

Intelligent car parking information exploiting using VLC

S.Deepika¹, N.Gopinath¹, Moumita sharma¹
ECE dept
Valliammai Engineering College, SRMnagar
Kattankulathur, Chennai, India
deepikasubramanian42@gmail.com

D.Murugesan².
Assistant Prof., ECE dept.,
Valliammai Engineering College, SRMnagar
Kattankulathur, Chennai, India.
mdmurugesan@gmail.com

ABSTRACT- In this modern world the number of vehicle increases by day-by-day. These lead to a major problem in parking their vehicle in various places like hospital, business place and sports place. To overcome this problem various parking slot consists of parking management system with number of sensors. These sensors are used to detect the available space in the parking slot. The proposed system consists of visible light communication (VLC) to data transmission. The sensors in the parking slot detect the available space and this information regarding empty parking slot is indicated to the driver and guide them to the corresponding parking slot. Since the data transaction is in the form of light it is applicable for indoor parking system. The light emitting diode (LED) is used to transmit the data about the available space.

Keywords- visible light communication(VLC), parking module, vehicle module.

INTRODUCTION

As the population increases the vehicle units also increase as people fascinate on their vehicles and brands. Hence vehicle units are increases. People find trouble in parking their vehicle. Looking for an empty parking slots during an events like parties, meetings and even during festive times also. To overcome this parking system need to be smarter. Hence various parking area is implemented with advanced parking management system which is mostly based on wired or wireless network. It's mainly applicable for indoor applications.

Now-a-days parking area not only bound in one ground, its modified into different manners such as, floor-by-floor even underground parking are constructed. In this modified version the parking area is divided into various slots and vehicles are parked in these correspondingly labeled slots. In order to detect the empty space, each slots are implemented with sensors. The detected information is used to guide the driver to the empty space and the data

transmission is carried through either wired or wireless.

EXISTING SYSTEM

The parking slots near the buildings, businesses, or institutions are often with special vehicle space for the owners and employees. The wireless sensor network based car parking management systems are implemented. They designed by using the RF technology to transmit the parking area information to the entrance of the parking area to display available parking slot. But its need one radio spectrum to transfer the information and interference occur more in this system. This system consists of wired network that make the system more complicated. Some parking slots have parking meters into which coins must be paid to park in the adjacent space.

PROPOSED SYSTEM

In the proposed system the VLC is used for the data transmission. In the VLC mode of transmission the data is transformed in the form of light. The light fidelity is the new form of wireless system. Which act as an alternative of WI-FI

With a solid state of lighting system the LED flickering of light creates the binary coded as 1s and 0s. This binary data is transmitted to the driver. Any electronic photo diode is used to receive the transmitted signal. Depending on the data to be coded the flicking of the LED rate is varied. If the LED is on or transmission of light is possible then the send data is 1. If the LED is off or no passage of light then the data transmitted is 0. Thus the data is encoded by varying the rate of light flicking. The intensity of LED is varied soo rapidly that it is not visible to the human eye and the output appears constantly. Even the parallel data transmission is possible by array of LED and for encoding a different data channel the mixture of red, blue and green LEDs are used which has about 10Gbps.

WORKING

In the proposed system each parking slots consists of their respective proximity sensors. These proximity sensors are used to detect the available empty slots. The data about the available slots are then transmitted to the receiver section or to the driver. The data transaction is through VLC technology. Depending on the data the LED light flicking is modified.

I.PARKING UNIT

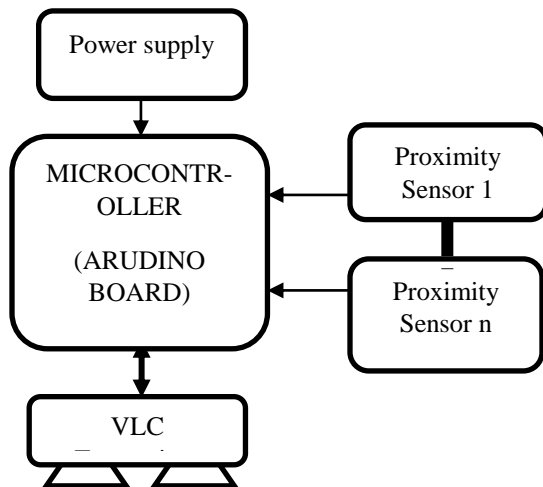


Fig1. Block diagram for parking slot

The proposed system consists of low power consumption ARDUINO board act as a main server. The ARDUINO is updated by the sensor for every second. The proximity sensor is used to detect the presences of the vehicle and the data from all the sensors are used to update in the server board. Then this data from the parking module is transmitted to the driver through the VLC module.

