Vehicle to Vehicle Communication using LI-Fi technology

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Abstract — In this paper, a vibration-based method for autonomous pothole and speed breaker location detection is presented. Based on Li-Fi technology, the automobiles communicate with one another. It is a wireless technology that transmits data at a rate 100 times faster than Wi-Fi by using visible light. Every time the first automobile slows down, a message is transmitted through Li-Fi. Consequently, the automated braking system is activated to use the obtained data for braking on highways. The GPS is utilised to lock down the road's potholes. Android devices can communicate through Wi-Fi thanks to Node MCU. Wireless communication has become a basic utility in our day to day life such that it becomes a fundamental of our lives and this communication uses the radio spectrum for data transfer. There are issues in using the radio spectrum for data transfer. Road safety is mast of the primary concern nowadays because we see IoT of accident happening on road right now. Lot of people loss of life. Just because of something we cloud an avoided so that eliminate accident purpose of improving safety.

Keywords: Vehicle Communication, LI-Fi Technology

I. INTRODUCTION

Further using li-fi technology we develop vehicle to vehicle communication. In this model transmit data to LED lights of vehicle. A Visible Light Communication (VLC) system known as LiFi, or Light Fidelity, is a relatively new technology that uses light as a conduit for data transport at fast speeds. When light is employed, a variety of frequencies and wavelengths are available [1]. Wi-Fi can be compared to this technology, although it provides a higher accessible range, high speed, security, and efficiency. Prof. Harald Haas introduced LiFi in a July 2011 TED Global Talk.

A certain brand or kind of vehicle is not intended for the car communication system. Any vehicles can use this with a small adjustment. The technology was created with the idea that the average automobile owner could use it as well. When transmitting data, the main concerns are speed and security. Wi-Fi is easily hackable since it can pass through walls. Li-Fi, on the other hand, needs a Line Of Sight (LOS), doesn't pass through walls, and thus offers additional security. The primary technical distinction is that Li-Fi employs visible light while Wi-Fi uses radio frequency to deliver data.

The high-speed LED, which offers a transmission rate of more than 100Mbps, is the primary Li-Fi communication component. Over 600TB of data are regularly transferred by cell phones in continuous operation. Radio waves are now employed for remote communication.

However, there are drawbacks to radio waves in terms of effectiveness, use, range, and security. Range is a crucial requirement for remote communication The problem is not addressed by the current radio wave range, which leads to the limit issue. Innovation has advanced, and the number of clients has increased. We redesigned the idea of remotely sending data via light using LEDs, which we call Li-Fi, to address all of the issues. Li-Fi technology is used in the notion of vehicle to vehicle communication. In contrast, Li-Fi needs a Line of Sight (LOS), cannot pass through barriers, and so offers higher security. Li-Fi communication's primary element is the high-speed Li-Fi has advanced significantly in every aspect of communication. There is a big potential for remote information because it offers a faster rate of transmission, higher security, and fewer interference. By keeping track of the obstacle avoidance, a collision can be prevented by warning the driver. Wireless technology is essential for communication in many parts of the world, reaching even the most remote areas. As a tool for text and multimedia communication, Wi-Fi, or Wireless Fidelity, is gaining popularity. A transmission speed of 450 Mbps is achieved when three Wi-Fi antennae are used, but resources including bandwidth, security, upkeep, and network switching are sacrificed. We are gradually moving towards a new technology called Li-Fi as a result of technological improvement. The Light-Fidelity protocol Li-Fi has significantly improved communication in every area since it allows for far more remote data transmission at a faster rate with more security and fewer interference.

LiFi is the term for the use of the electromagnetic spectrum's visible light region to carry data at very high speeds. In contrast, well-established wireless communication technologies like Wi-Fi employ conventional radio frequency (RF) waves to convey data.

II. OBJECTIVES

To create a smart system that can recognise road obstacles like potholes and speed bumps. employing Li-Fi technology to create communication between vehicles in order to prevent traffic accidents Identify applicable funding agency here. If none, delete this text box. should use the closest Android device to gather sufficient information about the location of the car.

III. LITERATURE SURVEY

A. Introduction to li-fi problems and indoor networking principles.

Eight Li-Fi attocell APs were used in a single study hall to deliver an economically viable Li-Fi network, together with two other Wi-Fi APs that support seven study halls. Depending on the type of activity and transfer speed, each Wi-Fi AP can support information rates of between 300 and 867 Mbps. Every Li-Fi AP has the ability to support a circular inclusion zone that extends between 2.8 and 3.5 metres. A maximum of eight clients can be supported by each Li-Fi AP, which compares to a maximum cumulative data rate of 344 Mbps per study hall. This idea validation system uses standard, unmodified LED luminaires with an electrical transfer speed of around 2 GHz. The main motivation for the goal of the current project is to demonstrate how remote system administration and lighting may function together.

