

Smart traffic system using Li-fitechnology for automobiles

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Abstract - Li-Fi is the advanced technology of the world. This project is concise in the vehicle to vehicle communication to avoid accidents. The ultrasonic sensor is using to find the distances of the front vehicle and measuring the vibration level in the vehicle the gas sensor measuring the alcohol level of the driver and this data is sent through the Li-Fi transmitter to receiver vehicle. If any abnormal condition in a front vehicle means this vehicle will stop on the second. Li-fi is connected with the UART function to the microcontroller. Light Fidelity, also known as LiFi, is a technology based on communication using light as a medium. This technology is known as Visible Light Communication (VLC) which removes the complexity of cable communication. LiFi has evolved over the past years and has been proven to be secure, efficient and can send data at very high . This paper also demonstrates a communication system in which data is sent from a transmitter to a receiver using light as a medium to control the speeds of two motors.

percentage, then is would of great significance in avoiding accidental deaths.

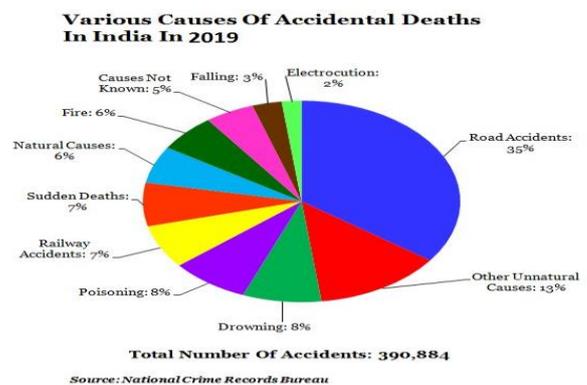


Fig. 1. Causes of accidental deaths in India

Keywords: Light Fidelity (LiFi), Visible Light Communication (VLC), Wireless communication technologies

1. INTRODUCTION

Li-Fi knows a light fidelity concept in the world. Li-fi is based on visual light communication. In that, we use an LED light emitting diode to transmit the data's to the receiver side from the receiver side we used the photovoltaic cell to receive the data's from the transmitter. LiFi [6]the rated speed can reach until 14 Gbps. On body can hack this Li-Fi technology. A predictive analysis or a prevention system for the accidents is a necessity of this moment. That is practically being implemented in the paper with the randomized and extensive use of appropriate sensors and the latest technology data transfer protocol. The data transfer has to be done in the minimum amount of time, since this is a real time scenario. Cost Effectiveness and the material constraint has been taken into account. Analysis of data due to number of accident occurrence in India in the year 2019 will provide an better understanding into the concept of accident detection and prevention. It is clearly understood by the figures that Road Accidents contribute to about 35% of the accidents in India (as per NCRB, India)[7]. If there is any chance to reduce this

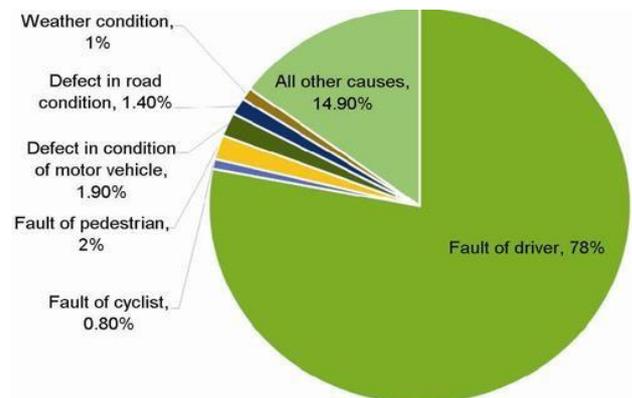
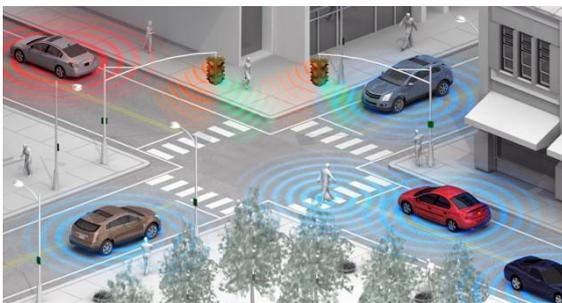


Fig. 2. Causes of road accidental deaths in India

A further deep insight into the accidents in India, provide better understanding that Human mistakes are also a common cause of mishaps. Human mistakes contribute to around 78% of the total road accidents in India. Common Human Mistakes during driving are continuous driving with fatigue or drowsiness, drunken driving and ignoring the traffic systems.

