Research Article Available online www.ijsrr.org ISSN: 2279–0543

International Journal of Scientific Research and Reviews

Co-Designing Smart Lighting and Communication for Visible Light Networks

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ABSTRACT

Nowadays traffic accident discovery is getting one of the intriguing fields due to its tremendous operation in intelligent transportation systems. Main reasons behind these road accidents are absence of unskilled auto mobilists, consuming alcohol while driving, over speed, rash driving. plenitude of results has been applied to help these road accidents. But utmost of them were failed to help this. In this paper we present an advanced accident discovery using LIFI technology. This paper provides an intelligent system for accident forestalment and discovery for mortal life safety. That forestalment part has colourful detector like mems detector, alcohol detector and ultrasonic detector. If the detector detects whether the rider consumes alcohol or the spacing between two vehicle is low also it sends that data to another vehicle which is going in front it. So that they can be guarded.

KEYWORDS: Internet of Things, Sensors, Nodemcu, LI-FI.

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INTRODUCTION

There square measure around 1.4 million cell pole radio waves base stations set, with quite five billion cell phones. Cell phones transmit over 600TB of knowledge on a standard reason for systematically. Presently a day's remote correspondence utilize radio waves. Yet, radio waves have a difficulty of effectiveness, accessibility, security and limit. vary is important necessity for remote correspondence. With headway in innovation and increment in range of purchasers, existing radio radiation vary neglects to deal with the difficulty and consequently, the limit issue. to see all the problems, we've concocted the concept of transmittal data remotely through light-weight utilizing LEDs, known as Li-Fi that may be a most up-to-date innovation that utilizes junction rectifier lights that helps within the transmission of knowledge significantly faster, and variable because of the durability, effectiveness and high life time attributes that creates Li-Fi plan a superior one.

Driven lights square measure recently typically utilised for individual and authority functions for his or her bright viability improvement. Obvious light-weight correspondence (VLC) is another technique for remote correspondence utilizing noticeable light-weight. Common transmitters utilised for noticeable light-weight correspondence square measure obvious light-weight LEDs and recipients square measure photodiodes and movie sensors. Being a deeply inhabited nation like India and parcel of traffic problems, there's perpetually a difficulty of manual control at no matter purpose associate emergency vehicle shows up on a particular course that is not powerful.

The projected system aims in mistreatment li-fi for transmission of information through junction rectifier light-weight between 2 vehicles that helps in reducing road accident and promotes safe driving.

EXISTING SYSTEM

Present system needs a transmitter and receiver in every vehicle in each rear and front sides of the vehicle. Thus, a lot of situations are going to be applicable. For the nowadays, we have a tendency to describe 2 situations which will be studied within the existing system. A message is going to be sent through the transmitter that is placed in back lights to vehicle two. Then the message is going to be received by vehicle two mistreatment the photodiode that is placed at the front of car two. A notice of (Slow DOWN) are going to be then showed in vehicle two mistreatment alphanumeric display display. the knowledge are going to be received by photodiode in vehicle two and compared to vehicle two speeds. If the vehicle two is getting ready to cross the junction whereas vehicle one is moving with a high speed, the driving force are going to be alerted to see the opposite vehicle that is around within the

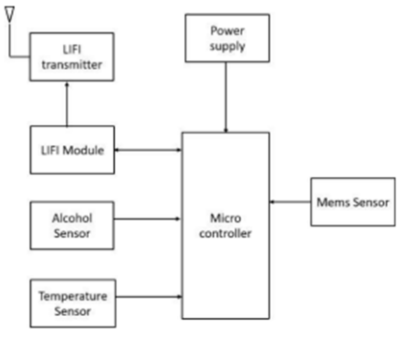
space.

PROPOSED SYSTEM

The projected system is meted out exploitation LIFI technology. The LIFI system has been connected to every vehicle. That li-fi system is employed to transmit and receive data kind a vehicle. Here, during this projected system we've got used numerous sensing element like instinctive reflex sensing element, unhearable sensing element, mems sensing element and alcohol sensing element. This sensing element has been connected with a microcontroller to every vehicle. If the rider consumes alcohol, then the alcohol sensing element senses it and provides that data to the closest vehicle moving into front of it through LIFI. as a result of whereas drunk and driving the rider might ride with over speed and it should hit the opposite vehicles which ends accidents. The rider ought to follow a specific distance with another vehicle. When the vehicle extremely on the point of next vehicle then the unhearable sensing element detects it and transmit that data through LIFI. this can facilitate to cut back the accidents. MEMS sensing element senses axis of the automobile, once there's a tilt in axis, it'll send message. This mem sensing element can facilitate to observe just in case of rash driving. which data are going to be shared with the assistance of li-fi technology. Here, we have a tendency to use an extra sensing element known as instinctive reflex sensing element that detects the sleepiness of a rider that might alert the motive force before mishap happens. we've got connected Associate in Nursing warning device for that. Here we've got used a liquid show to observe of these parameters.

