

Laser Li-Fi System For Driver Communication And Smart Honking In Vehicles

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Abstract- The radio frequency (RF) technology has been the dominant wireless technology. The emergence of the media-rich smart devices has pushed the already congested RF spectrum usage to its limit. There is a need for solutions to overcome spectrum crunch experienced in the RF technology. VLC has become increasingly popular as a method of data transmission as well as indoor localization in a multitude of applications, thus opening up new opportunities with the way we will use light in the future. LI-FI or Light Fidelity is such kind of communication system that proves to be an alternative to this problem. The idea of using RF for driver communication with smart honking system was initially proposed but due to many previously mentioned constraints and other security reasons, it was not hugely implemented. This paper proposed the idea of using LASER based LI-fi connection between vehicles which helps them to communicate while maintaining LOS and also honk without external noise.

Keywords- Lifi, honking, pollution, communication, vehicles, VLC.

I. INTRODUCTION

In the present time remote correspondence has turned into the indispensable piece of our life. There are numerous advancements that can be utilized for remote correspondence. Wi-Fi is one of those. Without a doubt, Wi-Fi is extremely prominent innovation that has vast applications in both our own and expert life. One of its application is for remote correspondence should be possible by brilliant blaring. Be that as it may, because of enormous utilize, RF groups are getting rare and furthermore they are confined at planes and clinics. A portion of the issues related with Wi-Fi are its Capacity, Efficiency, Availability and Security. LiFi fundamentally alludes to light devotion which implies exchanging the data with the assistance of light. In this innovation the light waves are adjusted by the data which is to be sent. In this way, by utilizing this innovation, we can utilize it for imparting for passing any information as opposed to sounding so anyone can hear and causing commotion contamination.

II. RELATED WORKS

There are numerous other related works which have been done in this field for at some point now and how it is being utilized for better correspondence purposes. One has exhibited a usage of the new advanced correspondence, innovation that utilizes noticeable light, known as LIFI (Light Fidelity) or VLC (Visual Light Communication), and apply it for busy vehicle correspondence. This correspondence may enhance driver's wellbeing by enabling the vehicles to discuss effortlessly with one another (V2V correspondence). The primary model of a unidirectional VLC correspondence was created at the research center of signs and pictures (LSI) of USTOMB[1]. Using the intensity of LIFI for remote correspondence to transmit client data from vehicle to toll. Each vehicle will have a microcontroller and a memory associated with it. What's more, the setup will be utilized to send valuable encoded information like vehicle number by means of LED. The LIFI collector is available in center of street at tollbooth. A savvy processor will be there at collector side, which will naturally process the toll impose installment as indicated by the sort of vehicle through a wallet connected with vehicle number. The innovation will be useful in protecting the fuel utilization of vehicle and will make an eco-accommodating environment[2]. The light which we are utilizing in our day by day life isn't utilized for giving light yet in addition to correspondence by enlightenment. Transmission of picture through LiFi innovation is finished. Utilizing obvious light for information transmission including numerous points of interest and dispenses with the weaknesses of transmission of information through electromagnetic waves[3]. Now and again, Li-Fi has been utilized for better transmission in electrical cables for better effectiveness. The Powerline Communications (PLC) can make it conceivable to utilize the electrical cables as the medium of correspondences. The utilities of home systems administration over electrical cables can exploit the current wiring framework for arrangement of enlightenment cum correspondence. The incorporated arrangement of VLC and PLC is a shrewd method for satisfying the introduce of broadband access for home systems administration, while giving productive and minimal effort lighting. To accomplish the higher information

rates (MHz), PLC channel is reproduced utilizing DMT-QAM regulation plan [4].

III. HARDWARE

Microphone

An amplifier, casually nicknamed mic or mike is a transducer that proselytes sound into an electrical flag. Mouthpieces are utilized in numerous applications, for example, phones, portable hearing assistants, open location frameworks for show lobbies and open occasions, film creation, live and recorded sound building, sound account, two-way radios, bull horns, radio and TV broadcasting, and in PCs for recording voice, discourse acknowledgment, VoIP, and for non-acoustic purposes, for example, ultrasonic sensors or thump sensors.

Speaker

A speaker is an electroacoustic transducer which changes over an electrical sound flag into a relating sound.

LED Lights

Driven alludes to light radiating diode. It is a p-n intersection diode, which radiates light when actuated. At the point when a specific voltage is connected to LED then vitality, get discharged due to the mix of electron and openings as photons. The shade of the light relies upon the band hole of the semiconductor used to make LED. This impact is called electroluminescence. It is utilized at transmitting end.