A.ARDUIINO BOARD

The ARDUINO UNO board consists of ATmega 328 is a high performance and low power 8bit micro controller. It has 14 i/o pins (in which 6PWM pins), 6 analog pins and it has in-built oscillator that generates 16MHZ carrier signal. The important feature is that it and 8 AD/DA converter. Hence there is need of separate program for the A/D convertors which is mostly used in the display units. Thus the ARUDINO board is flexible for this project.



Fig2. Arduino board top and bottom view

B.PROXIMITY SENSOR

The PROXIMITY SENSOR is used to detect the presence of sensors. The proximity sensor consists of LED and a photo diode. The LED is used to transmit light to a particular height and the photo diode is used to detect the reflection of light. The proximity sensor consists of trigger to vary the intensity of light emitted by the LED. If car has been parked then the transmitted light from the LED is reflected back. These reflected lights are detected by the photo diodes. When the output of the photo diode is high then it is identified as the parking slots are not empty. This data about the parking detail is updated in the ARDUINO board by wired networks.

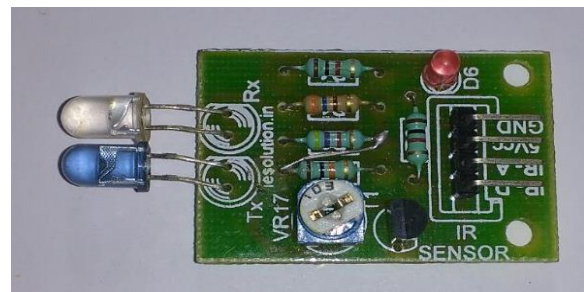


Fig3. Circuit connection of proximity sensor

C.VLC MODULE

The VLC is used to transmit the binary data in the form of light. The input of the VLC module is binary data and it's transmitted through LED. According to the binary data the flicking of the LED varies. The transmitter of VLC module consists of LED connected to the JFET, Where the LED is connected to the output.

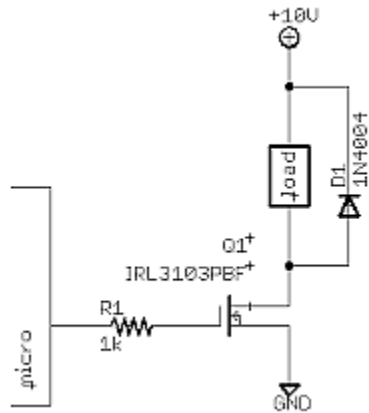


Fig4. Circuit diagram for VLC

The power supply is connected to the source and drain is connected to the ground. This operation is processed by if the binary value is 1 then the VSS is connected to LED then the LED is on. If the binary value is 0 then it is connected to the ground thus LED is off. The flicking of the LED can be modulated thus it provides data transmission at high speed. In the receiver section the photo diode or photo detector is used to detect the light and decodes the received signal.

II. THE VEHICLE UNIT

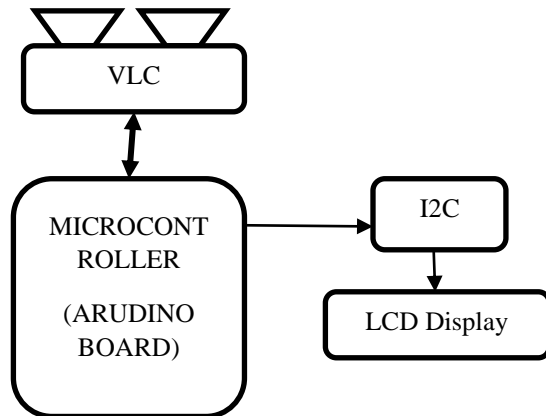


Fig5. Block diagram vehicle unit

D. I2C DRIVER

The I2C stands for inter-integrated circuits. The I2C is used to fetches data from the micro controller and feed as an input to the display unit. In I2C driver each data is stored in a special address with a 7-bit address in ASCII format with 16 reserved addresses hence maximum of 112 nodes can

