

# Vehicle To Vehicle Communication using Li-Fi

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**Abstract** – The latest technology called as LI-FI is developing a lot in few years. Traffic congestion and tidal flow management are two major problems in modern urban areas which lead to road accident and loss of life. Using the concept of LI-FI two vehicles communicate with the help of LED bulbs using transmitter and receiver circuit and so road accidents can be controlled and many human lives can be saved. A device called ultrasonic sensor which is used to measure the distance and also to detect any obstacles is used here just to communicate the two vehicles when they come into contact within some range. Using LI-FI, data are transmitted from one vehicle to another and the data that is transmitted through LIFI can be an audio, video or text. At present, the day to day activities use lot of LED based lights for illumination, which can also be used for communication because of the advantages like fast switching, high power efficiency and safe to human vision. This system aims at communicating with the vehicle in its surrounding with the help of its location (i.e., using the latitude and longitude) to indicate their proximity. When these vehicles are very close in proximity the drivers are cautioned with the help of a message. In this way the drivers can communicate with each other and act according to the situation.

**Keywords**– Traffic congestion, Ultrasonic sensor, Obstacles, Proximity.

## I. INTRODUCTION

In today's world Internet plays a major role in everyone's life. Various activities can be done with the help of Internet. Generally Internet is used for data transmission and people want to transfer data with high speed. For efficient and fast data transmission wireless communication between the devices is used. The wireless data is transmitted by the electromagnetic waves.

Now-a-days, Wi-Fi is the main wireless communication medium which uses radio waves and is used in all the areas such as offices, schools, homes, colleges, Universities etc. But the main problems of Wi-Fi are scarcity of radio waves, non-stop depletion of bandwidth, RF interferences, expense of bandwidth and the use of repeaters. Other portions of electromagnetic spectrum include X-rays, Gamma rays and Ultraviolet lights but they are not suitable for wireless communication as they are dangerous for human body.

Other than the said problems due to extensive usage the radio frequency waves are getting blocked and the capacity is decreasing. In order to overcome this difficulty in future, light fidelity (Li-Fi) technology was invented in 2011 by Dr. Harald Haas which transmits the data through visible light instead of radio waves. In this paper we propose a method to manage traffic and to maintain the safety of a road using LI-FI technology. We assign each vehicle an unique number against which information is

stored in the database. Whenever any car breaks the traffic signal or crosses the maximum speed limit the information against the unique number of the car goes to the central server through Li-Fi. The information from the server will help to take legal actions against the vehicles. Also if any two vehicles cross the minimum distance which is required to prevent accident then a signal is sent to the latter vehicle to slow its speed in order to avoid the accidents.

## II. EXISTINGSYSTEM

The main problems faced in the existing system by using zigbee and GPS are inaccuracies in the calculation of speed, distance measurement, and Slow response time, etc.The problems of traffic congestion in urban arterials are increasing day by day and it is very difficult to handle it during emergencies. Because of inaccurate distance measurement and reduced response time the indication alert from other vehicle is slow which may lead to accidents in fraction of second.



Fig.1. Existing System.

### III. EMBEDDED SYSTEM

An embedded system is a special-purpose computer system designed to perform one or a few dedicated functions, often with real-time computing constraints. It is usually embedded as part of a complete device including hardware and mechanical parts. In contrast, a general-purpose computer, such as a personal computer, can do many different tasks depending on programming. Embedded systems have become very important today as they control many of the common devices we use.

Since the embedded system is dedicated to specific tasks, design engineers can optimize it, reducing the size and cost of the product, or increasing the reliability and performance. Some embedded systems are mass produced, benefiting from economies of scale. Physically, embedded systems range from portable devices such as digital watches and MP3 players, to large stationary installations like traffic lights, factory controllers, or the systems controlling nuclear power plants. Complexity varies from low, with a single microcontroller chip, to very high with multiple units, peripherals and networks mounted inside a large chassis or enclosure.

In general, "embedded system" is not an exactly defined term, as many systems have some element of programmability. For example, Handheld computers share some elements with embedded systems — such as the operating systems and microprocessors which power them — but are not truly embedded systems, because they allow different applications to be loaded and peripherals to be connected. An embedded system usually contains an embedded processor. Many appliances that have a digital interface -- microwaves, VCRs, cars -- utilize embedded systems. Some embedded systems include an operating system. Others are very specialized resulting in the entire logic being implemented as a single program. These systems are embedded into some device for some specific purpose other than to provide general purpose computing.

### IV. RESOURCES USED

In the system, various sensors are deployed like alcohol sensor, seatbelt sensor, ultrasonic sensor, heartbeat sensor, Gas sensor in order to sense the health conditions of the driver and arduino uno to make communication using wifi over this system including micro controller. LCD and LED to display the data information and notification.

#### 1. Micro Controller

A micro-controller is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals. The important part for us is that a micro-controller contains the processor (which all computers have) and memory, and

some input/output pins that you can control. (often called GPIO - General Purpose Input Output Pins).

We will be using the Arduino Uno board. This combines a micro-controller along with all of the extras to make it easy for you to build and debug your projects. The Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

#### 2. Heart Beat Sensor

The Heart Beat Sensor provides a simple way to study the heart's function. This sensor monitors the flow of blood through ear lobe. As the heart forces blood through the blood vessels in the ear lobe, the amount of blood in the ear changes with time. The sensor shines a light (small incandescent lamp) through the ear and measures the light that is transmitted. The clip can also be used on a fingertip or on the web of skin between the thumb and index finger. The signal is amplified, inverted and filtered, in the box. The Heartbeat sensor is delivered with a Bluetooth plug and can be connected to interfaces.