BLOCK DIAGRAM

FRONT CAR



BACKSIDE CAR

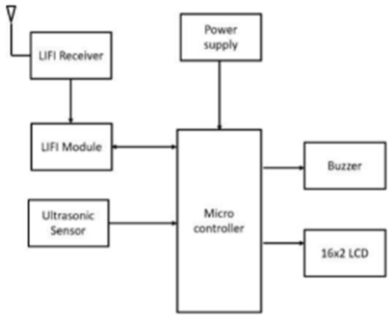


Figure 1. Outline of Smart Lighting and Communication for vehicle to vehicle using li-Fi

WORKING

This sort of communication are often referred to as as actinic radiation communication (VLC). victimization this system, the user will transmit the info through light-weight from one device to a different. In recent years, wireless networks and applications have achieved marvellous successes in government, enterprise, home, and private communication systems. Li-Fi technology works on an easy digital principle that is nothing however a crystal rectifier is ON a digital knowledge one are often transmitted and if it's OFF digital knowledge zero are often transmitted. So, during this project work we tend to ar getting to switch the LEDs terribly quickly.

These quick switches are often achieved by PWM technique to transmit digital knowledge stream containing strings. to accumulate this, we tend to programming the microcontroller to varies the duty cycle of the PWM signal that has the task of control this within the crystal rectifier.

The biased current is fed to crystal rectifier driver unit. the ability of crystal rectifier is varied in keeping with the undulation of knowledge signal. At the receiver facet photodiode device produces a current proportional to the received fast power.

CIRCUIT DIAGRAM

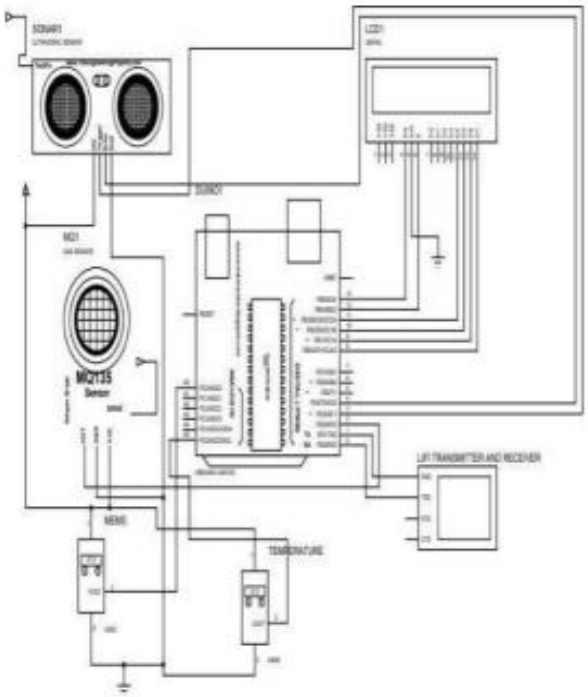


Figure 2. Outline of Smart Lighting and Communication for Visible Light Networks

HARDWARE DESCRIPTION

a) Arduino

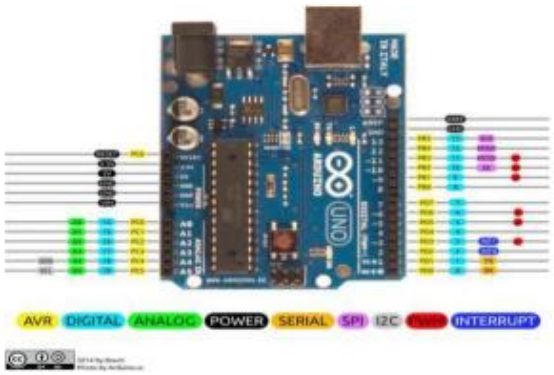


Figure 3. Arduino

Arduino Uno could be a microcontroller board supported 8-bit ATmega328P microcontroller. Along-side ATmega328P, it consists different parts like quartz oscillator, serial communication, transformer, etc. to support the microcontroller. Arduino Uno has fourteen digital input/output pins (out of that six may be used as PWM outputs), six analog input pins, a USB affiliation, an influence barrel jack, Associate in Nursing ICSP header and a push button.

Along with ATmega328P MCU IC, it consists different parts like quartz oscillator, serial communication, transformer, etc. to support the microcontroller.

b) LI-FI Module

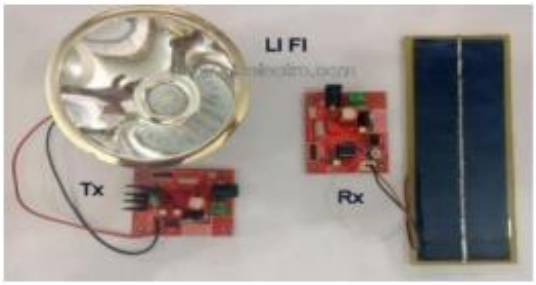


Figure 4. Li-Fi Module

LI-FI is transmission of information through illumination, that is causing knowledge through associate degree LED light-weight bulb that varies in intensity quicker than human eye will follow. The new LIFI receiver is intended with solar battery that receives the sunshine with knowledge. baud of operation is 9600.