The advantage of this framework is that it corresponds quickly, which is the concept we tried to emphasise in the suggested paper.

B. Li-Fi

A wireless communication technique called LiFi (Light Fidelity) uses visible light to send data at incredibly fast rates. It has some similarities to the current WiFi technology, but it also differs significantly.

To put it another way, LiFi uses visible light, like that produced by a typical lamp or lightbulb!

The available radio spectrum below 10 GHz (cm wave communication) has been insufficient due to the growing demand for remote information correspondence. In response to this test, the industry for distant correspondence has begun to consider radio frequencies over 10 GHz (mm-wave correspondence).

Yet, the higher frequencies, f, imply that obstacles and shadows in earthly correspondences become increasingly difficult to overcome at higher frequencies. This is because misfortune expands according to the Friis free space condition. A continuation of the trend to shift to higher electromagnetic frequency ranges is light-fidelity (Li-Fi).

An attocell Li-Fi network makes use of the lighting system to provide fully organised (multiuser access and handover) remote access. In this study, we discuss some underlying effects of the downlink operation of a DCO-DCO-OFDM-based Li-Fi attocell system and evaluates how it compares to the top RFfemtocell systems in its class.

The technology is comparable to Wi-Fi in terms of its end user, with the main technological distinction being that Li-Fi transmits data by modulating light intensity rather of using radio frequency, which induces a voltage in an antenna. Li-Fi can operate in places that would ordinarily be sensitive to electromagnetic interference (such as military bases, hospitals, or airline cabins).

Many experts foresee a movement towards Li-Fi in homes because it has the potential for faster speeds and its security benefits with how the technology works. Because the light sends the data, the network can be contained in a single physical room or building reducing the possibility of a remote network attack. Though this has more implications in enterprise and other sectors, home usage may be pushed forward with the rise of home automation that requires large volumes of data to be transferred through the local network.

Because Li-Fi has the potential for higher speeds and has security advantages due to the way the technology functions, many experts predict a move towards it in residential settings. The network can be contained in a single physical room or building because the light conveys the data, lowering the risk of a remote network attack. The advent of home automation, which necessitates significant amounts of data to be transferred across the local network, may push home consumption forward, even though this has more ramifications for enterprise and other sectors.

C. A novel strategy for wireless data transmission that makes use of visible light

A free-space advanced optical wireless communication (OWC) technology called visible light communication (VLC) employs visible light (375nm–780nm) to send data across long distances. In terms of security, data rate, and cost, VLC is far superior than current wireless technologies like Wi-Fi, Wi-Max, Bluetooth, etc.Authors and Affiliations

The phrase "visible light communication (VLC), which has a history dating back to the 1880s, refers to any method of transmitting information using the visible spectrum of light. The Institute for Digital Communications in Edinburgh received funding for the D-Light project from January 2010 to January 2012.

D. Knowing how li-fi affects the quality of led lighting

According to the framework, it is possible to focus on how Li-Fi affects LEDs by putting various Li-Fi control techniques into practise and then tracking the variations in the light quality measurements that result, as shown in our earlier research. This is an expensive and time-consuming process that can be necessary. This makes it appealing to develop a simple model or tool from which to assess how Li-Fi affects the quality of LED lighting.

Such a model will have the capacity to provide a direct link between the LED driving current and transmitted light quality measures. Since the driving current for the LED is properly balanced in Li-Fi, such a model will enable precise evaluation of:

The most extreme potential variations in the light quality measurements over the entire strong range of the LED. Variations in transmitted light quality at any driving current. The subsequent varieties might then be compared to the industry standard to see if the changes in light quality brought on by Li-Fi fall within the acceptable range or not.

IV. FLOW CHART

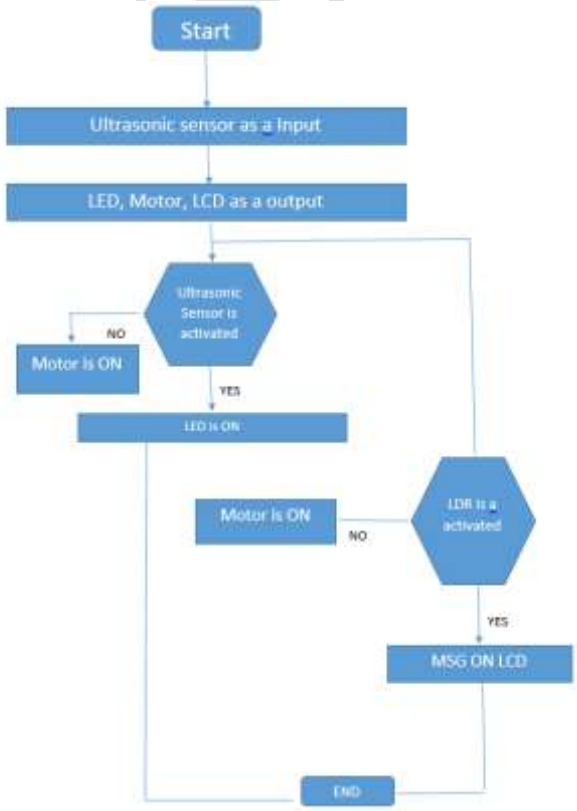

Fig. 1: Flow chart of v2v communication system.

