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VEHICLE TO VEHICLE COMMUNICATION USING LI-FI TECHNOLOGY

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Abstract - In this paper, we present you the designs of a small-scale prototype of a Vehicle-to Vehicle communication system using light fidelity (Li-Fi) technology. The vehicle to vehicle communication is the most effective solution that has been used to reduce vehicles accidents. The proposed use of Li-Fi technology comprises mainly light-emitting diode (LED) bulbs as means of connectivity by sending data through light spectrum as an optical wireless medium for signal propagation. In fact, the usage of LED eliminates the need of complex wireless networks and protocols. Li-Fi is the wireless communication system in which light is used as a carrier signal instead of traditional radio frequency as in Wi-Fi. Our main aim is to enhance the quality of Intelligent Transportation System (ITS) with the help of VLC technology using a Li-Fi technology.

Keywords: Li-Fi, Vehicle to Vehicle Communication, Wireless Signal Propagation

I. INTRODUCTION

There are around 1.4 million cell pole radio waves base stations set, with more than 5 billion cell phones. Cell phones transmit over 600TB of information on a normal reason for consistently. Presently a day's remote correspondence utilizes radio waves. Yet, radio waves have an issue of effectiveness, accessibility, security, and limit. Range is significant necessity for remote correspondence. With headway in innovation and increment in number of clients, existing radio wave range neglects to address the issue and consequently, the limit issue. To determine all the issues, we have concocted the idea of transmitting information remotely through light utilizing LEDs, called as Li-Fi which is a most recent innovation that utilizes LED lights which helps in the transmission of information considerably more quicker, and adaptable due to the sturdiness, effectiveness and high life time attributes that makes Li-Fi idea a superior one. Driven lights are these days generally utilized for individual and authority purposes for their radiant viability improvement.

Obvious light correspondence (VLC) is another method for remote correspondence utilizing noticeable light. Common transmitters utilized for noticeable light correspondence are obvious light LEDs and recipients are photodiodes and picture sensors. Being a profoundly populated nation like India and parcel of traffic issues, there is constantly an issue of manual traffic control at whatever point an emergency vehicle shows up along a specific course which isn't powerful. The proposed system aims in using lifi for transmission of data through led light between two vehicles which helps in reducing road accident and promotes safe driving

II. LITERATURE SURVEY

A. Introduction to indoor networking concepts and challenges in LiFi

An economically accessible Li-Fi organize, was conveyed in a solitary study hall utilizing eight Li-Fi attocell Aps with two extra Wi-Fi APs that serve seven study halls. Every Wi-Fi AP can bolster information rates somewhere in the range of 300 and 867 Mbps, contingent upon the method of activity and transfer speed. Every Li-Fi AP can bolster a roundabout inclusion zone with distances across extending somewhere in the range of 2.8 and 3.5 m. Every Li-Fi AP can bolster a limit of eight clients, this compares to an all-out most extreme accumulated information pace of 344 Mbps per study hall. This confirmation of-idea framework utilizes off-the-rack unmodified LED luminaires whose electrical transfer speed is in the locale of 2 MHz whose primary reason for existing is to exhibit the concurrent elements of lighting and remote systems administration utilizing a similar framework. The benefit of this framework is its speed of correspondence which is the idea that we have attempted to guzzle in the proposed paper.

B. What Is Li-Fi?

Because of the expanding interest for remote information correspondence, the accessible radio range underneath 10 GHz (cm wave correspondence) has gotten inadequate. The remote correspondence industry has reacted to this test by thinking about the radio range over 10 GHz (mm-wave correspondence). In any case, the higher frequencies, f, imply that the way misfortune, expands as per the Friis free space condition also, blockages and shadowing in earthly correspondences are progressively hard to defeat at higher frequencies. Light-Fidelity (Li-Fi) is a continuation of the pattern to move to higher frequencies in the electromagnetic range. A Li-Fi attocell organize utilizes the lighting framework to give completely arranged (multiuser access and handover) remote access. This paper gives some underlying consequences of the downlink execution of a DCO-OFDM-based Li-Fi attocell system and analyzes its exhibition to the best in class RF femtocell systems

C. A new approach to wireless data transmission using visible light

The proposed framework comprises of Arduino, photodiode, drove, 16x2 LCD show. The framework proposed in their paper can possibly abuse the current light sources accessible in the earth to shape a strong system of conveying gadgets. This framework exhibits that it is conceivable to have a system arrangement dependent on upon light. On the off chance that the framework is completely actualized, at that point each light source can be utilized as a passage to have the information correspondence office. The framework was tried under various situations to assess the presentation of the framework. The benefit of this framework is that it guarantees effective remote correspondence.

