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INSPECTION ON COMMUNICATION INTERFERENCE AND MITIGATION USING LIFI TECHNOLOGY

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ABSTRACT

Communication during disaster plays a vital role. In this paper, a system is proposed to provide communication during disaster like earthquakes, sandstorms, tsunamis floods. etc when disaster happens it causes a black-out in communication, a serious of network failure which could cause the delays in rescue team especially in remote areas. The foremost important thing is generating the first response from the people or family who had a close encounter to that if it gets broken then communications with other people's get collapsed which lead to major impact to society by natural calamity. Li-Fi is a booming technology and plays a role on this scenario with the speed of transmission is up to 150mbps. This idea has been implemented as a demo using Arduino Uno processor with bit transfer and receives via serial communication ports. The bits are transmitted as a pack of 8 bits, and they are sent in a binary encoded format. Then the primary parameters such as BER, MSE, and PSNR are computed for the different field of distance by varying the position of Light source.

I. INTRODUCTION

All of us have increasingly become dependent on the internet some way or the other. It is impossible to think of a day in our lives, when we are not "connected" to the "net". We are using the internet for a variety of purposes, chief among them being sharing of data. In scenarios where we want to transmit data quickly and efficiently, low internet speeds can be quite annoying. LI-FI is a new technology which uses visible light for communication instead of radio waves. It refers to 5G Visible Light Communication systems using Light Emitting Diodes as a medium to high-speed communication in a similar manner as WI-FI [6]. It can help to conserve a large amount of electricity by transmitting data through light bulbs and other such lighting equipments. It can be used in aircrafts without causing any kind of interference. LI-FI uses light as a carrier as opposed to traditional use of radio waves as in WI-FI and this means that it cannot penetrate walls, which the radio waves are able to. It is typically implemented using white LED bulbs at the downlink transmitter [1]. By varying the current through the LED at a very high speed, we can vary the output at very high speeds. This is the principle of the LI-FI. The working of the LI-FI is itself very simple—if the LED is ON, the signal transmitted is a digital 1 whereas if it is OFF, the signal transmitted is a digital 0. By varying the rate at which the LEDs flicker, we can encode various data and transmit it. Li-Fi is no longer a concept or an idea but a proven technology, albeit still at its infancy. Already, several experts in the field of communication have attested that Li-Fi technology would soon become a standard adjunct to Wi-Fi. That is, until its inherent limitations could be overcome. Since it is light-based, its major drawback is that it won't be able to penetrate solid objects such as walls. Though it could also mean privacy for the personal user, it also questions its use for large-scale delivery of data transmissions. But despite its drawbacks, researchers all over the world have been going all-out in further developing this new technology. A research was initiated by a consortium of universities that includes the Universities of Cambridge, Oxford, St. Andrews and Strathclyde in Scotland. It is led by Professors Martin Dawson, from the Institute of Photonics, and Harald Haas, from the University of Edinburgh. The goal of the consortium is to eventually make every illuminated device, such as televisions, lamps, road signs, and commercial ad boxes, transmit data to gadgets such as mobile phones. At the University of Strathclyde, researchers have begun earnest efforts at bringing this new

technology to market. Their biggest accomplishment to date is the development of LEDs that are a thousand times smaller than the smallest commercial LED. Dubbed micro-LED. This means that 1,000 more lights could be fit into the same space as a typical LED. In addition to its size, micro-LEDs can flicker 1,000 times faster than commercial LED. Thus, in theory, a bank of 1,000 micro-LEDs flashing 1,000 times faster could transmit data a million times faster than that of an average LED. At the moment, the potential advantage of micro-LEDs for Li-Fi use is staggering. While Li-Fi technology by itself is already incredible, having increased its data transfer speed that is comparable to fibre optics is what makes this new technology a major issue. Imagine having a light source that not only provides light but also networking capability at astonishing speeds. Or a home television that communicates with every other gadget around, including the ability to project your smart phone's display onto it for easy presentation to large groups. Or highways lighted by Li-Fi, providing motorists with real-time traffic and weather news as well as internet access to all devices inside. The possibilities seem endless, and the potential is much broader than at first thought. With all the support pouring in, it won't be long now before Li-Fi becomes an everyday technology.

