

Road traffic control by using Li-Fi Technology between Vehicle to Vehicle Communication

¹D.Raghava kumari, ²M.Anitha, ³G.Jhansi rani, ⁴D. Ramesh Babu

Abstract:

Road traffic control is biggest task which ever we face. Vehicle to vehicle communication is a new design to control the road traffic. This design is done by using a technology called Light-Fidelity (Li-Fi). It is a wireless technology which transmits the data via illumination. In our project we enlist Light-Fidelity technology. In this technology data is transferred from one vehicle to other vehicle via light. This technology is helpful to reduce the accidents and defended driving. Li-Fi uses visible light spectrum for transmission of data which is 10,000 times more than Wi-Fi spectrum. The transmission of data can be any type like text, audio or video. Transmission section comprises of LED which transfers light with the help of ultrasonic sensor to the receiver. Receiver section contains solar panel to perceive the original signal. When receiver will receive the signals from transmitter, then speed will be displayed on the LCD and motor will be controlled.

KEY WORDS: LIGHT-FIDELITY (Li-Fi), WIRELESS-FIDELITY (Wi-Fi), VISIBLE LIGHT SPECTRUM (VLS), LIGHT EMITTING DIODE (LED), LIQUID CRYSTAL DISPLAY (LCD).

I. INTRODUCTION

Road accidents are increasing day by day. As the population increases, the usage of vehicles of vehicles are increases. Road accidents are due careless driving, speeding, reckless driving, distracted driving, tailgating. Everyone rushes while travelling and fails to follow the rules for defended driving. The main reason for accidents is lack of proper information about other vehicle status.

To know the status of the other vehicles and to reduce the accidents, this paper presents a technology called Light-Fidelity (Li-Fi). This technology is invented by Harald Haas in 2011 at Edinburgh University in TED global talk. He was the founder of Li-Fi technology. Li-Fi technology is a derivative of optical wireless communication technology which uses illumination for data transmission. It is accompaniment to RF communications.

Li-Fi technology replaces the Wi-Fi technology due to less interference induced by light compare to Wi-Fi. Wi-Fi uses radio frequency to transmit the data whereas Li-Fi uses light for data transmission. Li-Fi works in high dense environment. The frequency of light is 10,000 times more than the frequency of radio waves. By using Li-Fi technology

¹ Sumathi Reddy Institute of Technology, Warangal, Telangana, India

² Sumathi Reddy Institute of Technology, Warangal, Telangana, India

³ Sumathi Reddy Institute of Technology, Warangal, Telangana, India

⁴ Sumathi Reddy Institute of Technology, Warangal, Telangana, India

there is no effect for environment. Li-Fi is a green information technology.

In Li-Fi technology LED plays a significant role. By using LED data is transmitted to other vehicle with greater efficiency. LED has advantages like fast switching speed, high power efficiency. The intensity of LED is faster than human eye. By using LED there is no effect for human vision. In Li-Fi technology every LED acts as a Wi-Fi to transmit the data.

This project comprises of ultrasonic sensor which senses the speed of that vehicle and send that information to other vehicle via illumination. Other vehicle contains solar panel to detect the light signal and that information is displayed on LCD with the help of Arduino. Arduino is programmed with Arduino IDE. By using Li-Fi technology in vehicles road accidents are reduced and defended driving is possible.

