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Design Development of Advanced Vehicle to Vehicle Communication Using LI-FI

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ABSTRACT: The main objective of this project is communicating vehicle to vehicle communication using LIFI technology. It is advance of WIFI and transmits data faster than WIFI. For using Technology we can avoid accident and crash between vehicles the latest technology called as LI-FI which has been developing a lot in few years. Using the concept of LI-FI two vehicles are communicated with the help of LEDs bulbs with the help of transmitter and receiver circuit. With the help of this technology the road accident can be controlled and reduce death count of human. The different sensors used like ultrasonic sensor which is used to measure the distance and Eye blink sensor is used to detect the driver sleeping. Using this LI-FI technology all the sensor data is transmitted from one vehicle LIFI transmitter to another vehicle Receiver.

I. INTRODUCTION

The car communication system is not designed for a particular brand or vehicle. This can be used in every vehicle with a little modification. The IEEE 802.11p protocol is used to get the efficient high speed communication. The system is designed considering the normal car user can also use it. The system is mainly divided in 3 sections which are described in section III Section IV and Section V and they are car positioning system, anchor system and signal communicators. The main advantage of the system is at the cost of GPS system a person can get the full car communication system and which will help him in secure transport which a GPS system can't support. The system is made to set up its own network among the cars. The cars are made to share their data. Car communication networks will provide a wide range of applications with different characteristics. As these networks have not yet been implemented, a list of such applications is speculative and apt to change in the future (However safety, which is the main purpose of these networks, will most probably remain the most important applications). Furthermore some of these applications require technologies that are not available now. Ultimately we would like to delegate the full handling control of our cars to the vehicles themselves; somewhat similar to autopilot.

In the last century, radio was introduced and implemented and gave rise to the new wireless world. It will be very surprising to know that the first wireless transmission of voice was done by the help of light waves. In 1880 the scientist Alexander Grahem Bell discovered the first wireless voice communication with the range over a distance of 213 m. this invention was one of the greatest invention for him but the invention of radio communication was given high priority and his invention was covered by radio communication Li-Fi is transmission of data through light by using fiber optics and sending data through a LED that varies in intensity, faster than the human eye can follow. Integrated chips inside LED will do the processing and amplification of data. The light intensity can be manipulated to send data by very small changes in the results. The technology transfers Thousands of data simultaneously in higher speed with the help of special modulation and demodulation technique. Li-Fi technology is high intensity brightness LED„s. Light emitting diodes can be made to switch on and off faster since operating speed of LED„s is even less than one µs, than the human eye can detect, causing the light source to be appear continuously. This on-off activity cannot be seen with the naked eyes of the human and that enables a kind of data transmission using binary codes. Switching on and LED is a logic 1„„ switch off is a logic 0„„ the data can be encoded from the light wave and the exact information can be achieved. Modulation is so fast that human eye doesn„t notice A light sensitive device (photo detector) receives the signal and converts it back into original data. This method of using the light waves and frequency in it and sending the required data refers as Visible Light Communication (VLC) though its potential to compete with conventional Wi-Fi has inspired the popular characteristics Li-Fi. Visible Light Communication Li-Fi is one of the very efficient version of Wi-Fi, which is based on visible light communication (VLC). This Li-Fi uses light for data communications medium using visible light waves as optical carrier for data transmission and illumination.

In basic terms, Li-Fi can be thought of as a light-based Wi-Fi. That is, it utilizes light rather than radio waves to transmit data. Also, rather than Wi-Fi modems, Li-Fi would utilize handset fitted LED lights that can light a room and

