Impact Factor Value 4.046 e-ISSN: 2456-3463
International Journal of Innovations in Engineering and Science, Vol. 4, No.1, 2019
www.ijies.net

Study on Intelligent Car Parking System Using RFID

Shrey Patel[1], Aniket Ghotekar[2], Praful Sahane[3], Alok Narkhede[4]

[1,2,3,4]Dept. of Mechanical Engineering, Yeshwantrao Chavan College of Engineering,Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur, Maharashtra, India.

Abstract*: Parking in the city is a major issue and thus this paper is aim at developing an Intelligent Car Parking system that is user friendly, cost effective and less time consuming than the already existing systems. This system comprises of RFID technology and sensors. RFID reader read the RFID tag of car and opens the gate and LED'S guides the car towards the vacant parking slot with the help of IR sensors attached in each slot. This system also consists led panel which will display the availability of parking slot. The RFID system proposed in paper resolves three main issues: safety and security in parking, proper utilization of parking space and reducing slot searching time.*

I- INTRODUCTION

Now a days in many public places such as malls, multiplex systems, hospitals, offices, market areas there is a crucial problem of car parking. So, there is a need to develop an automated parking system that indicates directly the availability of vacant parking slots in any lane right at the entrance. Entry-point and exit-point of the parking-lots will be under control with RFID readers, labels and barriers. Personnel costs will be reduced considerably using this technology. It will avoid ticket-jamming problems for the ticket processing machines as well. Vehicle owners will not have to make any payments at each Entry-point thus a faster traffic flow will be possible.

1. CONCEPT

This RFID Project tries to make the parking of the vehicle in the area easily and quickly with the help of the automation. As in modern world everything is changing to automatic, we are trying to make the parking system completely automatic. It will take into account the number of vehicle entering the premises in addition with the outgoing vehicle, also it will display the total capacity of the parking slot along with available vacancy for parking. The RFID System consists of a reader, and RFID tags. Each RFID tag records a unique ID and finite information. The information recorded in the tag is transmitted to the RFID reader. RFID reader is deployed at the gate and the RFID tags are placed in the car. When an RFID Parking Management System user's car approaches the gate, the induction and communication between RFID tag inside the car and antenna of RFID System is automatically established. Then the reader of RFID System translates the signal information to the digital content. Same follows when car goes out. Also, when car enters inside parking slot, LED's attached at each slot will indicate the car if the space for parking is available or not.

2. HARDWARE

RFID system composed of microcontroller, rectifier and voltage regulator, RFID reader, IR sensor, LCD display, motor, led's. The overall hardware design of the system is shown in figure 1.

2.1 Microcontroller

Here the microcontroller used is PIC18f25k22. It is the central and most important part of the system. Considering the system as body then microcontroller serve as the heart of it. Defining microcontroller as an integrated electronic computing and logic device that includes three major components on a single chip Microprocessor Memory/O ports Includes support devices Timers A/D converter Serial I/O Parallel Slave Port All components connected by common communication lines called the system bus. When RFID sensor sense the new tag it sends the message to the microcontroller which checks the tag details and also look if any vacant space is available and the send signals to different components regarding the decision made,