Simple mode of working:Connect Tx of LIFI to Rx of TTL, Rx of LIFI to Tx of TTL

- Power supply 12v (5v regulator is on board)
- LED source is soldered to Tx board.
- ATMEGA8 IC used on Tx & Rx boards for handling serial data.
- Li-Fi can be thought of as a light-based Wi-Fi. • It uses light instead of radio waves to transmit information.
- And instead of Wi-Fi modems, Li-Fi would use transceiver-fitted LED lamps that can light a room as well as transmit and receive information.

c) Alcohol Sensor

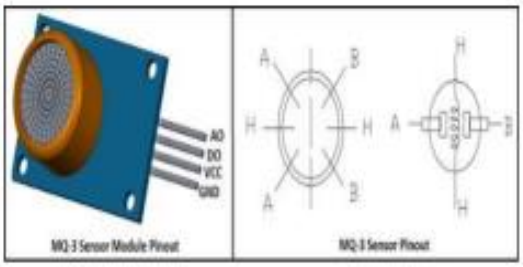


Figure 5. Alcohol Sensor

MQ-3 module is appropriate for police investigation Alcohol, Benzine, CH4, Hexane, LPG, CO. Sensitive material of MQ-3 gas detector is SnO2, that with lower physical phenomenon in clean air. once the target alcohol gas exists, the sensor's physical phenomenon is higher in conjunction with the gas concentration rising. MQ-3 gas detector has high sensitivity to Alcohol, and has sensible resistance to disturb of hydrocarbon, smoke and vapor. This detector provides associate degree analog resistive output supported alcohol concentration. once the alcohol gas exist, the sensor's physical phenomenon gets higher in conjunction with the gas concentration rising. there's a resistance across associate degree A and B within the detector that varies on detection of alcohol. additional the alcohol, the lower the resistance. The alcohol is measured by activity this resistance. The detector and cargo resistance type a resistance, and also the lower the detector resistance, the upper the voltage reading are going to be detected.

d) 16x2 LCD Display

16×2 LCD is named so because; it has 16 Columns and 2 Rows. There are a lot of combinations

available like, 8×1, 8×2, 10×2, 16×1, etc. but the most used one is the 16×2 LCD. So, it will have (16×2=32) 32 characters in total and each character will be made of 5×8 Pixel Dots.

e) BUZZER

A buzzer could be alittle nevertheless economical element to feature sound options to our project/system. it's terribly little and compact 2-pin structure thus will be simply used on board, Perf Board and even on PCBs that makes this a wide used element in most electronic applications.

Figure 6. 16×2 LCD Display

Figure 7. Buzzer

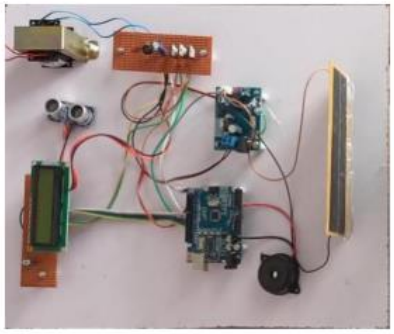
APPLICATION

- Automobile Applications
- Hospital Application
- Industrial application
- Security Application

RESULT

RESULT whereas driving a automobile within the main road at midnight time, if we have a tendency to found the one that goes ahead suddenly stops the automobile then to avoid accident to scale back the speed of our vehicle and a buzzer to alert us. so as to pass the data to the one that is returning behind , we have a tendency to use a LIFI technology and it helps him to scale back the speed of his vehicle so as to avoid any accidents. This LIFI technology are often utilized in real time to avoid such brutal incidents.

FRONT SIDE CAR **BACK SIDE CAR**



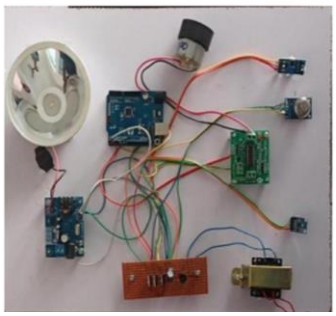


Figure 8. Outline for vehicle to vehicle communication of the Output

CONCLUSION

This project given the efficient technique to avoid collision between 2 vehicles (i.e.,front and rear vehicles) by victimization LIFI technology. The thought of emergence of LIFI technology alongside the methodology of V2V communication has been introduced with efficiency. The project presents an easy module of vehicle-to vehicle communication through visible radiation communication which will be enforced in future vehicles. the thought of victimization easy semiconductor diode lights as transmitter, exposure diode as a receiver and easy electronic equipment makes it price effective. At transmitter speed sensing element is employed to method the speed and brake standing of the vehicles to transmit over rear light-weight/brake light of the vehicle. At the receiver aspect exposure diode detects this and therefore the buzzer is afraid to point brake. This module is price effective. The prototypes of the important time transmitter and receiver circuits square measure given.

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