additionally transmit and get data. Since basic lights are utilized, there can in fact be any number of access focuses. This innovation utilizes a piece of the electromagnetic range that is as yet not enormously used The Visible Spectrum. Light is in truth particularly part of our lives for many years and does not have any real sick impact. Additionally there is 10,000 times more space accessible in this range and simply relying on the knobs being used, it likewise increases to 10,000 times greater accessibility as a framework, comprehensively. It is conceivable to encode information in the light by fluctuating the rate at which the LEDs flash on and off to give diverse series of 0s. The LED power is tweaked so quickly that human eyes can't see, so the yield seems steady More advanced systems could drastically build VLC information rates. Concentrating on parallel information transmission utilizing varieties of LEDs, where each LED transmits an alternate information stream. Different gatherings are utilizing blends of red, green and blue LEDs to change the light's recurrence, with every recurrence encoding an alternate information channel. Li-Fi, as it has been named, has just accomplished blisteringly high speeds in the lab. Scientists at the Heinrich Hertz Institute in Berlin, Germany, have achieved information rates of more than 500 megabytes for each second utilizing a standard white-light LED. Haas has set up a turn off firm to offer a purchaser VLC transmitter that is expected for dispatch one year from now. It is equipped for transmitting information at 100 MB/s - speedier than most INDIA broadband associations.

II. LITERATURE SURVEY

Husain Fidvi ET. al [3] have proposed vehicle to vehicle communication system that does not require a tracking global positioning System or even a Wi-Fi or 3G wireless connectivity. It was proposed to use Programmable Interface Controller (PIC) sonar which sends 40 KHz short pulse of sound that is undetectable by human ear. The echo of the signal will be detected by microcontroller. The distance is calculated by the time required for echo signal to be transmitted and received [3].This technology is demonstrated in the figure below Several research works have been attempted in literature for vehicle to vehicle communication using an advantage of light. As light frequency spectrum is huge, it is beneficial to be adopted in a short-range wireless communication [5]-[9]. In this work, we aim to develop a cost effective yet inexpensive mechanism for vehicle to vehicle. Which is light. The rest of the paper is organized as follows. Section II explains the details of the proposed system design. In section III, the system diagram is explained. Section IV provides details about the results of the system.

Recently, light emitting diode (LED) based optical wireless communication (OWC) systems have been developed. Especially, an OWC technology using visible light communication (VLC), has been receiving much attention. The LED is suitable as an optical-signal-sending device because light intensity of the LED can be modulated at high speed in comparison with traditional lighting devices, such as incandescent bulbs and florescent lamps. Furthermore, LEDs are inexpensive, already used for lighting and sign-ages, and have high energy efficiency and long operating life. Moreover, basic performances of LEDs are being improved constantly while achieving even lower cost.

Li-Fi remains for Light-Fidelity. Li-Fi is transmission of information utilizing noticeable light by sending information through a LED light that fluctuates in force quicker than the human eye can take after. On the off chance that the LED is on, the photograph finder enrolls a parallel one; generally its a parallel zero. This paper Rahul R. Sharma, Akshay Sanganal, Sandhya Pati "Usage of A Simple Li-Fi Based System" manages the usage of the most fundamental Li-Fi based framework to exchange information from one PC to another. The fundamental segments of this correspondence framework are high splendor LED which goes about as a correspondence source and silicon photograph diode filling in as the getting component. The information from the sender is changed over into transitional information portrayal, i.e. byte organize and is then changed over into light signals which are then discharged by the transmitter. The light flag is gotten by the photograph diode at the collector side. The turnaround process happens at the goal PC to recover the information over from the got light.
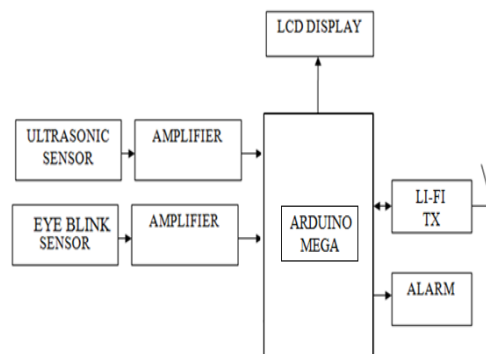
III. METHODS