V. LI-FI TECHNOLOGY

Wireless communication devices using "light fidelity" technology mostly employ visible light between the wavelengths of violet (800 THz) to red (four hundred THz). Li-main Fi's foundation is the uniform and controlled amplitude modulation of the light source used to transmit information.

On one end of the device is an LED transmitter (light emitting), and on the other is a photo detector (light sensor). Li-Fi is highly quick and easy to use. By altering the rate at which binary code (1s and 0s) is created by LEDs as they flicker "on" and "off," the data input to an LED transmitter is converted into light. Because LEDs turn on and off in less than a microsecond, this LED transmitter activity seems undetectable to the human eye. LED is turned on logically as "1," creating data.

Switching OFF is a logical "0" when transferring in accordance with receiving binary codes. By altering the rate at which LEDs turn on and off to create various combinations of 1s and 0s, data can be encoded in light.

VI. SOLAR PANEL

A solar cell panel, solar electric panel, or solar panel is an assembly of photovoltaic solar cells installed in a (often rectangular) frame. It is sometimes referred to as a photovoltaic (PV) module or PV panel. Sunlight is used by solar panels to collect radiant energy, which is then transformed into direct current (DC) power.

A photovoltaic system, often known as a solar array, is a well-organized collection of solar panels. A photovoltaic system's arrays can be used to produce solar power that either directly powers electrical equipment or, through the use of an inverter system, is sent back into the alternating current (AC) grid.

VII. SOLAR PANEL TECHNOLOGY

Crystalline silicon (c-Si) solar cells comprised of polycrystalline or monocrystalline silicon are currently used to make the majority of solar modules. More than 90% of all PV production in 2013 used crystalline silicon, with the remaining 10% of the industry made up of thin-film technologies using amorphous silicon, copper indium gallium selenide (CIGS), and cadmium telluride (CdTe) (a-Si).Innovative thin-film cells are used in third-generation solar technologies.

VIII. BLOCK DIAGRAM

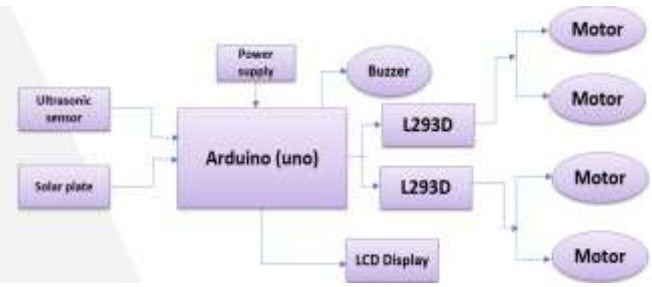

Fig. 2: Block diagram of v2v communication system.

A. Block Diagram Description

For road safety, we are building a vehicle-to-vehicle communication system in this project. The vehicles that are communicating with one another use a variety of characteristics, such as sensors and cutting-edge technology like li-fi, among other things. In order to achieve better results, wireless communication that controls and actuates parts should be more accurate. The key component of this project is the Arduino, which serves as the controlling component's primary function. the solace that offers a better method of steering the automobile. The correctness of these controlling components is crucial to the project's vision. When the IR receiver module receives the IR signal from the transmitter, the Arduino then performs the specific relay action through the receiver module. and send the command to the actuator at the appointed time. When compared to other solar technologies, they deliver a conversion with a comparatively high efficiency for less money. Also, because they provide the best ratio of generated power per kilogramme hoisted into space, close-packed rectangular multi-junction (MJ) cells with high costs, high efficiency, and high power density are typically employed in solar panels aboard spacecraft.

Gallium arsenide (gaas) and other semiconductor materials are used to make mj-cells, which are compound semiconductors. concentrator photovoltaic is a different cutting-edge pv technique utilising mj-cells (cpv).

IX. CONCLUSION

To communicate between vehicles, this system uses Li-Fi technology, which consists of a variety of sensors, including MQ3, a vibration sensor, an ultrasonic sensor, a PC camera, an Arduino board, an LED light, and a solar panel. This approach suggests a way to reduce traffic accidents, and by implementing it everywhere, it would eventually secure the safety of both drivers and other passengers.

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