# INTER VEHICLECOMMUNICATION USING LIFI TECHNOLOGY

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## I. ABSTRACT :

Vehicle-to-vehicle data transfer, show preliminary designs and findings of a small-scale prototype using light fidelity (Li-Fi) technology, a new technology developed in recent years that still requires further thorough investigation into its viability for outdoor vehicular networks.
Vehicle-to-vehicle communication is the most successful technique we've implemented to prevent car accidents. We employ LEDs in Li-Fi technology to transmit data from vehicle to vehicle. This technique employs elimination methods, which reduces the complexity of Li-Fi technology. The goal of building this system is to provide extremely reliable data communication between vehicles via a transmitter and receiver mounted on the vehicle.

**Keywords-:** Light Fidelity (LiFi),Visible LightCommunication (VLC),Vehicle to vehicle communication (V2V), Light emitting diode (LED), High speed Internet connectivity

## II. INTRODUCTION:

The car communication system has no connection to a specific brand or vehicle. This may be used in any car with minor modifications. The technology is built so that the average car user can utilize it. When it comes to data transmission, the main concerns are speed and security. On the other hand, Li-Fi requires a line of sight (LOS), does not penetrate walls, and so provides greater security. The usage of Li-Fi with high-speed LEDs that can deliver data speeds of more than 100Mbps is a considerable advantage. This guarantees that cars communicate quickly and reliably, contributing to increased road safety and efficiency. It is critical to emphasize Li-Fi's security benefits as a result of its Line of Sight (LOS).

## III. LITERATURE REVIEW:

Chunru Xiong et al. [1] created an intelligent car that manages the system by voice commands and an LCD display. This approach makes the car more user friendly and improves machine-human interaction. The vehicle control system additionally incorporates a high-accuracy ultrasonic obstacle avoidance sensor module to provide information signals for safety. This system is built around the LPC2138 ARM embedded microcontroller and real-time operating system. It is utilized in an intelligent vehicle control system. This system can be used in mobile robots, intelligent toys, and other applications. Lilli Due and Hoange Dao et al [2] proposed analytical formulas for estimating information propagation time delay in a V2V communication network. This system based on a one-way or two- way. A road stretch having many lanes. The roadside infrastructure communication is explained to separate from prior initiatives. The proposed system incorporates various essential communication and traffic flow elements that exist in reality, including wireless communication interference, intermittent

information transfer, and dynamic traffic flow. The system can be expanded to measure information propagation time delay and coverage over local transportation networks. Ai Lin GAO et al. [3] presented the construction of an intelligent vehicle system based on SPCE061A, a single chip. This system's hardware architecture comprises the SPCE061A main controller. It uses various transistors to create an H-bridge driver control circuit board that controls the car's motion. The graphical result demonstrates that the car may be controlled with voice instructions such as moving left, moving right, forward, backward, and stopping. William J. Fleming et al. [4] described an adaptive warning message dissemination technique for VANET that improves road safety. This document describes the various techniques for establishing communication between vehicles. It also detailed how to transmit the message. A Secure Cooperative method is provided here. This research demonstrates non-line of sight communication in cars. They proposed a collaborative protocol for verifying a broadcast position when direct contact between the answered node and theverifier is impossible. Various security approaches were used here to improve message dependability and machine. The system provides experimental results for five voice commands: forward, backward, left, right, and stop.

## IV. EXISTING SYSTEM:

In the current circumstance, only those affected by the traffic problem can provide low and high traffic information after waiting for a long period for a signal to go to the other side. Thus, fuel is wasted. If an accident occurs, sharing information takes a significant amount of time.

**Drawbacks:**

• Lack of long-distance communication capabilities.

• There is no accident detection.

• Vehicle distances are unknown.

**V. PROPOSED SYSTEM:** In this case, a vehicle (Vehicle-A) equipped with an ultrasonic sensor provides information on the distance between itself and the target vehicle (Vehicle-B). However, in this system,
communication is limited to two vehicles; however, we may create a number of target communication and ranging technologies for vehicle communication using the Spread Spectrum Technique. In this project, we can send messages to the receiving vehicle one at a time, depending on its state. We also use buzzer output and LCD to display messages on both the transmitter and receiver sides.