Fig1: **BLCOK DIAGRAM**

The block diagram of the system is shown in figure 4. The functionality of the building blocks of the system is described next. The data source e.g. (speed sensor) reads the speed of the vehicle. The speed data from the sensor is peak to peak AC voltage so it will be converted to DC voltage to be readable by the microcontroller. Then the data will be processed by microcontroller (e.g. to compare between the current and previous speed). New processed data will then be transmitted to the LED driver. LED driver will make the current constant to protect LED. Then, data will transmit by The propose plan of action for our project is inter-vehicles communication using optical wireless model having high data rates (in the range of MHz to GHz) and transmission distances is near about 1m. For transmission of information from one device to another device required LED. In this system at transmitter section input data is given using switching control system. According to the data, the microcontroller generates a stream of 1s and 0s thereby translate the data in binary. The output of this controller is given to the LEDs which is connected to transmitter side. Which turn ON and OFF at very high speeds. This ON-OFF regulate the transmits of data through light. LED is the selected for light source since it consumes very less power when compared to fluorescent lamp or a light bulb. In this paper we are presenting the communication between vehicles using light as medium and maintain safe distance between vehicles to avoid accidents. In simple terms, Li-Fi can be thought of as a light-based Wi-Fi. That is, it uses light alternative for radio waves to transmit data. And instead of Wi-Fi system, Li-Fi would use LED lamps that can be used to light a room as well as transmit data. And at receiving end we use photodiode. Since simple light bulbs are used to transmit the data hence provides more security. This system is proposed for communication between vehicles and maintains safe distance between vehicles. The line of sight between vehicles should be clear.
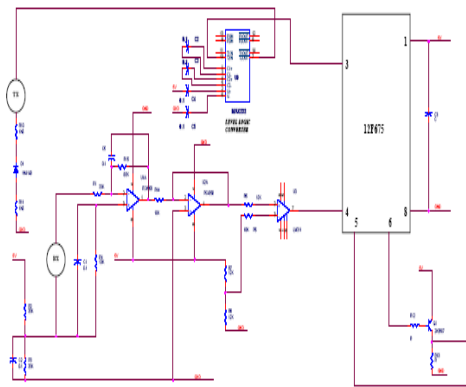

Fig2: **Circuit Diagram**

This circuit is designed to measure the distance of the object with the help of ultrasonic waves. The 12F675 microcontroller is used to generate the 40 KHz frequency signal. This signal is given to level logic converter (MAX232) in order to convert to TTL output pulse to +12v and -12v pulse. Then this pulse is transmitted through ultrasonic transmitter.

The ultrasonic wave is spread in the air and hit the nearest object and reflected from the object which is received by the ultrasonic receiver. The received wave is given to amplifier in order to amplify the received weak signal. After the amplification the amplified wave is given to zero adjustment amplifier because the amplified wave is in the range of above 6v level. Then the output is given to comparator in which the wave signal is converted into corresponding square wave signal. Then the square wave signal is given to input of the microcontroller. Now the microcontroller compares the time between the transmitted signal and received signal and generates the corresponding pulse output which is equal to distance of the object. Then the pulse signal is given to input of BC547 transistor.

IV. RESULTS

An object is classified by a majority vote of its neighbours, with the object being assigned to the class most common among its k nearest neighbours (k is a positive integer, typically small). If k = 1, then the object is simply assigned to the class of that single nearest neighbour.

It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a preset time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. Initially this device was based on an electromechanical system which was identical to an electric bell without the metal gong (which makes the ringing noise). Often these units were anchored to a wall or ceiling and used the ceiling or wall as a sounding board.

Another implementation with some AC-connected devices was to implement a circuit to make the AC current into a noise loud enough to drive a loudspeaker and hook this circuit up to a cheap 8-ohm speaker. Nowadays, it is more popular to use a ceramic-based piezoelectric sounder like a Sonalert which makes a high-pitched tone. Usually these were hooked up to "driver" circuits which varied the pitch of the sound or pulsed the sound on and off.

V. CONCLUSIONS

In conclusion, the concept of Li-Fi had been introduced along with existing techniques and classical trends used for vehicle to vehicle communications. As this project aims to propose a cost effective solution to reduce accidents in Oman, the design guidelines and details of system components were thoroughly explored. In this effective way are designing a vehicle to vehicle communication to avoid chance of accident. The main feature of our project is the LIFI Technology. It will transmit data quickly and the communication is happened quickly to avoid chance of accident. The safety travelling must of every human. The accident death count is increasing day by day. For this reason we are creating this project to provide safety travelling. Due to unavailability of all system components, proof of concept has been illustrated in this paper by sending data through Li-Fi small-scale prototype. Both numerical simulations and experimental work were presented and results agree well.

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