significantly improvement of indoor positioning accuracy with the help of Li-Fi assisted coefficient calibration. The proposed technique leverages indoor accurate localization framework. In this work, experimental study and measurements are conducted to verify the performance of the proposed idea.

4. PROPOSED SYSTEM

The Li-Fi system proposed in this paper is capable of transmitting video between two devices at the high speed. The main requirement is line of sight between the sender and the receiver and hence it can be used to transmit a video within a room. In this paper, we develop a VLC prototype with large increase in transmission distance and improvement in channel capacity. The optical link which performs as the substitute of connector wire can be widely applied in video conference, real-time video frequency monitoring, smart traffic system and various practical scenarios where illumination and data transmission is in joint demand to serve modern daily life. Figure 1 demonstrates the block diagram of the Li-Fi transmitting module in which it has a PIC16f788a microcontroller which takes the UART data and converts into TTL output to fed the input to the led. UART and led driver modules are used for the conversion of data in the form of light.

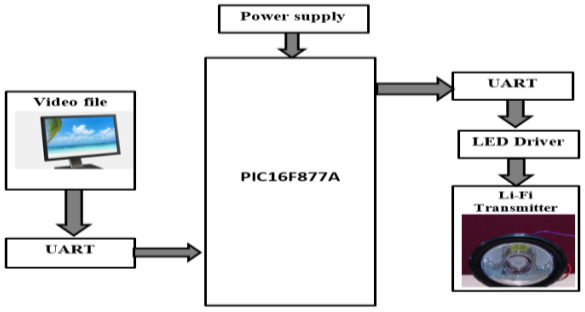

Fig-1:Li-Fi Transmitter

Figure 2 demonstrates the Li-Fi receiver module which receives the light and converts into the UART form of data which is to be fed into the system with the help of PIC16f788a microcontroller which converts the TTL input into packet format.

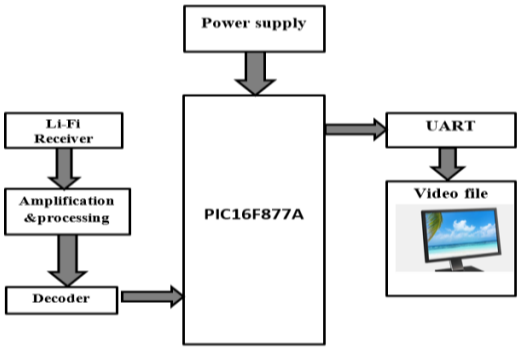

Fig-2: Li-Fi Receiver

5. CONCLUSION AND FUTURE SCOPE

Li-Fi continues to be in its incipient stages and thus offers tremendous scope for future research and innovation. The subsequent could be a brief overview of a number of the research work being conducted within the field and also the future scope for this technology. Researchers are developing micron sized LEDs which flicker on and off 1000 times faster than larger LEDs. They supply faster data transfer and also take up less space. Moreover, 1000 micron sized LEDs can fit into area required by 1 sq. mm large single LED. A 1 sq.mm sized array of micron sized LEDs could hence communicate 1000×1000 (i.e. a million) times the maximum amount information as one 1mm LED. The Li-Fi Consortium asserts that it's possible to attain speeds greater than 10Gbps. Researchers at the Heinrich Rudolph Hertz Institute in Berlin, Germany, have achieved data rates of over 500 megabytes per second employing a standard white-light LED. There are a plethora of possibilities to be gouged upon during this field of technology. If this technology becomes justifiably marketed then every bulb may be used analogous to a Wi-Fi hotspot to transmit data wirelessly. By virtue of this we will ameliorate to a greener, cleaner, safer and a resplendent future. The concept of Li-Fi is attracting lots of eye-balls because it offers a real and really efficient alternative to radio based wireless. It's a bright chance to exchange the standard Wi-Fi because as an ever increasing population is using wireless internet, the airwaves have become increasingly clogged, making it more and tougher to urge a reliable, high-speed signal. This idea promises to resolve issues like the shortage of radio-frequency bandwidth and boot out the disadvantages of Wi-Fi. Li-Fi is that the upcoming and on growing technology acting as competent for various other developing and already invented technologies. Hence the long run applications of the Li-Fi may be predicted and extended to different platforms and various walks of human life.

6. REFERENCES

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