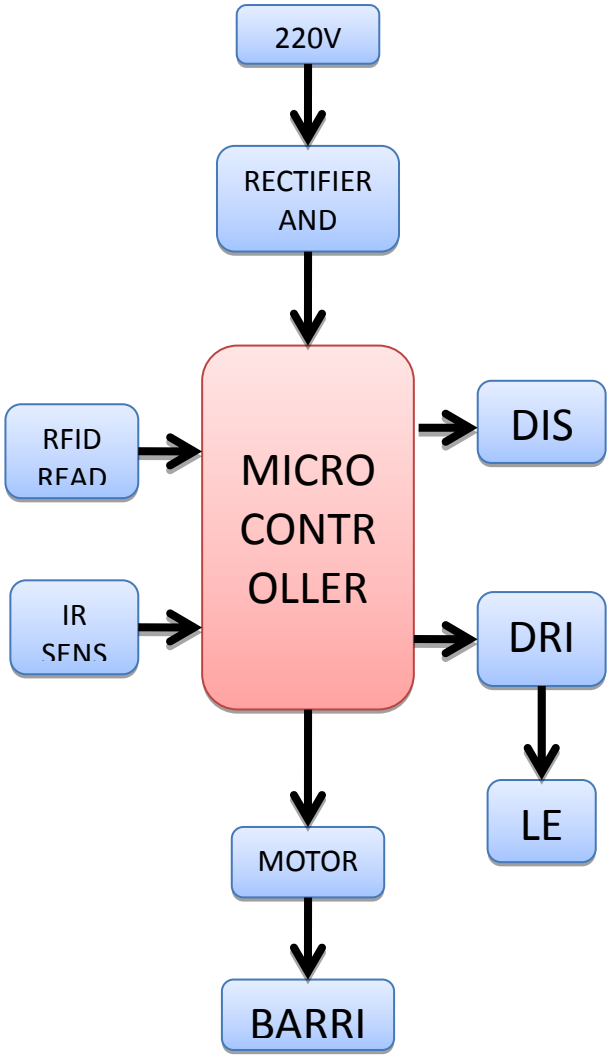

Fig 1. Hardware component diagram.

such as commanding the gate to let the car in premises and turn ON the led's to navigate car to the destination, displaying the capacity, vacant spot of the parking. Similarly during the exit when the car leaves it is sensed by IR sensors which trigger signals toward microcontroller which makes the updating in the data of vacant space of the parking.

2.2RFID System

An RFID system consists of two separate components: a tag and a reader. Tags are analogous to barcode labels, and come in different shapes and sizes. The tag contains an antenna connected to a small microchip containing up to two kilobytes of data. The reader, or scanner, functions similarly to a barcode scanner; however, while a barcode scanner uses a laser beam to scan the barcode, an RFID scanner uses electromagnetic waves. To transmit these waves, the scanner uses an antenna that transmits a signal, communicating with the tags antenna. The tags antenna receives data from the scanner and transmits its particular chip information to the scanner.The data on the chip is usually stored in one of two types of memory. The most common is Read-Only Memory (ROM); as its name suggests, read-only memory cannot be altered once programmed onto the chip during the manufacturing process. The second type of memory is Read/Write Memory; though it is also programmed during the manufacturing process, it can later be altered by certain devices.

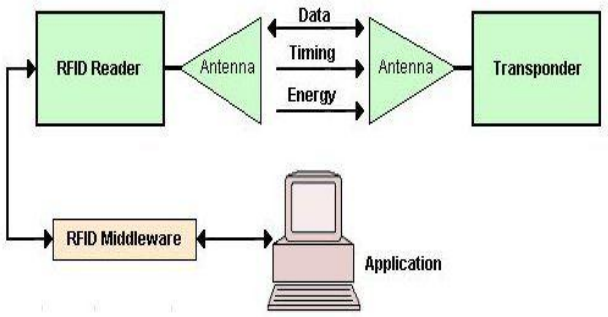

Fig 2. RFID Components

2.3 Display

LCD displays the intermediate between microcontroller and user. It displays the basic function of the system such as Total capacity, vacant slot. When a user scan its tag while entering the LCD displays users details as proof for slot allotment for the user. LCD display is an inevitable part in almost all embedded projects and this article is about interfacing 16×2 LCD with 8051 microcontroller. By using 16×2 LCD you can easily design embedded projects like digital voltmeter / ammeter, digital clock, home automation displays, status indicator display, digital code locks, digital speedometer/ odometer, display for music players etc. 16×2 LCD module is a very common type of LCD module that is used in 8051 based embedded projects. It consists of 16 rows and 2 columns of 5×7 or 5×8 LCD dot matrices. The module were are talking about here is type number JHD162A which is a very popular one. It is available in a 16 pin package with back light, contrast adjustment function and each dot matrix has 5×8 dot resolution.

