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"Li-Fi Integrated Data Transmission Using Visible Data Communication"

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ABSTRACT

We hope to make the concept and uses of Li-Fi technology more clear in this project. Although radio frequency waves are used by the present Wi-Fi network, only a small portion of the Radio Frequency spectrum is used. Goal in this project is to make the LiFi technology's idea and application more understandable. As a result, Li-Fi a new technology has emerged. Li-Fi is an newer technology. This project illustrates the usage of an array of LEDs for visible light spectrum data transmission. Compared to Wi-Fi, this technology offers significantly great speed, lower latency, more accessible spectrum, and security. The purpose of this research project is to use Arduino to construct a Li-Fi transceiver that can send and receive data in binary format. Programming is carried out using the Arduino Uno platform. Data (alphanumeric) transmission and reception have been completed successfully.

INTRODUCTION

VLC is a method of communication that makes use of light that is visible to the naked eye. Here, LEDs are used to help with communication. By turning on the LEDs, we modify the light at a very rapid speed such that it is invisible to the human sight. Then quickly off on the transmitter side. For example, the receiver side uses a photodiode to identify the modulation. Fast communication by light is known as light fidelity or Li-Fi. Prof. Harald Haas first announced Li-Fi at a TED Global Talk in July 2011. The Visual Light Communication system serves as its foundation. Li-Fi has a speed of roughly 224 Gbps. Processors like Arduino can be used to modulate light using LEDs.

Electronic devices can now connect to the internet wirelessly thanks to Li-Fi. Wi-Fi shortages are to be overcome by the rise of Li-Fi. Another wireless communication method based on the visible light communication approach is called Li-Fi, or light fidelity. It transmits data across the visible, infrared, and ultraviolet light spectrums using LED sources. With a larger bandwidth, it is a novel and effective alternative to Wi-Fi.

One of the biggest issues at time was handling data transfer for radio signals, which led to the development of Light as a noteworthy substitute. Data communication became possible with the advent of Visible Light Communication (VLC). Li-Fi, or light fidelity, is one of VLC technologies are a novel method of transmitting data from a source to a destination by using a light signals. It promises a number of advantages and can get beyond some of the drawbacks of Wi-Fi technology, such as radio interference, media obstructions, and security concerns.

Li-Fi technologies are primarily used in experiments and are not widely used in business. The industry's deployment of LiFi technology necessitates measuring the data transmission performance of the various data kinds that must be supported. The intention the purpose of this work is to examine VLCs data communication performance. Numerous businesses have started working on Li-Fi technology initiatives. Currently, businesses like LVX, Signify, Samsung, Philips, and others are developing this technology. A new analysis claims that Samsung has filed the greatest amount of Li-Fi patients. In order to streamline activities. O led communications has been attempting to integrate Li-Fi and big data.

PROPOSED SYSTEM ARCHITECTURE

Lighthouse that transmits data using Li-Fi. Visible light is used by the Li-Fi technology to transfer data. According to the block diagram, the lighthouse is equipped with a transmitter circuit, an LCD display, a PIC16F877 microprocessor (PC), a power supply, a Li-Fi transmission module, and a white LED. The lighthouse is powered by the power supply. The Li-Fi transmission module and the lighthouse are both managed by the microcontroller. Information about the lighthouse, including the Li-Fi transmission status, is displayed on the LCD display. The white LED is used by the Li-Fi transmission module to send data. The signal from the Li-Fi transmission module is strengthened by the transmitter circuit.