Transformer

A transformer is a static electrical gadget that exchanges electrical vitality between at least two circuits through electromagnetic acceptance. A fluctuating current in one curl of the transformer delivers a differing attractive field, which thus incites a shifting electromotive power (emf) or "voltage" in a second loop. Power can be exchanged between the two curls, without a metallic association between the two circuits. Faraday's law of acceptance found in 1831 depicted this impact. Transformers are utilized to increment or abatement the exchanging voltages in electric power applications.

Amplifier

An amplifier (or power amp) is an electronic intensifier that repeats low-control electronic sound flags, for

example, the flag from radio recipient or electric guitar pickup at a level that is solid enough to drive (or controlling) amplifiers or earphones.

LASER 5mV

A laser is a gadget that emanates light through a procedure of optical intensification in view of the fortified discharge of electromagnetic radiation. The expression "laser" started as an acronym for "light enhancement by fortified outflow of radiation".

Solar Panel

Photovoltaic solar panels retain daylight as a wellspring of vitality to produce power. A photovoltaic (PV) module is a bundled, associated get together of regularly 6x10 photovoltaic sun oriented cells. Photovoltaic modules establish the photovoltaic exhibit of a photovoltaic framework that produces and supplies sunlight based power in business and private applications.

Capacitor

A capacitor is a latent two-terminal electrical segment that stores potential vitality in an electric field. The impact of a capacitor is known as capacitance. While some capacitance exists between any two electrical conduits in closeness in a circuit, a capacitor is a part intended to add capacitance to a circuit. The capacitor was initially known as a condenser or condensator.

Switch

A switch is an electrical part that can "make" or "break" an electrical circuit, intruding on the present or occupying it starting with one transmitter then onto the next. The system of a switch evacuates or re-establishes the directing way in a circuit when it is worked.

Buzzer

A buzzer is a sound flagging device which might be mechanical, electromechanical, or piezoelectric (piezo for short). Regular employments of signals and beepers incorporate caution gadgets, clocks, and affirmation of client info, for example, a mouse snap or keystroke.

IV. EXISTING SYSTEM

The existing system for this paper has explored the following methods and achieved different goals accordingly.

- The existing system doesn't provide a medium for the drivers to communicate on-road.
- This leads to unnecessary honking and causes noise pollution.
- RF communication devices are not secure as multiple people can eavesdrop the conversation
- LED headlamps can be used for data communication but are extremely bright and disturbing
- Infrared Communication is possible but short range

V. PROPOSED SYSTEM

The proposed system uses the following methods and surpass the previous limitations.

- The proposed System uses LASER based Li-fi communication system that uses long range
- LASER beams to stream communication between drivers on-road
- The channel needs line of sight to work, thus it is safe from eavesdropping.
- Long-range communication can be achieved
- LASER light is hardly visible and will not glare the vision
- Using the microphone provided, the drivers can communicate and also honk to notify.
- Noise pollution can be avoided.

VI. SYSTEM MODULE

In order to style the system, the "Line of sight" between receiver and transmitter is needed to send the data. LIFI uses visible light communication or infrared and near-UV spectrum waves, which may be achieved by exploitation crystal rectifier (light emitting Diode). there's demand of transmitter yet as a receiver so on bring home the bacon the conception of wireless communication system, as the LIFI refers to the sunshine fidelity that is additionally a wireless communication system and it'll transmit information exploitation Electromagnetic wave(Light) thus it needs a transmitter circuit and receiver circuit. Here, Vehicle is acting as a transmitter as a result of the transmitter circuit i.e.LED or Laser is connected with the vehicle's power system Power system. because the vehicle has the 12V battery to power the Electronic parts gift within the vehicle, also this power are going to be given to the transmitter circuit. On the receiving finish there will be a

photo-detector to sense the change in lightweight transmitted from light-emitting diode, so on meet the necessity of "Line of sight" we have a tendency to as connecting the receiver circuit on the Road just below the automotive.

