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LI- FI Data Transmission Using Laser

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Abstract*:*
Many people nowadays use the internet to do tasks using a wired or wireless network. Wireless network speed reduces proportionally as the number of users increases. Even while IEEE 802.11n allows for speeds of up to 150 Mbps, it is still insufficient to serve the needed number of users. We're presenting the concept of Li-Fi to address Wi-limitations. According to German physicist Harald Haas, "data by illumination" means delivering data through an LED light bulb that varies in intensity quicker than the human eye can follow. Haas claims that his technology, dubbed DLIGHT, can provide data speeds of more than 10 Mbps, which is quicker than a typical broadband connection. The LASER Li-Fi is a more advanced form of Li-Fi that replaces the LED with a laser. In compared to LED, LASER has a faster on-off activity. LASER Li-Fi has a data transfer rate of up to 10Gbps, whereas LED Li-Fi has a data transfer rate of just 1Gbps. LASER is utilized for fast data transfer speed and better performance.
Keywords: *Arduino UNO, Laser, Arduino IDE, Li-Fi Technology, etc.*

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I. INTRODUCTION

Li-Fi (Light Fidelity) is a wireless system that uses light rather than radio waves, as the name suggests. Harald Haas, a German scientist at the capital's university, developed this technology. Within the year 2012, he demonstrated it. Li-Fi is a Wi-Fi alternative that uses actinic radiation to transport data. The information was wirelessly sent using LED or laser technology. Wi-optical Fi's version, Li-Fi, is fast and inexpensive. laser Li-Fi is a subset of Li-Fi in which a laser is used in place of a junction rectifier light-weight bulb. Li-Fi would replace Wi-Fi modems with transceiver-equipped led bulbs that could both send and receive data while also lighting up an area Li-Fi refers to data transfer using illumination, such as delivering data via an LED light bulb or LASER that changes intensity quicker than the human eye can follow. Data can be transferred using any type of light, including light that is invisible, ultraviolet, or visible in the spectrum.

II. Objective

The following is a list of the proposed work's goals:
1. To use laser as a carrier to transmit and receive text data.
2. Design and implement a Li-Fi prototype module (visible light communication).
3. To safely send messages from one tower to another.

III. LITERATURE SURVEY

[1] Secured Transmission of Data through Laser Using Li-Fi Technology
Author:- Nishakar Kankalla, K. Anirudh Reddy, N. Haripriya

The term "light amplification by stimulated emission of radiation" is abbreviated as LASER. They function similarly to fiber optic cables, with the exception that the beam is sent via open space. Laser light has recently been utilized to transport data across longer distances. Point-to-point communication will be possible over large distances, through air and space, with no loss. Higher data speeds, laser cross-link technology explosions, global development activity, improved hardware, and design maturity are all being driven by information transfer. The development of a dependable, high-power single mode laser diode as a directly modulable laser source has proven crucial in laser communications This advancement in technology allows laser communication system designers to create very light, high-bandwidth, low-cost communication payloads for satellites whose launch costs are heavily influenced by launch weight. Transmitting data using a certain technology is not significantly easier than processing data without it, and authentication is also required when sending data.

[2] LASER Li-Fi Based SMS Communication.
Author:- Vibhu Bindal .

Many people nowadays use the internet to do tasks using a wired or wireless network. Wireless network speed reduces proportionally as the number of users increases. Even while IEEE 802.11n allows for speeds of up to 150 Mbps, it is still insufficient to serve the needed number of users. We are introducing the notion of Li-Fi to address Wi-limitations. Fi's According to German physicist Harald Haas, "data by illumination" means delivering data through an LED light bulb that varies in intensity quicker than the human eye can follow. Haas claims that his D-LIGHT device can deliver data speeds of more than 10 Mbps, which is quicker than the average broadband connection. The LASER is a type of laser. Li-Fi is a more advanced form of Li-Fi that uses a laser instead of an LED. In compared to LED, LASER has a faster on-off activity. LASER Li-Fi has a data transfer rate of up to 10Gbps, whereas LED Li-Fi has a data transfer rate of just 1Gbps. LASER is utilized for fast data transfer speed and better performance. Li-Fi (Light Fidelity) is a wireless technology that, as the name suggests, is based on light rather than radio waves. Harald Haas, a German physicist at the University of Edinburgh, devised this technology. In the year 2012, he demonstrated it. Li-Fi is a Wi-Fi alternative that transmits data utilizing the visible light spectrum. Li-Fi technology employed LED or LASER to wirelessly transport data. Li-Fi is the optical variant of Wi-Fi that is both fast and inexpensive. LASER Another characteristic of Li-Fi is that I utilize a laser instead of an LED light bulb. Li-Fi would replace Wi-Fi modems with transceiver-equipped LED bulbs that can both illuminate and broadcast and receive data. Li-Fi refers to data transfer by illumination, such as delivering data via an LED light bulb or LASER that changes intensity quicker than the human eye can follow. Data can be transferred using any type of light, including light that is invisible, ultraviolet, or visible in the spectrum.

IV. PROBLEM STATEMENT

- In Currency Note Press they are using radio signals for communicating, if someone fits jammer so there is no communication.
- In radio frequency system there is more chance of hacking.
- Anyone at the same frequency can hear the message.