II. LITERATURE SURVEY

As the technology increases wireless communication is the most preferable communication type for transmitting data, but major disadvantage is we use radio frequency spectrum for transmitting the data. For transmitting data everyone must focus on safety, security, efficiency, time of arrival and bandwidth. Radio waves has narrow bandwidth, harmful, less security. Li-Fi technology defend all these problems. This technology focus on the essential requirements that are safety and security. The speed of operation is high. Li-Fi technology provides definitive and securable information with greater efficiency. Using Wi-Fi technology position and gesture recognition is not possible. Compliment to the Wi-Fi technology visible light communication is required. Everyone wants information at right time which needs fast internet. Wi-Fi not able to work as fast compare to Li-Fi. Sometimes late information may cause our death. By using the Li-Fi technology in vehicles we get the status of the vehicles with in the time. Accidents are reduced, defended driving is possible and human life will have saved. This technology is eco-friendly to the nature. By using this technology there is no effect for environment. By using Li-Fi module we can reduce the noisy environment which is created by vehicle horn. Li-Fi technology can replace the usage of vehicle horn. In vehicles the usage of Li-Fi technology will give the clear information about status of the vehicle.

III. PROPOSED METHOD

In previous projects vehicle to vehicle communication is done by using RF-IR technology. By using RF-IR technology we detect the vehicle and that vehicle movement is known by transmitting the radio frequency signal. Radio frequency signals will effect environment and it will harmful for human. By replacing the Li-Fi technology in the place RF-IR technology we can able to identify the speed of the vehicle. In other projects Li-Fi technology is used for vehicle movement. In Li-Fi technology the usage of ultrasonic sensor will give the speed the vehicle. Using the Li-Fi Communication instead of RF communication will able to receive secure information with harmless.

This proposed Li-Fi technology is sustained security architecture. This technology achieves essential security requirements, not only security requirements but also it achieves desirable needs like safety, efficiency, time of arrival and bandwidth. Li-Fi technology attracts while transmitting the data. This technology is a wireless communication and one of the classification in visible light communication. This proposed system comprises of two sections that are transmitter and receiver sections. Transmitter section involves ultrasonic sensor, LED, Arduino. In receiver section solar panel, LCD, Arduino present. Ultrasonic sensor emits ultrasonic waves and receives echoes of that waves. Echoes

are generated when waves are strike the obstacle. By using echoes ultrasonic sensor determine the distance between the vehicles and send this information to Arduino. Arduino sends that information to other vehicle using LED light. Here light acts as a medium. The intensity of light is faster than human eye. Solar panel of receiver section detects that light waves and converted this light waves into electric charge and send this charge to receiver Arduino. Arduino receives that information and send to LCD. LCD display the status of transmitter section vehicle.

Transmitter section:

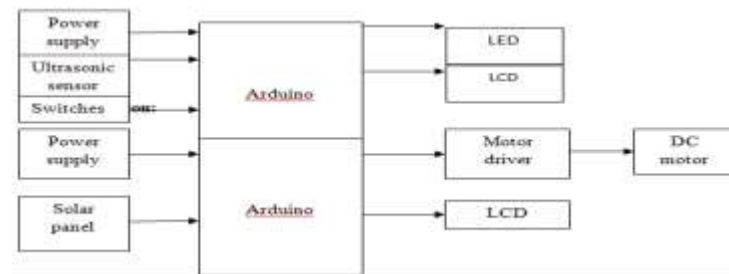


Fig. 1 Proposed System

IV. ASSEMBLED HARDWARES

A.Arduino UNO:

Arduino UNO is a microcontroller based on MicrochipATmega328P. This Arduino programmed with Arduino IDE (Integrated Development Environment) through type B USB cable. It accepts the voltage between 7 to 20v. This Arduino is performed based on RISC (Reduced Set Instrumentation Set) Architecture. Arduino is used to connect and control other devices. It is used to describing that devices performance.

B.LED:

Light Emitting Diode is a semiconductor light source. The electrons and holes in the LED are combined together and produced energy in the form of photons by a phenomenon of electroluminescence. LED is used for visual signals that passed from source to destination. It transmits the data in the form of light spectrum. It conveys messages. In Li-Fi technology every light source will work as a Wi-Fi for data transmission.

C.Ultrasonic sensor:

Ultrasonic sensor is optical sensor which sends ultrasonic signals and receives echoes of that waves. Echoes are generated by the waves when they strike the obstacle. It is also called as level sensor. Ultrasonic sensor is used to measuring the distance from source to destination by sending ultrasonic signals.