**Advantages of LIFI:**

- Reduces accidents.
- It will notify the vehicles if there is any possibility of collision.
- It will be used with a big number of vehicles.

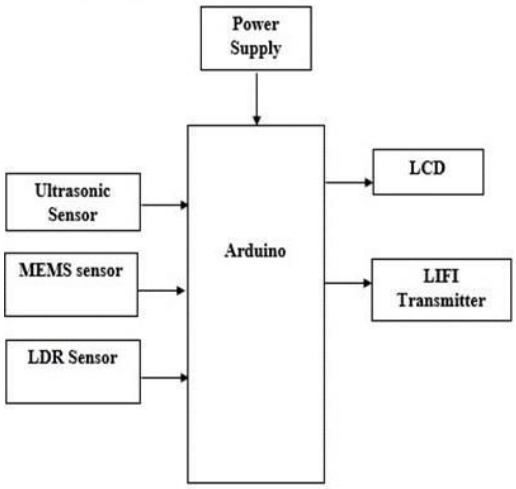
## VI. IMPLEMENTATION:

The vehicle is fitted with a light source. This source is used to convey data. Data can be any information about a vehicle, such as its velocity or load, that other cars should be aware of in order to avoid an accident. The intensity of light varies depending on the data to be delivered. The automobiles in the proximity of this vehicle have light detectors. These detectors capture light fluctuations and collect data.

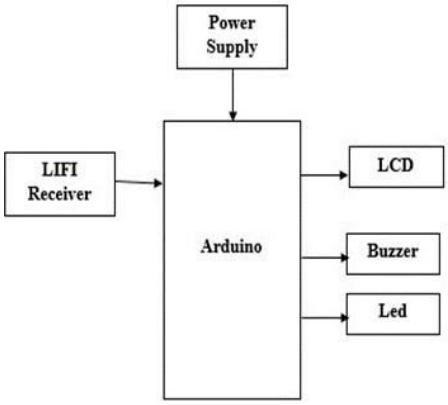
This is how to communicate using light as a medium. This allows us to connect vehicles using Li-Fi technology. It is a safe, efficient, and quick method of linkingcars. Information on a vehicle must be transmitted. This analog data is transformed to digital using an Analog to Digital Converter (ADC). This digital data is transmitted to a controller. This controller then adjusts the intensity of the light source used to send information about the vehicle. This analog data is transformed to digital using an Analog to Digital Converter (ADC). This digital data is transmitted to a controller. This controller subsequently adjusts the strength of the light source, which is received by the photodiode. This data is digital and is transformed to analog by a Digital to Analog Converter (DAC).

The output of the DAC is analog data, hence data transfer occurs with the use of light. Once the surrounding cars acquire this data, they can perform a variety of activities based on it.

Block diagram:(Tx)




Block diagram:(Rx)




V2V could capture and transmit the following inputs that are regarded important.

- Vehicle speed
- Vehicle location and direction of travel
- Vehicle throttle control
- Lane changes
- Gear position
- Stability and traction control information
- Brake and anti-lock braking information.

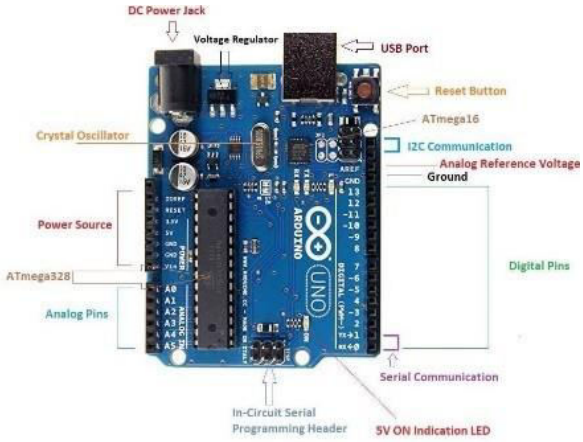
## VII. COMMUNICATION TECHNOLOGIES:

In this section, Table 1 compares the wireless technologies LiFi, WiFi, Bluetooth, and Zigbee.