II. POWER SUPPLY

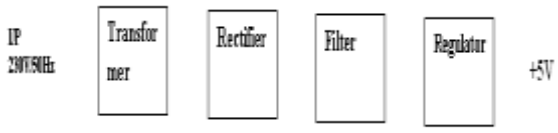


Figure Power Supply

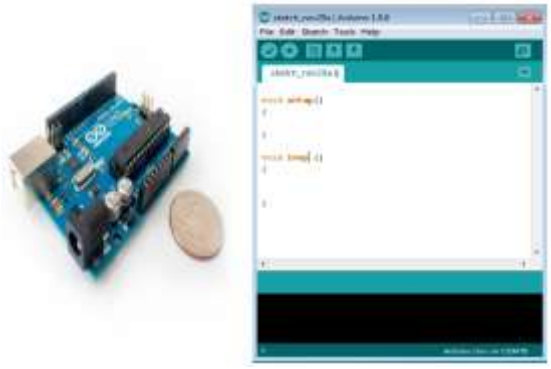
III. HARDWARE

3.1 Arduino

Arduino is a prototype platform (open-source) based on an easy-to-use hardware and software. It consists of a circuit board, which can be programed (referred to as a microcontroller) and a ready-made software called Arduino IDE (Integrated Development Environment), which is used to write and upload the computer code to the physical board.

The key features are −

- Arduino boards are able to read analog or digital input signals from different sensors and turn it into an output such as activating a motor, turning LED on/off, connect to the cloud and many other actions.
- You can control your board functions by sending a set of instructions to the microcontroller on the board via Arduino IDE (referred to as uploading software).
- Unlike most previous programmable circuit boards, Arduino does not need an extra piece of hardware (called a programmer) in order to load a new code onto the board. You can simply use a USB cable.
- Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program.
- Finally, Arduino provides a standard form factor that breaks the functions of the micro-controller into a more accessible package.



Here is a list of different Arduino boards available.

Board Description:

In this chapter, we will learn about the different components on the Arduino board. We will study the Arduino UNO board because it is the most popular board in the Arduino board family. In addition, it is the best board to get started with electronics and coding. Some boards look a bit different from the one given below, but most Arduinos have majority of these components in common.

3.2 Liquid Cristal Display

A liquid crystal display (LCD) is a thin, flat display device made up of any number of color or monochrome pixels arrayed in front of a light source or reflector. Each pixel consists of a column of liquid

crystal molecules suspended between two transparent electrodes, and two polarizing filters, the axes of polarity of which are perpendicular to each other. Without the liquid crystals between them, light passing through one would be blocked by the other. The liquid crystal twists the polarization of light entering one filter to allow it to pass through the other.

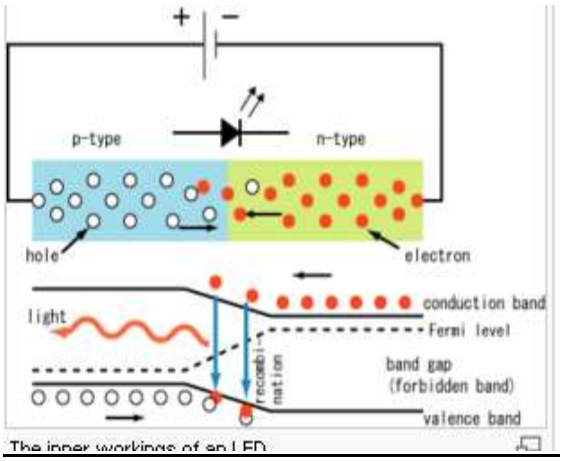
A program must interact with the outside world using input and output devices that communicate directly with a human being. One of the most common devices attached to an controller is an LCD display. Some of the most common LCDs connected to the contollers are 16X1, 16x2 and 20x2 displays. This means 16 characters per line by 1 line 16 characters per line by 2 lines and 20 characters per line by 2 lines, respectively.

3.5 LED

A light-emitting diode (LED) is a semiconductor light source. LEDs are used as indicator lamps in many devices, and are increasingly used for lighting. Introduced as a practical electronic component in 1962, early LEDs emitted low-intensity red light, but modern versions are available across the visible, ultraviolet and infrared wavelength s, with very high brightness.

The LED is based on the semiconductor diode. When a diode is forward biased, electrons are able to recombine with holes within the device, releasing energy in the form of photons. This effect is called electroluminescence and the color of the light (corresponding to the energy of the photon) is determined by the energy gap of the semiconductor. An LED is usually small in area (less than 1 mm^2), and integrated optical components are used to shape its radiation pattern and assist in reflection. LEDs present many advantages over incandescent light sources including lower energy consumption, longer lifetime, improved robustness, smaller size, faster switching, and greater durability and reliability. However, they are relatively expensive and require more precise current and heat management than traditional light sources. Current LED products for general lighting are more expensive to buy than fluorescent lamp sources of comparable output.