Texas Instruments CBL™ data-logger, there is an adapter (art. 0520) to connect sensors with Bluetooth plugs to 4-mm inputs.

#### 3. Gas sensor

The gas sensor is a device which detects the presence of gases in the vehicle. Based on concentration of alcoholic gas consumed by the driver, the sensor detects the attentiveness of alcohol gas in the vehicle and the output reading is given as an analog voltage. This sensor has excellent sensitivity combined with a quick response time.

#### 4. Ultrasonic Sensor

A special sonic transducer is used for the ultrasonic proximity sensors, which allows for alternate transmission and reception of sound waves. The sonic waves emitted by the transducer are reflected by an object and received back in the transducer. After having emitted the sound waves, the ultrasonic sensor will switch to receive mode. The time elapsed between emitting and receiving is proportional to the distance of the object from the sensor.

#### 5. Li-Fi

VLC represents only a fraction of what appears to be a much larger movement towards optical wireless technologies in general. This larger world has been dubbed 'Li-Fi' (Light Fidelity) by people such as Dr. Harald Haas of Edinburgh University and organizations such as the Li-Fi Consortium.

Li-Fi is transmission of data through illumination of the LED by taking the fiber out of the fiber optics by sending

data through the LED light bulb that varies in intensity faster than the human eye can follow. The LED bulbs will hold a micro-chip that will do the job of processing the data. The light intensity can be manipulated to send the data by tiny changes in the amplitude. This technology uses visible spectrum of light, a part of the electromagnetic spectrum that is still not greatly utilized. In fact this technology transfers thousands of streams of data simultaneously in parallel in higher speed with the help of the special modulation using a unique signal processing technology. The light used to transmit the data is called D-light by herald has, the inventor of Li-Fi.

### 6. LCD Module

Dot matrix LCD modules is used for display the parameters and fault condition. 16 characters 2 lines display is used. It has controller which interface data's and LCD panel. Liquid crystal displays (LCD's) have materials, which combine the properties of both liquids and crystals. Rather than having a melting point, they have a temperature range within which the molecules are almost as mobile as they would be in a liquid, but are grouped together in an ordered form similar to a crystal. A LCD consists of two glass panels, with the liquid crystal material sandwiched in between them. The inner surface of the glass plates are coated with transparent electrodes which define the character, symbols or patterns to be displayed. Polymeric layers are present in between the electrodes and the liquid crystal molecules to maintain a defined orientation angle.

### 7. LED

Most typical LED's are designed to operate with no more than 30-60 mw of electrical power. Around 1999, commercial LED's capable of continuous use at one watt of input. As well, the semiconductor diodes were mounted to metal slugs to allow for heat removal from the LED diode. In 2002, 5W LED's were available with efficiencies of 18-22 Lumens per watt. It is projected that by 2005, 10watt units will be available with efficiencies of 60 Lumens per watt. These devices will produce about as common 50 watt Incandescent bulb, and will facilitate use of LED's for general illumination needs.

#### Block Diagram:

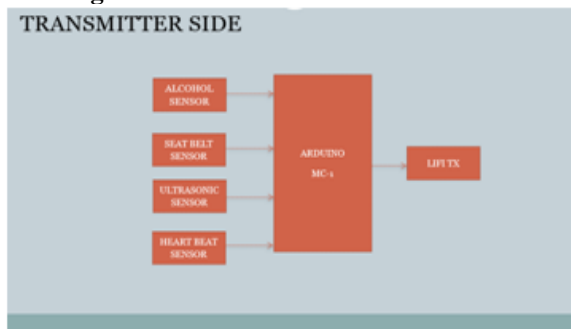


Fig. 2 Block diagram.

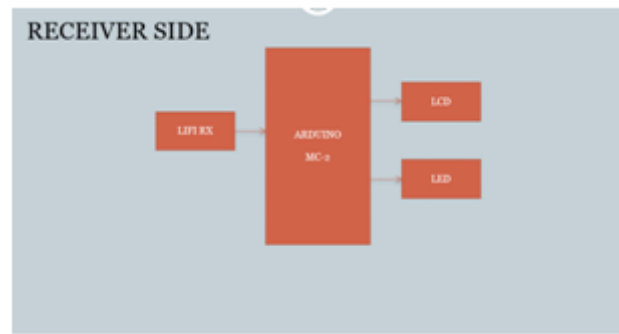


Fig.3 Block Diagram2.

## VI. RESULTS AND DISCUSSION

This system aims at communicating with the vehicle in its surrounding with the help of its location (i.e., using the latitude and longitude) to indicate their proximity. When these vehicles are very close in proximity the drivers are cautioned with the help of a message. In this way the drivers can communicate with each other and act according to the situation where while driving few sensors are used for some alerting /indications like alcohol sensor, heartbeats sensor, seat belt alerting, and lifi transmitter to transmit and communicate to other vehicle as well as with known member when driver is in danger a message is given in cloud source, this setup uses arduino microcontroller.

## VII. CONCLUSION

Li-Fi technology has a massive use in traffic management and in establishing safe movements of vehicles on the road. But to implement it commercially each and every vehicle has to include a LED-based traffic head-light, tail-light and Arduino microcontroller. But the fact is, Li-Fi technology is more costly than any other existing one. If we can somehow minimize the cost to some extent, then there is no need of any traffic police on the road. Again we will not face any unnatural death on the road due to recklessness of the drivers. So it is high time we implement this fabulous technology to step forward to a digital world.

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