V. PROPOSED SYSTEM

We only use one information source in this project, which is a digital signal. We need to convey data in digital form, then send it to the laser driver circuit in the form of morse information, which is a mixture of dots and dashes, using the Microcontroller. We use a photo detector circuit, such as a solar photodiode, to read the li-fi signal, which is sent in light form, and then convert it to electrical form using a photodiode. We can convert it to digital data and display it on an LCD display using a microcontroller. In this project, we employ light as a travelling medium for information signals, and both the signal and the light are conveyed by the same source, so the light and data are transmitted by the same source. The transmitter section and the receiver section are employed in this process. A modulated light signal is sent from the transmitter source, which is decoded at the receiving end and presented with information.

Advantages of Proposed System:

- Because Li-Fi employs light rather than radio frequency transmissions, it is sensitive to interference.
- VLC might be used on planes without interfering with airline signals.
- Because this technology does not use radio waves, it can be easily integrated into medical devices and hospitals.
- Wi-Fi does not work underwater in the sea, but light may be used, thus undersea excursions are now possible with simplicity.
- To transfer data, billions of bulbs around the world need to be replaced with LEDs.
- Another advantage of employing light for data communication is that it does not pass through walls.
- On highways for traffic control applications, such as cars with LED headlights and backlights that can communicate with one another and prevent accidents.
- Every streetlamp in the globe would be a free data connection point if this technology was used.
- Li-Fi may be able to solve the problem of radio frequency bandwidth scarcity.

VII. SYSTEM ARCHITECTURE

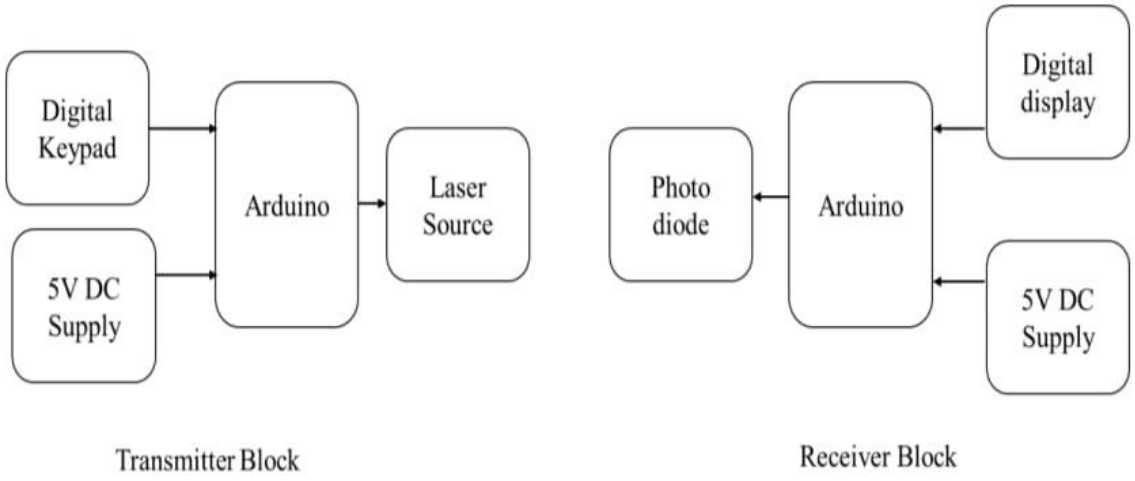

Fig. System Architecture

VIII. METHODOLOGY:

To begin, load the data that will be communicated into the microcontroller using dumper and an embedded C application. We employ morse code in that software. There is a morse code decoder on the transmitter side and a morse code encoder on the receiving side. The microcontroller on the transmitter side serves as an input device for data transmission to another part. Second, address codes are mentioned in the microcontroller itself utilizing switches (transistors) in the transmitter portion. Laser light can be used to transfer the data that has been loaded. Data receiving, on the other hand, may be accomplished using photodiode4 and an Arduino uno to convert TTL logic levels to RS232 logic. Only when the authenticated passkey is accessed can the data be received. On the other side, the photodiode converts the signal into an electrical signal that is used to show the data on the LCD. Incorrect passwords can result in data access being prohibited and a trash value being displayed on the screen. It is a point-to-point communication system that can easily detect disturbances. A general-purpose input/output (GPIO)8 is an uncommitted digital signal pin on an integrated circuit or electrical circuit board whose behavior—including whether it works as an input or output—can be controlled by the user at run time, which is a great feature in this system.

Applications:

- Smart city
- Healthcare
- Education
- Smart Homes
- Aviation
- Automotive
- Industrial
- Military applications
- Advertisement and Disaster Management
- Radio broadcasting
- Underwater Explorations

Disadvantages:

- Sometimes External light may interfare in the laser light.

X. CONCLUSION

THE ADVANCED VERSION OF LI-FI IS LASER LI-FI, IN WHICH WE USE LASER INSTEAD OF LED LIGHT BULB. THE DATA TRANSFER RATE INCREASES UP TO 10 GBPS DUE TO THE USE OF LASER. THE CONCEPT OF LI-FI IS GETTING A LOT OF ATTENTION RIGHT NOW, NOT LEAST BECAUSE IT MAY PROVIDE A REAL AND EFFECTIVE OPTION TO RADIO BASED WIRELESS. THE AIR WAVES ARE BECOMING GRADUALLY MORE CRAMMED AS MORE AND MORE PEOPLE AND THEIR DEVICES ACCESS WIRELESS INTERNET, MAKING IT MORE AND MORE DIFFICULT TO GET A CONSISTENT, HIGH-SPEED SIGNAL, SO LI-FI HAS A BRILLIANT FUTURE.

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