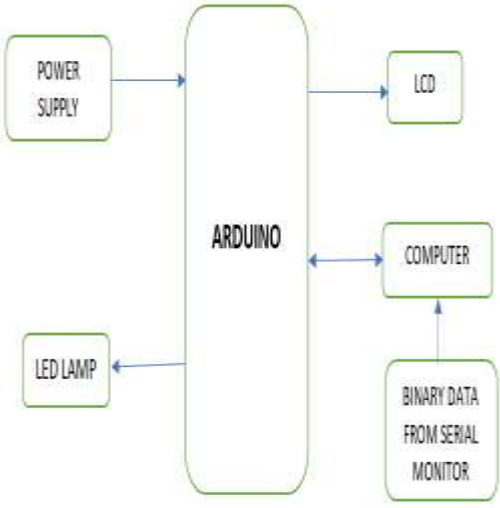
Working: Charge-carriers—electrons and holes—flow into the junction from electrodes with different voltages. When an electron meets a hole, it falls into a lower energy level, and releases energy in the form of a photon. The wavelength of the light emitted, and therefore its color, depends on the band gap energy of the materials forming the *p-n junction*. In silicon or germanium diodes, the electrons and holes recombine by a *non-radiative transition* which produces no optical emission, because these are indirect band gap materials. The materials used for the LED have a direct band gap with energies corresponding to near-infrared, visible or near-ultraviolet light.



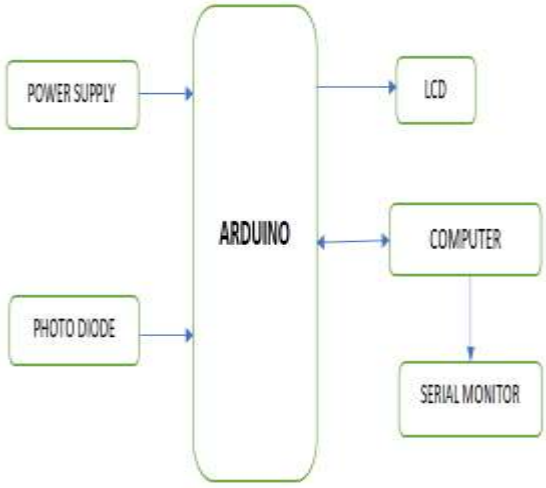
The inner workings of an LED

IV.Result:

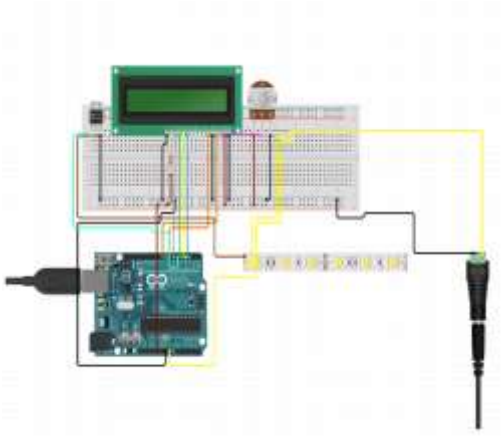
IV.1 TRANSMITTER



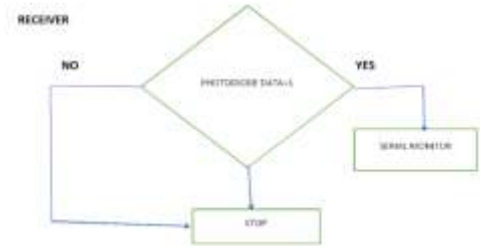
RECEIVER:



SCHEMATIC DIAGRAM



FLOW CHART
TRANSMITTER



Working

In this project we are transferring the data with help of new technology i.e., LiFi Technology in this technology the data is transferred with help of a diode which emitters the light ray which will be collected by another photodiode. The transfer rate will be faster in this technology. Here we use Serial monitor for output.

V. CONCLUSION

LI-FI is an emerging technology and hence it has vast potential. A lot of research can be conducted in this field. Already, a lot of scientists are involved in extensive research in this field. This technology, pioneered by Harald Haas, can become one of the major technologies in the near future. If this technology can be used efficiently, we might soon have something of the kind of WI-FI hotspots wherever a light bulb is available. It will be cleaner and greener and the future of mankind will be safe. As the amount of available bandwidth is limited, the airwaves are becoming increasingly clogged, making it more and more difficult to get a reliable, high-speed signal. The LI-FI technology can solve this crisis. Moreover, it will allow inter access in places such as operation theatres and aircrafts where internet access is usually not allowed.

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