2. Existing Method

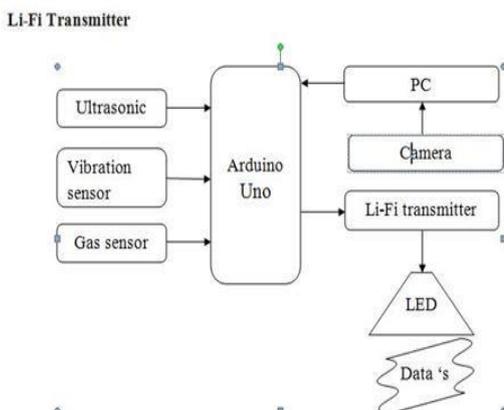
The proposed paper aims in using the Wi-Fi technology and enabling communication of vehicles with the traffic light system in order to prioritize the vehicles and change the signals accordingly rather than by a process of pre-defined order or by manual order. Traffic lights already use LED[8] lighting, so that this proposed system may seem easy to implement. Sending data through siren lights in an ambulance and fire extinguishers to a traffic light control system and switching the signal in order to allow faster and non interrupted transport.



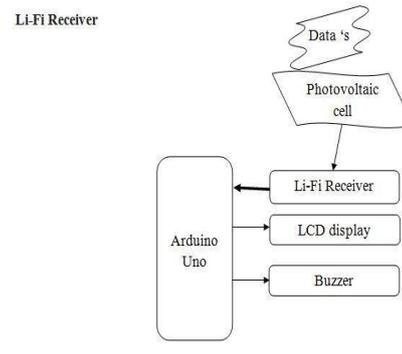
3. Proposed System

- Illumination and communication.
- The optical output is varied at extremely high speed.
- Unutilized electromagnetic spectrum Can be used in more environment.
- No health problems.

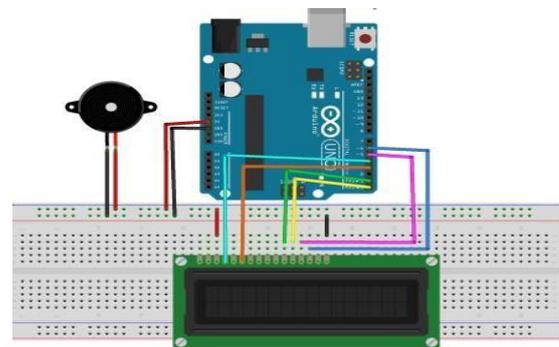
4. Block Diagram



LIFI Transmitter Block Diagram

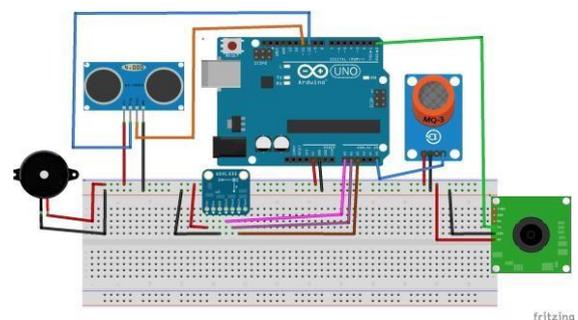


LIFI Receiver Block Diagram



LIFI Transmitter module 1 Figure

The vehicular transmitter module 1 consists of Arduino Uno controller[9], Gas Sensor for sensing any gas leakage of Alcohol consumption by the driver, Ultrasonic sensor for detection of any object intrusion in the road, PC & Camera Setup to detect the fatigue ness of the driver using eye blink control. It also has the Li-Fi Transmitter[11] module to transfer data from the device to other. Arduino is an inexpensive, cross platform, open source programmable controller with hardware and software.



LIFI Receiver module 2 Figure

The vehicular receiver module 2 will consist of the Arduino controller 2, that will be placed at the vehicle 2. This receiver module will only have the LCD Module for displaying the content received from Vehicular Transmitter module 1 and the Li-Fi receiver. Li-Fi[10] is using to transmit

the data's one end to another end through the light emitting diode. In this project, we have the two sections one this transmitter and receiver side. Each side we used three sensors the first ultrasonic sensor is found the distances of the front vehicle and vibration sensor is find the vehicle vibration least one gas sensor is using to find the alcohol level of the driver this value is displayed on the LCD at the same time data's are sent by Li-Fi transmitter. The transmitted data are received by the photovoltaic cell in the second vehicle. If any abnormal value means the second vehicle will stop on the feminists.

