

Intelligent Li-Fi Technology Adopted for Congestion Eliminating

Prof. A. Ambika

Assistant professor Department of Electrical and Electronics Engineering, Sri Sairam Engineering College,
Chennai

ambika.eee@sairam.edu.in

M.A Swinkumar

Department of Electrical and Electronics Engineering Sri Sairam Engineering College, Chennai

aswineee98@gmail.com

M.Kamalesh

Department of Electrical and Electronics Engineering, Sri Sairam Engineering College, Chennai

mkamalesh111@gmail.com

K.NAVEEN

Department of Electrical and Electronics Engineering, Sri Sairam Engineering College, Chennai,

naveenkarthikkeyan@gmail.com

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Abstract

There are large numbers of toll gates in the National Highways across the country. Most of the people find it very difficult to wait in a long queue because of manually operating toll gate system. This causes waste of time and fuel. This project provides a great solution to all these problems. Most recently, Li-Fi is a new emerging technology in the trend. Here, the concept of Li-Fi is used to eliminate this queue. In this project, the data transmission and reception is done by pic microcontroller. The data which is received by the Li-fi receiver is sent to the monitor for checking account balance. The account detail is showed in the LCD display. Here the Dc motor is used to drive the barrier. As we use the concept of Li-Fi, high speed data transfer is achieved. So that the technology used in this project eliminates the queue in the toll gates and helps the people to reach their destination on time.

Keywords: Pic microcontroller, Li-fi transmitter and receiver, Dc motor, LCD display.

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I. INTRODUCTION

A high-speed wireless communication technology that uses visible light to transmit information is Li-fi. Unlike Wi-Fi, Li-Fi uses visible light communication (VLC) or near- UV spectrum waves and infrared.

The light emitted by bulb can be used as source for Li- fi technology. So, any bulb can emit Li-fi. If the LED source is given to the Li-fi

The Li-fi receiver placed at the toll section receives the data transmitted by Li-fi. The toll

section provides the data to the technology then high speed data communication is achieved. Instead of using Wi-Fi and other technology, Li-fi increases the bandwidth by 100 times. Because light spectrum is 10000 times greater than the radio waves. It can also be used in electromagnetic-sensitive areas like hospitals, airplane cabins, and nuclear power plants (where electromagnetic disturbance can be disastrous).

II. LITERATURE SURVEY

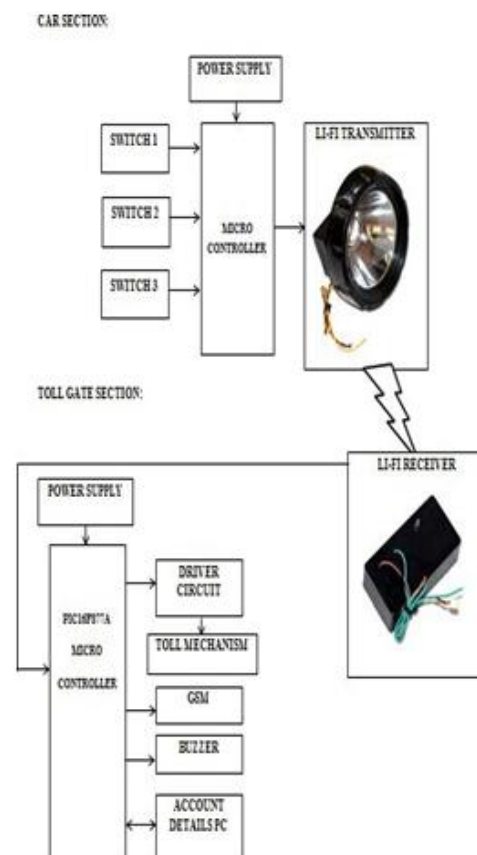
Automatic traffic signal control using Li-fi technology for emergency vehicles by implementing vehicle to vehicle (V2V) communication. Li-fi provides connectivity with more security and higher data transfer^[1]. Automatic toll collection system for eliminating queue of vehicles, waste of time and heavy traffic jam using QR code^[2]. Audio multicast for location information by visible light communication and this helps for visually impaired^[3]. RFID based electronic toll gate using antenna array synthesis. This is one of the techniques where vehicles passing the toll are automatically detected^[4].

III. PROPOSED SYSTEM

The drawback in the existing system is eliminated by this system. Three car based prototype consisting of three Li-fi data in the controller is used in the system. Whenever the specific car is selected then the unique number of that car is transmitted by Li-fi.

controller. The controller checks whether the account has the sufficient money to pay the toll amount. If the account has enough money for paying the toll, then the toll mechanism is operated and the car is allowed to pass through. If the driver's account has lower balance for paying the toll, then the vehicle is restricted to pass through and the alert message will be sent to the user using GSM. LCD is used to display the status of the account and beep sound using buzzer when the account has low balance.

BLOCK DIAGRAM



GSM MODEM

Wireless modem that works with a GSM wireless network is a GSM modem.

BLOCK DIAGRAM DESCRIPTION POWER SUPPLY

The power supply of 5V is given as an input to the PIC microcontroller.