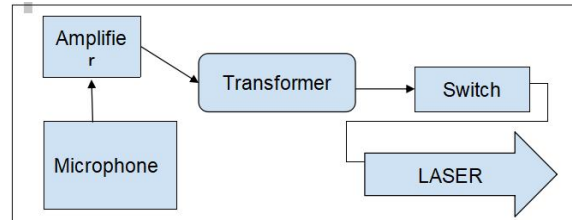


Figure 1. Transmitting Module

The photodiode can receive the data sent by light-emitting diode in kind of current pulses. The strength of the signals can decrease because it travels through air, therefore on convert these weak current pulses into equivalent voltage pulses we'd like to amplify these signals by transimpedance electronic equipment(amplifier). The amplified signal needs an indication process part that may be a microcontroller. Data will be forwarded to microcontroller for any process, comparison of received knowledge with existing information takes place

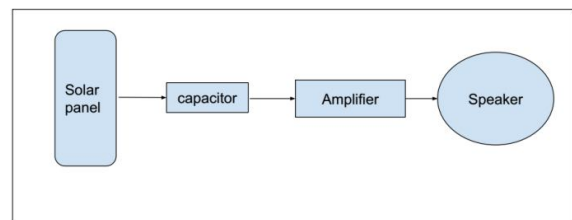


Figure 2. Receiving Module

The Figure 3 explains the system architecture of the project where two cars communicate with each other and can honk at each other without noise pollution. They both have internal honks and honk buttons to trigger the horn. They both check for receiver and when receiver is active, they hear the honk.

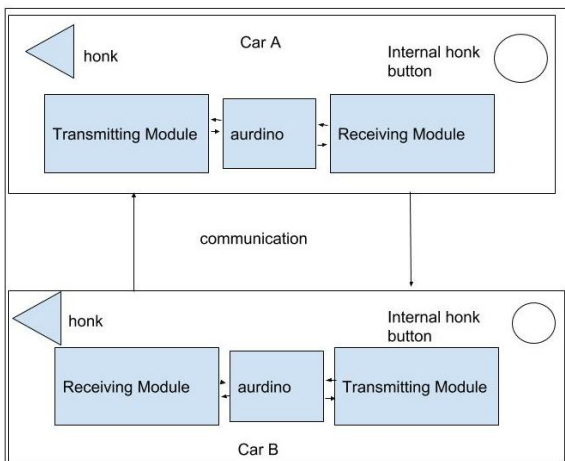


Figure 3. System Architecture

VII. IMPLEMENTATION

The platform used is arduino IDE and its used to demonstrate the possibility of data transfer using laser diode and sensor. The next setup uses simple circuit system with solar panel and laser diode to transmit audio analog which makes data stream transferable between two cars via laser. The Algorithm is basic loop of input stream. If the incoming signal is laser high. Then it prints 1 . if the incoming signal is laser low, then it prints 0. its stays in loop till its stopped.

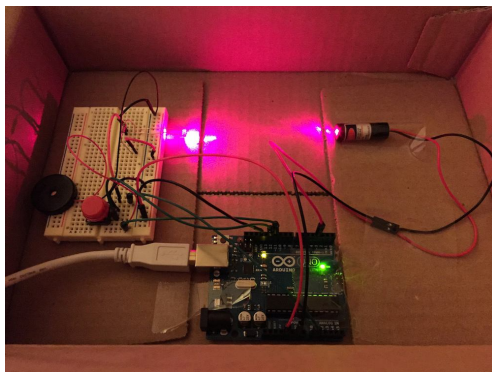


Figure 4. Aurdino based data communication

The non arduino setup has the following system for data transfer. The System uses solar panel to receive the audio analog input from the phone to transmit data over laser. The resultant audio is amplified using speaker.

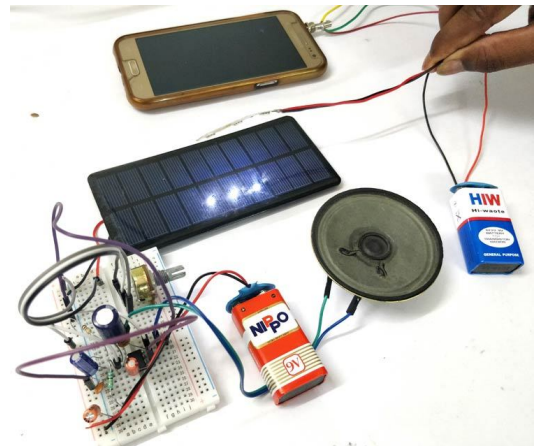


Figure 5. Non-Aurdino based Laser Communication

VIII. CONCLUSION

Both the Systems prove the possibility for data transfer using laser li-fi and its efficiency over conventional LED based li-fi. The final model can be installed in vehicles to implement smart honking where the noise pollution is greatly reduced. The use of laser in li-fi will ,thus, increase the efficiency and range of working. It also proves an alternative for loud conventional honking system.

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