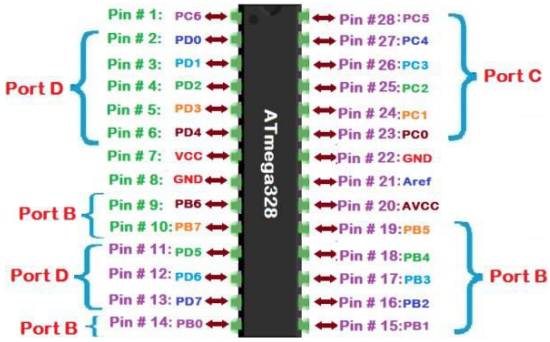
| Feature | Wi Fi | Li Fi | Bluetooth |
|---|---|---|---|
| Mode of Operation | Using Radio waves | Using Light waves | Using UFH radio waves |
| Coverage Distance | 32 m | 10 m | 10 m to 100 m |
| Frequency Of Operation | 2.4G Hz, 4.9G Hz And 5GHz | 1000 Times radio waves | 2.4 - 2.485 GHz |
| Speed | 150 | 1 Gbps | 25 Mbps |

**Table 1. Comparison of wireless communicationTechnologies**

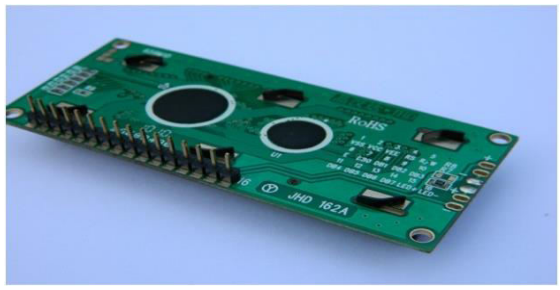
**Hardware components used:**




Arduino UNO

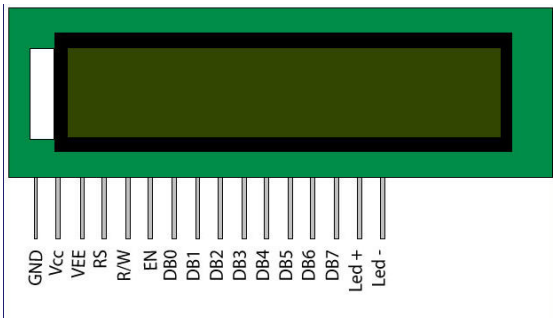



Atmega328 Microcontroller




LCD – Back View

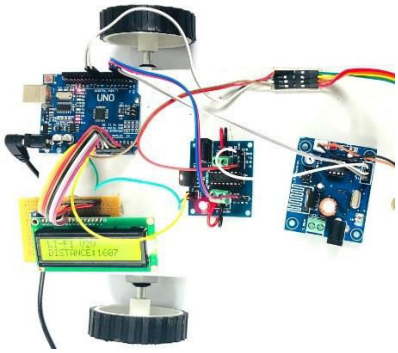

LCD – Front View




Pin Diagram

## VIII. CONCLUSION:

The idea proposes a cutting-edge system that uses Li-Fi technology to monitor real-time distances between vehicles and notify them when they change lanes. The system allows for seamless data sharing by using Arduino-based modules equipped with ultrasonic and LDR sensors, potentiometers, and Li-Fi transmitters/receivers. The ultrasonic sensor measures distance between vehicles, while the LDR sensor detects lane changes. Li-Fi. Communication enables the speedy and secure exchange ofcrucial data, such as distance measurements, speed variations, and lane change alarms. With a focus on improving road safety, the technology intends to provide drivers with timely warnings and notifications when near vehicle proximity creates a risk. This innovation attempts to make the driving environment safer and more efficient by addressing issues about tailgating and unexpected lane changes.

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