PIC16F877A

The PIC16F877A CMOS FLASH-based 8-bit microcontroller. It features 200ns instruction execution, 8 channels of 10 bit A/D converter, 2 comparators, self-programming, 256 bytes of EEPROM, a USART and a parallel slave port, 2 capture/compare/PWM functions. It will perform as both a transmitter and receiver.

LI-FI TRANSMITTER

Li-fi transmitter is used to transmit the data which is programmed as binary. The source of data transmission is visible light. Whenever

data is one Li-fi transmitter is on and Li-fi transmitter is off when data is zero.

LI-FI RECEIVER

Li-fi receiver is used to receive the data which is sent by the transmitter. The received data is passed to the microcontroller. The distance between the Li-fi transmitter and receiver depends on the intensity of the light.

DRIVER CIRCUIT

Driver circuit is used for power supply to the motor of toll gate mechanism. Driver circuit is connected between the microcontroller and toll gate mechanism. When the account has enough money for paying toll then microcontroller will enable the driver circuit. Now the driver circuit will give constant voltage of +12V to motor for opening of barrier to allow the vehicle. It features are high-voltage output 50V, 500mA rated collector current.

working of GSM modem is based on commands, the commands always starts with AT(ATtention), finish with a <CR> character and the dialing command ends with semicolon. The PC or controller give the AT commands to the GSM modem. The GSM modem is serially interfaced with the controller with the help of MAX 232. The TX and RX pin of GSM modem is connected to the T1_OUT and R1_IN pin of MAX 232. Here the GSM is used to send two types of message to the user. If the amount is deducted from the account then how much amount is taken from the account is sent to the user and if the account has low balance then alert message is sent to the user. This is the two purpose of GSM modem.

BUZZER

Buzzer or beeper is a audio signaling device to indicate the emergency situation. There are three types of buzzers are present. They are electromechanical, mechanical and piezoelectric. Electric bell where it has no metal gong is a electromechanical type buzzer. In mechanical type buzzer it has driver and in piezoelectric type beep or sound is used to indicate the emergency situation. Here the buzzer is used to indicate that the account has sufficient amount to pay the toll.

IV. WORKING

In the proposed system, "SMART TOLL COLLECTION USING LI-FI

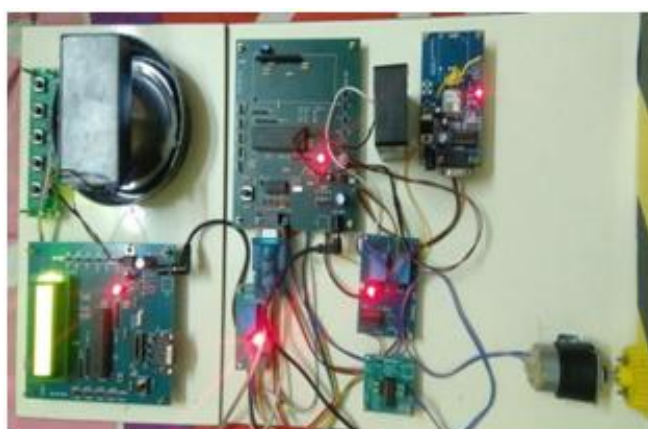
TECHNOLOGY", three switches are function as a three different cars. Each car number is programmed as a binary code. By that "The account is not maintaining the sufficient amount" is sent to the user. This account is rechargeable. pressing switch1 the car number of the car1 is transmitted by Li-fi technology. Similarly by pressing switch2 and switch3, the car number of car2 and car3 are transmitted respectively. A separate account is created for all cars using car number because OTP is required for access the bank account. Now the Li-fi receiver receives the car number of switch which is pressed. The Li-fi receiver sent the received data to PIC microcontroller. Now the PIC microcontroller gives the data to the PC. With the details of car number, the account of that car is accessed by PC. Now PC checks the account of the car that the account has money for paying the toll or not. If the account has money for paying the toll amount then PC will give a signal to the microcontroller for enabling the driver circuit. Driver circuit is used for giving a constant power supply to toll mechanism because the motor of toll mechanism requires constant supply for its operation. By enabling driver circuit, constant voltage of +12V is given to the motor. Now the toll is opened for allowing the car passed through it. The toll amount is deducted from the user account. The amount how much is deducted from the account is informed to the user by sending message and the total amount in that account is informed by sending a mail. Now if account has not sufficient amount for paying the toll amount then the alert message is screened in the monitor. This alerts the guards to stop that car. The barrier is opened and the car is allowed to pass through it but the car is stopped by the guards. The driver has to pay additional amount for not maintaining the account with sufficient amount. Suppose the car is escaped from that toll, the car number

and model of that car is sent to next toll. They will catch that car. The alert message

V. RESULT

Here the system works same for balance and low balance conditions. Under balance condition, the amount is reduced from account and car is allowed to pass the toll.

To implement this system, little modification is needed by fixing the Li-fi transmitter in the car.



Under low balance condition, the car is allowed to pass the toll but driver has to pay additional amount for maintaining the account less than the toll amount

VI. CONCLUSION

In this system, the toll mechanism is fully automatic. No need of man power for monitoring the process. By using this system, waste of fuel and time due to

VII. ADVANTAGES

- Traffic jam gets eliminated across toll section.
- Accuracy is more using Li-fi.
- Time and fuel are saved by

eliminating queue.

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