Anti-collision and communication device for autonomous vehicles based on Light-Fidelity

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Abstract: A new way of data transmission between two vehicles using light fidelity technology is proposed in this paper. A best way of avoiding accidents can be achieved by the communication between the vehicles. This system can be simplified by using LED bulbs for data transmission. The previously used data transmission technology can be overcome by the newly proposed LI-FI technology. The major objective of this system is to achieve reliable communication between the vehicle using a transmitter and a receiver. The communication methods and the operations are presented in detail.

Keywords: Light Fidelity (LI-FI), Intelligent transport system (ITS

I. INTRODUCTION:

Light Fidelity (LI-FI) is a new way of communication which uses light as a medium of transmission. LI-FI refers to light fidelity. It is also a faster and effective way of communication than a WI-FI. Light fidelity works by using light emitting diode for data transmission. In this work a new design of data transmission based on light fidelity is shown in fig 1..LI-FI uses visible light as a medium hence it can be called as an optical version of WI-FI. This technology has data speed at the rate of terabits which is much faster compared to WI-FI. Spread spectrum technique to use as a vehicle to vehicle communication previously[1-4] .The major drawback of this technique is it requires driver's attention for control of speed. But in the proposed system the motor connected to the controller senses the speed between the vehicles and automatically stops the vehicle. Automation can be achieved as the distance between the vehicles reduces then the controller reacts and the motor speed is reduced.

Intelligent transport system (ITS) using visible light communication with a transmitter and a receiver is given in .But the speed of this system is limited[4]. The proposed technique modes of operation, its principles are presented in detail.

II. EXISTING SYSTEM:

• Vehicle to Vehicle communication and Ranging System has been proposed by using Spread Spectrum Technology.

• This method requires a transmitter and a receiver in each vehicle in both rear and front sides of the vehicle . A particular vehicle can communicate its speed information with other target vehicles in this method

• It uses Programmable Interface Controller (PIC) sonar which sends short pulse of sound that is undetectable by human ear. The echo of the signal will be detected by micro controller. The distance is calculated by the time require for echo signal to be transmit and receive.

• Human attention is needed for speed control in the existing method of vehicle to vehicle communication .

• This method does not provide an complete prevention from accidents.

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III.   PROPOSED SYSTEM:

The system has a transmitter and a receiver in each vehicle in both rear and front sides of the vehicle. The speed of the first vehicle is transmitted to the second vehicle and if the speed exceeds ,a notice of slow down is displayed in the LCD display .Similarly ,if the vehicles have the chance of collision , driver will be alerted with an chance of crash.The motor in the receiver controls the speed of the vehicle in accordance to the distance calculated between the vehicles.Similarly when an alert of crash is displayed ,the vehicle stops automatically preventing the accident.Security level for the vehicles is enhanced in this proposed method shown in fig 1&2.
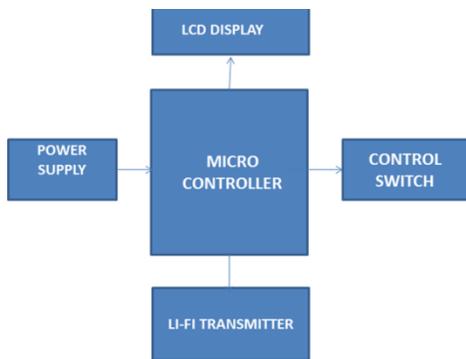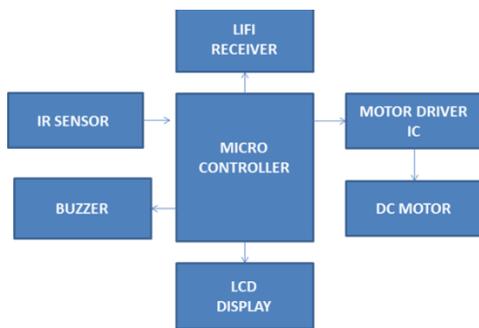

Fig1: Transmitter Block

Fig:2 Receiver Block

ARDUINO UNO BOARD

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button.

LCD DISPLAY

LCD (liquid crystal display) is the technology used for displays in notebook and other smaller computers. Like light-emitting diode (LED) and gas-plasma technologies, LCDs allow displays to be much thinner than cathode ray tube (CRT) technology.

LI-FI TRANSMITER

Li-Fi (short for light fidelity) is a technology for wireless communication between devices using light to transmit data. In its present state only LED lamps can be used for the transmission of visible light. ... The key technical difference is that Wi-Fi uses radio frequency to transmit data.

LIFI RECEIVER

Li-Fi Receiver Optimization Program Comes to Light. ... The receiver is integral in   converting the visible light waves produced by LEDs into electronic signals. That signal is then   decoded into an audio, text, or video file on a connected device.

MOTOR DRIVER

A motor driver is a little current amplifier; the function of motor drivers is to take a low-current control signal and then turn it into a higher-current signal that can drive a motor.

IR SENSOR

An infrared sensor is an electronic instrument which is used to sense certain characteristics of its surroundings by either emitting and/or detecting infrared radiation. Infrared sensors are also capable of measuring the heat being emitted by an object and detecting motion.

BUZZER

Electrical device that makes a buzzing noise and is used for signalling.

IV.   CONCLUSION:

A new technique of communication between vehicles which is reliable and simple compared to existing ones

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and also cost efficient. . The development of a VLC communication system consisting of a commercial LED-based traffic light and a vehicle mounted receiver has the main aim is to reduce accidents and to provide safer transportation which we have implemented in this system. LI-FI technology makes vehicles to communicate with each other and prevents the accidents by applying the braking system. The simulation results show the interface of vehicle to vehicle communication. Thus, the visible light communication was established which transmits data at the rate of terabytes and the hardware components gives the necessary results .Throughout the implementation process, we also focused on keeping the implementation cost as low as possible.

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