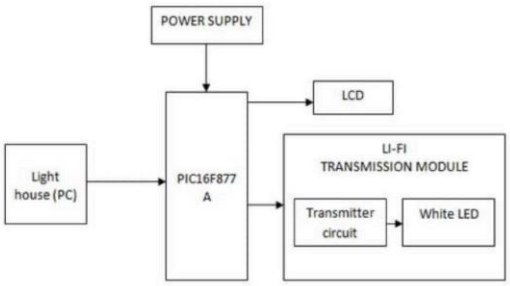

Fig:1.1 Transmitter

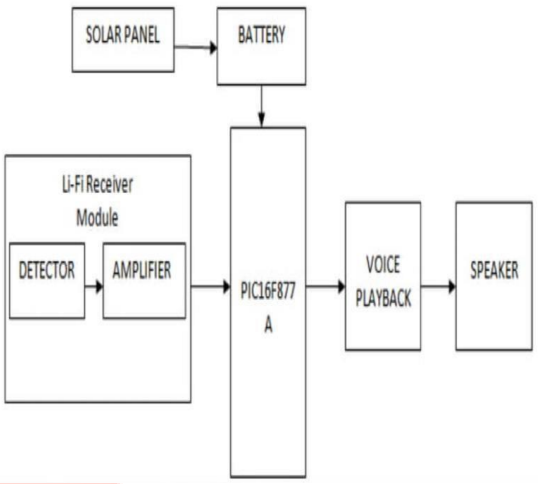

Fig:1.2 Receiver

System for light-fidelity, or Li-Fi, audio data transmission. Li-Fi is a technique that transmits data instead of radio waves using visible light. A solar panel, a battery, a LiFi receiver module, a detector, an amplifier, and a speaker make up the system shown in the block diagram. Sunlight is converted by the solar panel into power, which is then stored in the battery. Light signals are transformed into electrical impulses by the
Li-Fi receiver module. The Li-Fi transmitter, which is not depicted in the diagram, emits modulated light signals that are detected by the detector. The electrical impulses from the detector are amplified electrical signals are subsequently transformed back into audible sound via the speaker.

A PIC16F877 microcontroller is also mentioned in the diagram's text; this microcontroller is probably utilized to regulate the speaker and receiver module's functions. The diagram's "A" could stand for an aerial or antenna, which would be used to pick up the light signals coming from the Li-Fi transmitter.

HARDWARE REQUIREMENTS

1. Microcontroller PIC16F877A

In the industry, one of the most well-known microcontrollers is the PIC16F877A. There are 33pins designated for input and output out of the total 40pins. Numerous pic microcontroller applications make use of the PIC16F877A. its instruction set is smaller, with 35 items. It has a 20 MHz frequency range for operation. Four integrated circuit packaging options are available for it: 40-pin PDIP, 44-pin PLCC,
44-pin TQFP, and 44-pin QFN. Between
4.2 and 5.5 volts is the operational voltage. If you give it a voltage higher than 5.5 volts, it can sustain irreversible harm.

2 VLC Module

It is appropriate for a variety of speech recording and replaying electronics applications. The user can choose from 26 to 120 seconds for the message duration, depending on the specific device. An further intriguing characteristic of the ISD1700 series is the ability to modify the sampling frequency through the use of an external resistor. When both options are combined, the user is presented with an intriguing opportunity to compromise between the length and quality of the recording.

3 16X2 LCD Display With 12C

16 ASCII characters can be displayed on each of the two rows of the 16x2 character LCDs require 7 digital pins; however, this 12C-equipped module only requires 2pins. Additionally, a potentiometer is used to modify the contrast of the display. These LCDs are utilized in many different applications, including industrial testing instruments, laser printers, copiers, and fax machines.

4 Solar Panel

A solar panel is a device that uses photovoltaic (PV) cells to convert sunlight into electricity. Materials used to make PV cells emit excited electrons when exposed to light. Direct current (DC) electricity is created when electrons move across a circuit and can be stored in batteries or utilized to power a variety of devices. PV modules, solar electric panels, and solar cell panels are other names for solar panels. Typically, solar panels are installed in groups known as arrays or systems. One or more solar panels and an inverter that changes dc electricity into alternating current(AC) electricity make up a photovoltaic system.

5 Speaker

One of the most often utilized output devices with computer systems is a speaker. While some speakers can only be connected to computers, others can be connected to any kind of sound system. The goal of speakers, regardless of how they are made, is to generate audible output that the audience can hear. Electromagnetic waves are transduced into sound waves by speakers. This input could be digital or analog in nature. All analog speakers do is convert analog electromagnetic impulses into sound waves via amplification. Digital speakers must first convert the digital input to an analog signal before producing sound waves are produced in an analog format.

6 Battery

A battery is electrochemical device that may be charged with an electric current and discharged as needed. It is made up of one or more electrochemical cells. Typically, batteries are composed of several electrochemical cells that are attached to external inputs and outputs. Batteries are frequently used to power small electric gadgets, like flashlights, remote controls, and cell phones.
Historically, the combination of two or more electrochemical cells has always been referred to as a “battery”. Nonetheless, it’s thought that the contemporary meaning of “battery” includes gadgets with a single cell.

CONCLUSION

As the electromagnetic spectrum gets increasingly crowded, Li-Fi technology aspires to offer a quicker, simpler, greener, better, and healthier future for wireless networking systems. Every light source will be utilized as a Li-Fi entry point when this model is fully established, meaning that data transmission services will be available everywhere there is an LED lightbulb. In a few years, we anticipate Li-
Fi to be integrated with other complimentary wireless technologies to build a sophisticated, potent computer network. With this next integration, Li-Fi will be able to connect and charge any device big enough to install an LED and a light sensor. This article outlines the technological possibilities and rapid expansion of Li-Fi, as well as the remaining challenges to a fully integrated.

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