D. Understanding Li-Fi Effect on LED light Quality

The framework has suggested that the effect of Li-Fi on LED can be concentrated by actualizing diverse Li-Fi regulation methods which should be executed and observing the subsequent varieties in the light quality measurements as revealed in our prior work. This is a procedure that could have a place, exorbitant and tedious. It is in this way attractive to build up a straightforward model/instrument from which the effect of Li-Fi on the LED light quality can be evaluated. Such a model will have the option to give an immediate connection between transmitted light quality measurements and the LED's driving current. Since in Li-Fi the LED 's driving current is legitimately balanced, such a model will in this way make it conceivable to precisely evaluate: (1) the varieties in transmitted light quality at any driving current (2)The most extreme potential varieties in the light quality measurements over the whole powerful scope of the LED. The adjustments in light quality because of Li-Fi would then be able to be contrasted with the business standard with check if the subsequent varieties fall inside the reasonable range or not. This is essentially significant in understanding the effect of Li-Fi on LED light quality and by expansion the prosperity of the clients. To get a current-light quality model, the CRI, CCT and chromaticity of each LED are estimated with an optical spectrometer at various driving flows. For every estimation, at any rate 2000samples are recorded and the mean of these examples is utilized as an information point in the exchange work plots

III. WORKING OF LI-FI

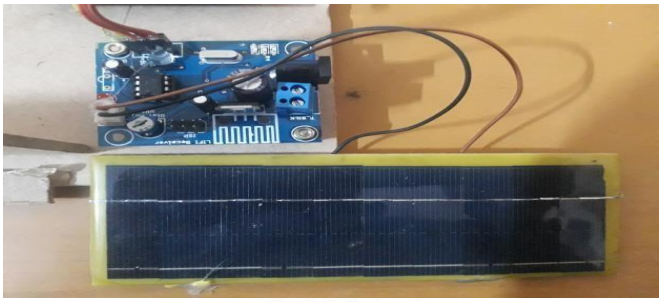
Li-Fi utilizes obvious light through overhead lighting for the transmission of information. This is conceivable using a Visible Light Communications (VLC) framework for information transmission.
Communication of Li-Fi consists of two parts.

1. **Li-Fi Transmitter**
   First transmitter will be connected to the Arduino board. Then Arduino board will send the data to transmitter, the transmitter will convert the data into binary and make it ready to transfer the data
   , now the data will be transferred using LED bulb. If the binary number is 0, then the led will not blink if binary number is 1 the LED will blink. The LED bulb will turn on and off so fast that the human eye cannot see. This is one of the methods to transfer the data using Li- Fi.

Fig 7. Li-Fi Transmitter

2. **Li-Fi Receiver**

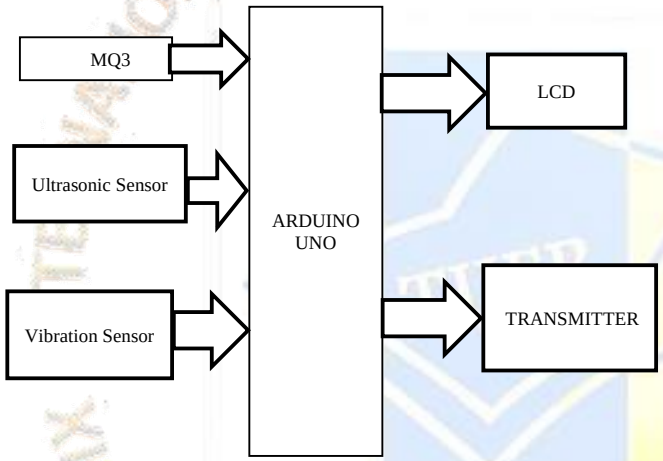
The Photovoltaic cell will receive the light from the LED then the photovoltaic cell will send that to the receiver. The receiver will convert that binary data into actual data then send that data to the Arduino board.



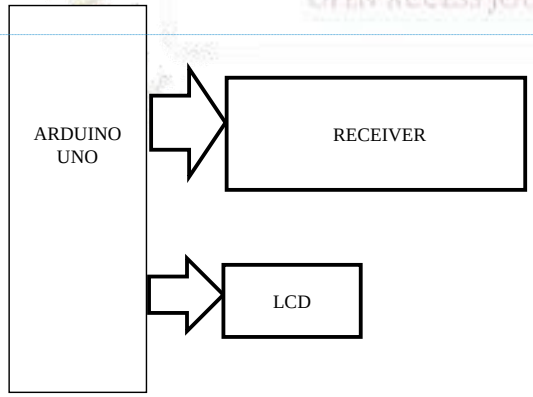
IV. Methodology

• In this proposed system, the system has a transmitter and receiver in each vehicle in both rear and front sides of the vehicle.
• The speed of the first vehicle is transmitted to the second vehicle and if the speed exceeds a notice of slowdown is displayed in the LCD display.
• Similarly, if the vehicles have the chance of collision, driver will be alerted with a chance of crash
. • The motor in the receiver controls the speed of the vehicle in accordance with the distance calculated between the vehicles.
• Similarly, when an alert of crash is displayed the vehicle stops automatically preventing the accidents.

Block diagram in Transmitter side:



Block diagram in Receiver side:



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V. Result and Discussion:

This system is specifically designed to ensure safety to the drivers and to the co-passengers by keeping in control of the vehicle using the information obtained from the sensors. By doing so we can avoid most of the road accidents and can promote safe driving.

VI. Conclusion and Future scope:

This system uses Li-Fi technology which includes many sensors such as MQ3, vibration sensor, ultrasonic sensor along with an Arduino board, LED light and a solar panel to communicate from one vehicle to another. This system proposes a solution to minimize road accidents, and in the future, it can ensure safety to the drivers along with co-passengers by integrating this system everywhere.

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