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ADVANCED SAFETY SYSTEM FOR AUTOMOBILES THROUGH VEHICLE TO VEHICLE COMMUNICATION USING LIFI

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Abstract:

The new vehicle execution has been persistently improved and the examination results identifying with the wellbeing of vehicle driving have additionally been consistently announced and illustrated, it is attempting to discover an equalization point between the advancement of vehicle speed limit and the assurance of driver's security. Li-Fi is a VLC, visible light communication innovation that manages move of information through enlightenment by removing fibre from optics by sending information through a LED light that fluctuates in the force quicker than a human eye can pursue. In this undertaking we attempt to build up a framework to give the before mishap data to the vehicle control unit with the goal that it empowers the vehicle to anticipate the occurrence of mishap. Vehicle to vehicle correspondence is the best arrangement that has been utilized so as to decrease vehicles' mishaps. The proposed utilization of Li-Fi innovation in this task involves the light emitting diode (LED) bulbs as methods for network by sending information through light range as an optical remote vehicle for signal engendering. Truth be told, the use of LED dispenses with the need of complex remote systems and conventions.

Keywords: Light Emitting Diode; Photodiode; Vehicle to Vehicle Communication; Visible Light Communication.

1. Introduction

As per the statistics released by the Ministry of Road Transport and Highways of India, more than 1.5 lakh people lost their lives due to road-accidents last year with 1 person dying every 4 minutes on the roads. Globally, more than 1 million people lose their lives due to road accidents every year. Of the 1.5 lakh, more than 60% of the deaths is of youth between the age of 15-34 years and every day, 20 children under the age of 14 die due to road-accidents.

Li-Fi is a significant and mainstream innovation in the correspondence framework. Li Fi is known as Light loyalty correspondence frameworks. It is the exceptionally quick and cheap remote correspondence frameworks and is the optical form of the Wi-Fi. The innovation works by

adjusting light transmitting diode (LED's) to send computerized kind of data, undetectable to the unaided eye. In this, we structure model which depends on Li-Fi innovation for vehicle to vehicle information transmission. Vehicle to vehicle correspondence is the best arrangement that has been utilized so as to diminish vehicles mishaps. In LI-Fi innovation information transmission through light for this reason wellspring of light is utilized as LED. Vehicle to vehicle interchanges, for example, is one of the past patterns, which is one of the best systems that will actualize in cars to give wellbeing and a convention of correspondence. Extra to existing remote innovations. To restores rapid association rapidly (if there should be an occurrence of calamity issue). Li-Fi is utilized in light of the fact that it is quick and optical form of Wi-Fi which is modest.

1.1. Literature Review

A Tutorial Survey on Vehicular Ad Hoc Networks [1] VANETs include vehicle-to-vehicle and vehicle-to-foundation interchanges dependent on remote neighbourhood advancements. The unmistakable arrangement of competitor applications (e.g., impact cautioning and nearby traffic data for drivers), assets (authorized range, battery-powered power source), and nature (e.g., vehicular traffic stream designs, protection concerns) make the VANET an extraordinary region of remote correspondence.

Standard for Information innovation Telecommunications and data trade between frameworks Local and metropolitan zone systems [2] to extend the utilization of Ethernet to incorporate endorser access organizes so as to give a critical increment in execution while limiting gear, activity, and support costs.

Vehicular Channel Characterization and its Implications for Wireless System Design and Performance [3] assess and advance ITS applications arranged to vehicular security dependent on remote frameworks, the learning of the spread channel is imperative, specifically the way misfortune. From a narrowband V2V channel estimations crusade completed in a rural territory of the city.

Strong Channel Estimation in Wireless LANs for Mobile Environments [4] versatile remote channels, the relationship of the channel recurrence reaction at various occasions and frequencies can be isolated into the increase of the time-and recurrence area connection capacities. Henceforth, our MMSE channel estimator can be a recurrence area channel utilizing the quick Fourier change (FFT), trailed by time space channels.

Mid-saunter supported OFDM execution examination in high portability vehicular channel [5] Mid-wander helped channel estimation and its exhibition investigation of OFDM signal in high versatility vehicular radio channel. Preface and Pilot subcarriers are utilized for introductory procurement and direct estimation in WAVE framework. If there should be an occurrence of since quite a while ago measured parcels, the exhibition is corrupted in high versatility radio channel.