D.Tactile Switch:

Tactile switch is one of the category of push buttons. These switches are used to power the circuit or make any connection. These switches are also used for triggering of SCR by gate terminal. When we press the button it makes the circuit and breaks the circuit when we released. In our prototype switches are used for representing the vehicles for power the circuit.

E.LCD:

Liquid Crystal Display is a flat panel visual display. LCD contains rectangular pixels which shown image. LCD allow displays to be thinner compare to CRT tubes. LCD uses light modulating properties of crystal displays. It is operated by applying a varying electric voltage to a layer of liquid crystal.

F.Solar panel:

A solar panel is a group of photo-voltaic cells. Russel Ohl, an American scientist invented silicon solar cell in 1941. Solar panel is also known as PV panels which are used to convert light which is composed of particles of energy called photons into electricity.

G.DC motor:

A DC motor is a rotary electrical motor. It is used for converting direct current electrical energy into mechanical energy. They receive power from existing direct current lighting power systems. Speed of DC motor can be controlled by varying voltage or by changing the current.

H.Motor driver:

Motor drivers are interface between motors and control units. Motor has high amount of current required. But control units give low amount of current. Motor driver convert these low current into high current. That current is used to drive a motor. L293D IC motor driver is used in our project. It is a 16 pin motor driver IC.

Software Description:

I.Arduino IDE:

Arduino Integrated Development Environment is open source software application platform which is written in functions from C. Programs written using Arduino Software (IDE) are called sketches. Arduino IDE used to operate Arduino.

V. CONCLUSION AND FUTURE SCOPE

The usage of Li-Fi technology in vehicles collision is avoided and defended driving is possible. This technology helps to our transportation to make easier. By using this technology, we can perceive the distance between the vehicles by using ultrasonic sensor and sends the information through light spectrum. The intensity of light is faster than human vision. This technology is cost effective and there is no effect for environment. By using this technology, we got the information at pleasant time with safe and secure.

In future this technology replaces the usage of Wi-Fi technology due to the reasons of security, safety, time of operation and efficiency. By using Li-Fi technology communication is much simple. This technology is used in offices, industries, hospitals and sensitive areas such as air crafts.

REFERENCES:

- [1] T. Komine and M. Nakagawa, "Fundamental Analysis for Visible-Light Communication System Using LED Lights," IEEE Trans. Consumer Electronics, vol. 50, no. 1, Feb. 2004, pp 100-07.

- [2] Aman Sodhi, Jeslin Johnson, “Light Fidelity (Li-Fi) – The future of Visible Light Communication”, March – April 2015.
- [3] R. Karthika¹, S. Balakrishnan, “Wireless Communication using Li-Fi Technology”, March 2015.
- [4] Mehboob raza haider, manoj mdongre, “Vehicle to vehicle communication using visible light communication technology”.
- [5] V.K.G. Kalaiselvi and A. Sangavi, “Li-Fi technology in traffic light,” in Proceedings of the 2017 2nd International Conference on Computing and Communications Technologies (ICCCT), pp. 404-407, IEEE, Chennai, India, February 2017.
- [6] A. Adwani and S. Nagtode, “Li-Fi: information transferring through LED’s,” in Proceedings of the 2016 International Conference on Electrical, Electronics, and Optimization Techniques (ICEEOT), pp. 2125-2127, IEEE, Chennai, India, March 2016.
- [7] X. Bao, G. Yu, J. Dai, and X. Zhu, “ Li-Fi: light fidelity-a survey,” Wireless Networks, vol.21, no. 6, pp.1879-1889,2015.
- [8] Akshit Aggarwal – COMPARATIVE STUDY: LI-FI V/S WI-FI, International Journal of Research & Development in Technology and Management Science-Kailash Volume – 21| Issue 1| ISBN – 978-1-63102-445-0 | March 2014.