2.4 Servo Motor

Tiny and lightweight with high output power. Servo can rotate approximately 180 degrees (90 in each direction), and works just like the standard kinds but smaller. You

can use any servo code, hardware or library to control these servos. Good for making stuff move without building a motor controller with feedback & gear box, especially since it will fit in small places. It comes with a 3 horns (arms) and hardware.

2.5 ULN 2803 IC

ULN2803 is a High voltage, high current Transistor Array IC used especially with Microcontrollers where we need to drive high power loads. This IC consists of a eight NPN Darlington connected transistors with common Clamp diodes for switching the loads connected to the output. This IC is widely used to drive high loads such Lamps, relays, motors etc. It is usually rated at 50v/500mA. This article brings out the working of ULN2803 IC and how to use it in a circuit.

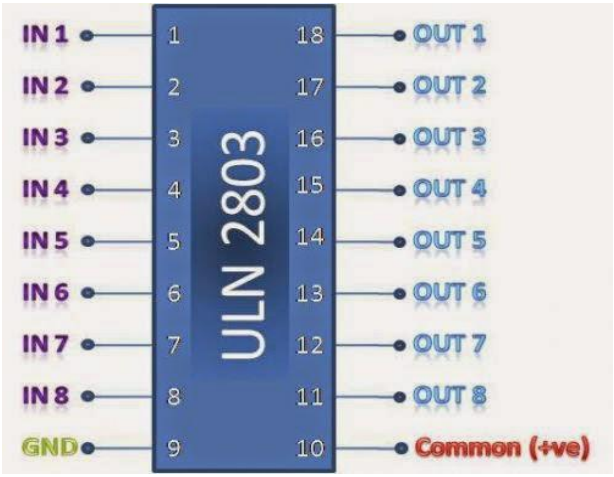

Fig 3. ULN 2803 IC

PURPOSE OF ULN2803:

Most of the Chips operates with low level signals such as TTL, CMOS, PMOS, and NMOS which operates at the range of (0-5)y and are incapable to drive high power inductive loads. However this chip takes low level input signals (TTL) and uses that to switch/turn off the higher voltage load that is connected to the output side.

WORKING OF ULN2803:

The ULN2803 IC consists of eight NPN Darlington pair which provides the proper current amplification required by the loads. We all know that the transistors are used to amplify the current but here Darlington transistor pairs are used inside the IC to make the required amplification.

2.6 IR Sensor

IR sensor basically consist an IR LEDand a Photodiode, this pair is generally called IR pair or Photo coupler. IR sensor work on the principal in which IR LED emits IR radiation and Photodiode sense that IR radiation. Photodiode resistance changes according to the amount of IR radiation falling on it, hence the voltage drop across it also changes and by using the voltage comparator (like LM358) we can sense the voltage change and generate the output accordingly.

The placing of IR LED and Photodiode can be done in two ways: Direct andIndirect. In Direct incidence, IR LED and photodiode are kept in front of one another, so that IR radiation can directly falls on photodiode. If we place any object between them, then it stops the falling of IR light on photodiode.

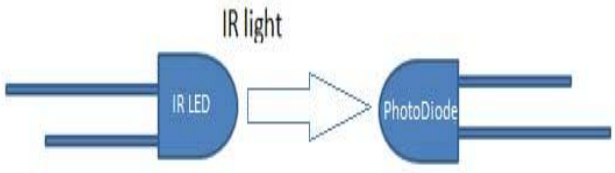

Fig4. Direct Incidence

And in Indirect Incidence, both the IR LED and Photo diode are placed in parallel (side by side), facing both in same direction. In that fashion, when an object is kept in front of IR pair, the IR light gets reflected by the object and gets absorbed by photodiode. Note that object shouldn't be black as it will absorb all the IR light, instead of reflect. Generally IR pair is placed in this fashion in IR sensor Module.