5. Hardware Requirements

1. Arduino Uno
2. LCD display
3. Ultrasonic sensor
4. Gas sensor
5. Li-Fi Transmitter / Receiver

6. Software Requirements

1. Arduino IDE
2. ORCAD Design.

7. Description

Arduino controller UNO

Arduino is a microcontroller or it can be called as tool for making computers that can sense and control more of the physical and real world than your desktop computer. It's physical computing platform based on a simple microcontroller board, and a development environment for writing software for the board Arduino can be used to develop interactive objects, taking inputs from a variety of switches or sensors, and controlling a variety of lights, motors, and other physical outputs. Arduino projects have the tendency to standalone, or they can be helped by the software section running on your computer. The boards can be assembled by hand or purchased preassembled from the market, it is available very easily. The arduino IDE is the software platform which can be downloaded for free. The Arduino programming language is an implementation[11] of Wiring and defining the devices used, a similar physical computing platform, which is based on the Processing multimedia programming environment.

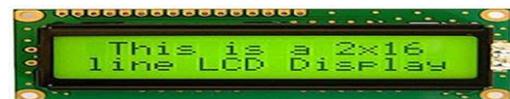


LCD DISPLAY

A liquid-crystal display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals. Liquid crystals do not emit light directly. This display is used to display the information about the detected object. The LCD display are built-in in the controller kit.

Ultrasonic sensor

Ultrasonic sensor is the device which is used to measure the distance. The working principle of the ultrasonic sensor is that it uses high intensity of sound waves and the sound waves are returned as the echo to the sensor[12], with the help of this concept the distance are measured. Here in this project ultrasonic sensor are used to measure the distance between the two vehicle when the come nearer to some



extent. As the two vehicles comes across in the contact the data is transferred to the other vehicle about the current status of the vehicle so that thechance of accident reduces.

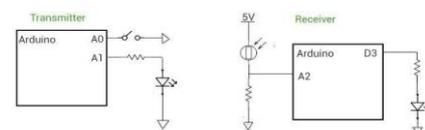


Gas sensor



The MQ series of gas sensor use a small heater inside with an electrochemical sensor[13]. They are sensitive for a range of gasses and are used indoors at room temperature. The output is an analog signal and can be read with an analog input of the Arduino.

Lifi transmitter/ Receiver



Transmitter is an electronic device which produces radio waves with an antenna. The transmitter itself generates a radio frequency alternating current, which is applied to the antenna. In receiver section photodiode module is used to detect the light signal generated by the LiFi transmitter in a faster way possible.

8. CONCLUSIONS

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 Li-Fi technology. We implement this fabulous technology to step forward to a digital world. Thus this method will help us to avoid road accidents. In future this data transmission using Li-Fi technology will be promised to play a vital role in human's life. traffic problem get reduces to a great number by using Li-Fi technology and this will proceed towards the cleaner, greener, safer and brighter future in this world without radio wave, because radio waves create a harmful effect for living thing, but Li-Fi is the optical wireless communication for data, audio and video streaming in LEDs. In future this system helps the communication much easier than other system. It involves Li-Fi communication, we can use these system in places such as Industries, offices etc.

Advantage

- Lifi can pass the message to longer range.
- The LiFi system is still in its experimental phase towards the future of self automated cars.
- Can operate using communication between vehicles and street lamps. Also access to high speed internet
- Street lamps can be implemented. Once an efficient and secure design for visible light communication is ready.
- Can change the future of communication. LiFi can also be used in disaster management and Medical environments where the use of RF waves may pose as a risk for patients.

9. APPLICATIONS

- It is only used for automobile purpose.
- Speed: LiFi can transmit data at the rate of 10 Gbit/s. This is almost 250 times faster than any other high speed broadband connection.
- High-density coverage: LiFi is more ideal for a high density coverage. WiFi is more ideal for common purposes.
- Secure: LiFi is more assured and dependable than WiFi. Light cannot pass through opaque objects hence it can be easily blocked by many surrounding objects.
- Cost: LiFi technology is free.
- Larger Spectrum: There are no restrictions to the capacity of LiFi. Visible light spectrum is about 10,000 times larger than RF spectrum.

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