communicate simultaneously. Both master and slave relationship exists in I2C driver. The master can be both as a master-transmitter and master-slave. While it receives the data from the micro controller it acts as a master receiver. If it sends the data to the display unit then it acts as a master transmitter. In I2C driver only two bus lines are required. They are serial data line(SDA) and serial clock line(SCL). The true multi-master bus consists of collision detection and arbitration. It is used to prevent the data corruption if two or more masters simultaneously transfer data. The spikes on the bus data lines are filtered by on-chip filtering process. This preserves the data integrity

E.DISPLAY UNIT

The DISPLAY unit is used to display the empty slot to the driver. The 20x4 LCD is used as a display unit. The reason why LCD is: LCDs is an eco-friendly and an easily programmable deice, & even custom characters (unlike in seven segments)are displayed, animations and so on.



Fig6. LCD display unit

The LCD interface the three power supply pins, three control pins and eight digital input pins. The supply pins are VCC, VSS and GND is used to for power supply and grounding purpose. The control pins are RS, RW and E. where RS is register set. If RS=0 Instruction register (writing). If RS=1 data register (for both reading and writing). RW is read/write. If RW=0 for writing and if RW=1 is for reading. 'E' stands for enable. Used to enable the operation when E=1. The eight digital output pin D0-D7 is used to display 8-bit data. An intelligent LCD needs only a few commands and data to function command sets for the LCD.

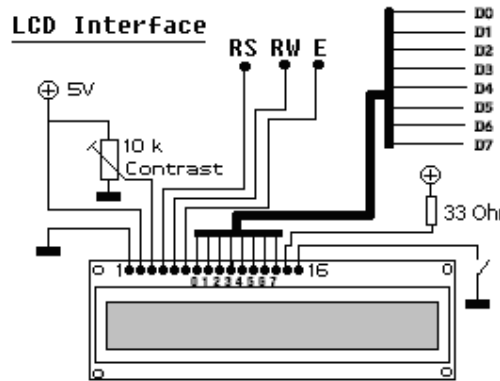


Fig7. LCD interface diagram

III.CONCLUSION

The visible light communication based car parking system sense and detects the available parking slots and display to the driver and guide them to the corresponding slot using parking slot module and vehicle module with a display unit. The proximity sensors detect the available space and are transmitted through the VLC module. This transmitted information about the parking space is displayed through LCD interface. This method eliminates the time required to find the empty space and the fuel wastage. Since the visible light communication is used for the data transmission the energy consumption also reduced. Thus the system is considered to be a simple, consume less power and reduces wireless interference.

REFERENCE

1. Muhammad F. Mridha (2015), "A Time and Energy Efficient Parking System Using ZigBee Communication Protocol " Proceedings of the IEEE SoutheastCon 2015, April 9 - 12, 2015 – Fort Lauderdale, Florida.
2. Carlos Medina, Mayte Zambrano and Kiara Navarro (2015), "Led Based Visible Light Communication: Technology, Applications And Challenges – A Survey", International Journal of Advances in Engineering & Technology, ISSN: 22311963.
3. Mohit Patil and Rahul Sakore (2014), "Smart Parking System Based on Reservation" International Journal of Scientific Engineering and Research, ISSN (Online): 2347-3878, Vol. 2, Issue 6.
4. Manjusha Patil, Vasant N. Bhonge (2013), "Wireless Sensor Network and RFID for

Smart Parking System" International Journal of Emerging Technology and Advanced Engineering, ISSN 22502459, Vol. 3, Issue 4.

5. N. Kumar, N. Lourenco, D. Terra, L. N. Alves, and R. L. Aguiar, "Visible light communications in intelligent transportation systems," in Proc. IEEE Intell. Vehicles Symp. (IV), Jun. 2012, pp. 748–753.