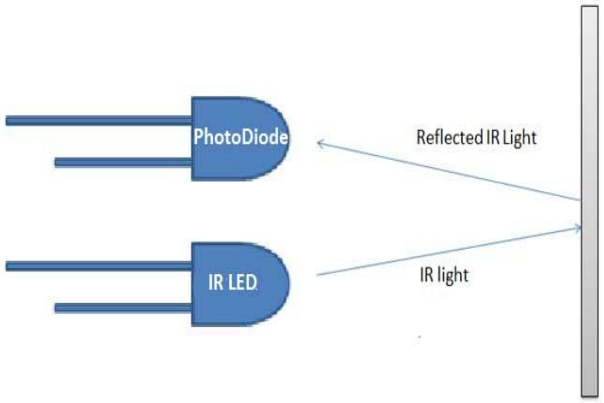

Fig5. Indirect Incidence

2. SIGNIFICANCE

It will reduce human efforts and time required for entry and exit of vehicles.

It will eliminate fraud and reduce cash handling.
It will enable the drivers at entry and exit gate to enter if there is empty space in the parking and disable them to enter when there is no empty space.
Proper space utilization will allow more parking space and reduce the traffic jams within parking area.
It will reduce the number of people needed at the gate to guide drivers.
It will also reduce the fuel consumption by reducing the standby time at entry, exit and while searching for empty parking slot.

3. FUTURE SCOPE

This system can further be enhanced by connecting it with IOT platform and giving live status of parking slot availability on android app, hence parking slots can be booked online anytime for required period of time by paying online as per the duration.

4. CONCLUSION

The study has identified that the design and development of the intelligent car parking system using RFID allows easy management of car parking with minimum human efforts and it can be used at all the places starting from domestic to industrial sector. The system is built with simplicity which allows any user to access it without any knowledge of hardware or software.
The RFID system is designed to increase security by allowing cars with RFID tag. The automated car parking system significantly reduces the time taken for entry, exit and for checking space by displaying the spot where the space is available on LCD display at the entrance by using IR sensors at each parking slot. Also LED's attached at each slot will turn on if parking slot is empty and hence guide the driver to exact location.

REFERENCES

[1] *Yuan-Tsung Chang, Timothy K. Shih,"RFID-Based Intelligent Parking Management System with Indoor Positioning and Dynamic Tracking," in Proc. Int. Conf. on Ubi-media Computing and Workshops 2017.*
[2] *Sumita Nainan, Romin Parekh, Tanvi Shah, "RFID Technology Based Attendance Management System,"IJCSI International Journal of Computer Science Issues, Vol. 10, Issue 1, No 1, January 2013 ISSN (Print): 1694-0784, ISSN (Online): 1694-0814 www.IJCSI.org 516.*
[3] *Mohmmed Ahmed Mohmmed Ahmed, Wang Guang Wei, "Study on Automated Car Parking System Based on Microcontroller," IJERT, ISSN: 2278-0181, Vol. 3 Issue 1, January- 2014.*
[4] *Garvit Pareek, M. Vinay, "IoT based Prototype for Smart Vehicle and Parking Management System," IJST, Vol. 11(21), ISSN (Print): 0974-6846, ISSN (Online): 0974-5645.*
[5] *Dr. V. Kepuska, Humaid Alshamsi, "Smart Car Parking System," IJST, Vol. 5 No. 8, 2016, ISSN 2049-7318.*
[6] *B. Ramya Sri, A. Monika, G. Gowry Naga Sravanthi, D.Drona Akshay Kumar, CH. Papa Rao, "Automatic Car Parking System Using IR Sensors," IJESC Vol. 7 Issue No. 4 2017.*