2. Materials and Methods

The proposed framework requires a transmitter and a receiver in every vehicle in both back and front sides of the vehicle. Along these lines the situation will be examined in this paper.

As appeared in figure, when vehicle 1 is braking, the speed meter in the vehicle will detect that the present speed is lower than the past speed. Therefore, a message will be sent through the transmitter which is put in the back lights to vehicle 2. The message will be gotten by vehicle 2 utilizing the photodiode which is set at the front of vehicle 2. A notice of (Slow DOWN) will be shown in vehicle 2 utilizing LCD.
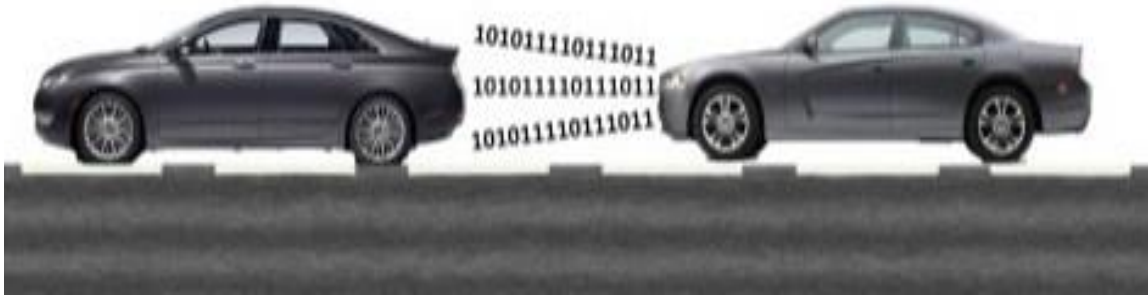

Figure 1: Vehicle to vehicle communication using LIFI

System Diagram

The 12v transformer receives the power supply voltage and steps down the voltage. Then it is passed through the rectifier which converts the alternating current into direct current by allowing the current to flow through one direction only.

Then the filter capacitors are used to filter the undesirable frequencies. Voltage regulators are used to provide a constant DC output voltage that is independent of the input voltage. Further the current is passed to the Arduino Uno board which is programmed according to the requirement.

It has digital and analog input/output pins used to convert the input into desired output. It delivers a 5v supply to ultrasonic sensor, LiFi transmitter module and Trimpot. The ultrasonic sensor uses the SONAR to determine the distance between the object. Its 'trigger' and 'echo' terminals are connected to the 6th and 7th pins of the Arduino board respectively.

Trimpot is used to vary the speed. It works like a variable resistor. LiFi transmitter module is connected to a LED light source to emit light as the source of information. It is then received by a solar panel which is connected to the LiFi receiver module.

The received information is sent to the arduino board. Then to L293D motor driver which allows the DC motor to drive in either direction. Its IN1 and IN2 terminals are connected to the 8th and 9th pin of the Arduino board respectively which is used for direction regulation. EN1 is connected to the 10th pin of the Arduino which is used for speed regulation.

The motor driver can control a set of two DC motors simultaneously in any direction. Here, the motor driver is connected to a single motor which rotates by the change in voltage.
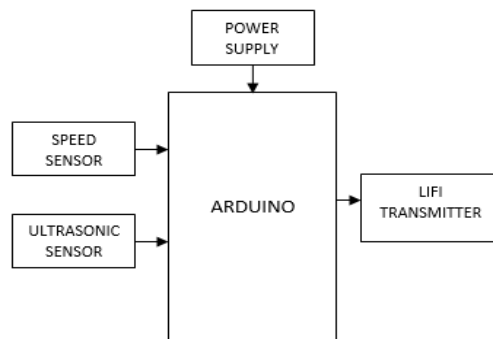
Block Diagram
Sender Module:

Figure 2: Block diagram of Sender Module

Separate power supply unit and Arduino board is used for the sender module. The sensors used are speed sensor and ultrasonic sensor. A LED is used as a LIFI transmitter.
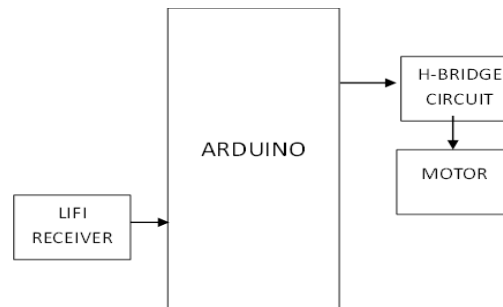
Receiver Module

Figure 3: Block diagram of Receiver Module

Separate power supply unit and Arduino board is used for the receiver module. A solar panel is used as a LIFI receiver. A motor driver is used to drive the motor.

3. Results and Discussions
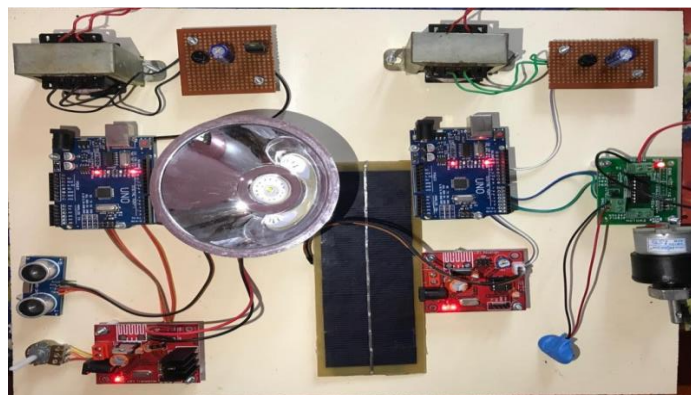
Figure 4: Project Model

As shown in this prototype model, there is a transmitter module for sending the distance and speed of the preceding car. There is a receiver module to obtain the information sent by the transmitter module, to slow down the vehicle automatically without the driver's intention when the preceding car slows down. Every car consists of a transmitter and a receiver module for the transfer of information.
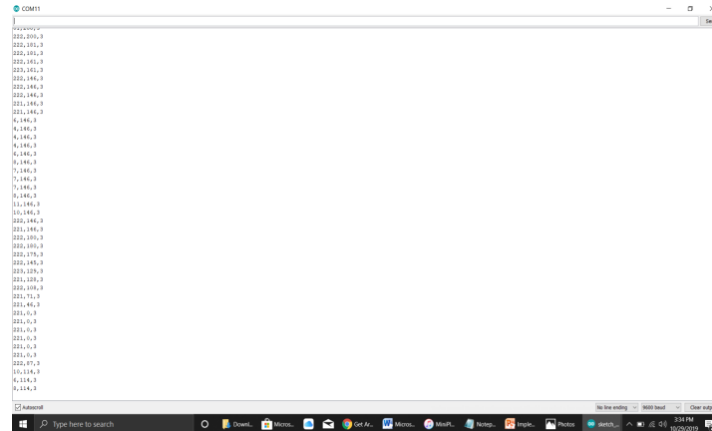

Figure 5: Output in Arduino software

The Arduino Uno board in the receiver end is connected to the Arduino software to check the output. In the software, the port is being selected and the serial monitor window displays the output. When the speed and distance values are varied, the output value changes. The output is shown in the image above.

4. Conclusion

Li-Fi innovation has a monstrous use in rush hour gridlock the board and in building up safe developments of vehicles out and about. However, to actualize it financially every single vehicle needs to incorporate a LED-based traffic head-light, tail-light and Arduino microcontroller. The idea of Li-Fi will present alongside existing systems and old style patterns utilized for vehicle to vehicle interchanges. In this task, point is to propose a financially savvy answer for diminish mishaps in Oman, the plan rules. The equipment viewpoints in regards to the improvement of a VLC correspondence framework comprising of a business LED-based traffic light and a vehicle will mount beneficiary. We will exhibit the methodology we pursue, a portion of the troubles we experience and clarify the decisions we have made. All through the usage procedure, we additionally endeavour on keeping the execution cost as low as could reasonably be expected. Due to unavailability of all system components, sending data through Li-Fi small-scale prototype.

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