

# Car Park Management System using RFID

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**Abstract**—This project is to design and construct Car Park Management System Using RFID. Parking space issues are major in most cities. The limited availability of parking space results in traffic congestion, air pollution, time consuming as well as economy of the nation. The price for parking growth is typically prohibitively high. All on top of numerous issues will be overcome by constructing a park that's embedded with Wireless sensing element Network Technology. Car park management systems operate by observing the available parking space and creating that info on LCD screen to users and facility directors. The prototype contains system architecture, software, hardware including its implementation phase. Our goal is to construct a car park system which is equipped with sensors and provides surveillance. We are developing a novel miniaturized modular platform for wireless sensor networks. The system design, hardware and software system are going to be mentioned moreover as details of the readying situation chosen for the model of a parking area management system.

**Keywords**- Car, Parking Lot, RFID, IR Sensor, Microcontroller, Monitoring

## I. INTRODUCTION

The Car parking is a parking area that utilizes various technologies to efficiently manage the lot early system used to display to drivers parking information such as the availability status and / or the number of available spaces. This system is still widely used today and now became the necessary part for building car parking area in major cities. There are also complex car parking area that incorporates more advanced technologies to serve customers of different needs.

The system contains RFID Tag and RFID Reader that strongly provide the security for the purpose of authentication of valid user to park the car. Monitoring system is used to save the details data of each individual who is parking his/her car in parking area. A car parking system is a mechanical device that has multiplies parking capacity to park the car inside a parking area. There are basically traditional and automated types of car parking systems. In the long term, automated type is likely to be more effective when compared to traditional parking garages. Automatic car park systems are less expensive per parking lot, since they tend to require less building space and less ground area than a conventional facility with the same capacity.

### A. Radio Frequency Identification Overview

RFID technology has several applications in extend beyond the retail sector. RFID tags are embedded in passports for security and personal identification in ID cards to control

access to buildings. Tags are used for electronic payment for transportation system and other payment systems, for example credit cards and smart cards.

It has several medical uses including tracking of new born babies in hospital, storing information of surgical patients, procedures, and tracking medical equipment.

RFID systems used in toll collection, transport payments and logistics management systems by using conventional RFID system. When the capability of RF communication is accurately analyzed, it can be seen that there are more possibilities beyond that. After considering the characteristics and behaviors of RF communication, it is possible to design some new applications that improve the safety, security, comfort-ability, and productivity in eco-friendly manner.

The RF tag play an important role to achieve safety, security, productivity and comfortability. The importance of RFID system is that, it gets verification from the Road Transportation Office (RTO).The user will require an authentication to get proceed to the thumb registration module by which the efficiency of thumb is enhanced using Pattern Matching Algorithm (PMA). Face recognition system is a technique in which will be used after the thumb registration system. This system allows the user to drive the car and for emergency, a key insertion slot will be placed in this system through which user can insert the key. In emergency mode of operation the camera captures the driver's image and sends it to the owner's mobile as Multimedia Messaging Service (MMS) and the owner will provide the authentication password. Global System for Mobile communication (GSM) module is kept inbuilt for tracking purpose.

The system used contactless smart card to limit the entries of unwanted persons. Contactless smart card has information stored in which when come in the field of RFID reader it reads the information stored in the card.

The RFID Reader read information and match with the data stored in it .If this reader has the information about card it will allow the card user to enter in area. If reader does not find information in tag in its memory then the user will restricted.

### B. Aims and Objective of this research work

This research aims at design and implementation of car parking management system using radio frequency identification (RFID) technology. This automated vehicle management system consists of embedding code into an RFID tag and assigning the same to car. The second stage is accessing the information from the RFID tag to the RFID

reader. In the third stage, the data is updated from RFID reader to the Database. The final stage is to keep a track of vacant space in the parking lot.

### C. Methodology

The project was implemented in four stages:

Step 1: This is by writing into the tag with the write ability of the RFID reader and assigned to a car. The tag contains distinct data of the vehicle, like employee ID number or name or any other distinct data.

Step 2: Reading information contained in the tag: The information in the tag needs to be read during the car parking and this done with the aid of the RFID reader.

Step 3: Data comparison: The data in the RFID reader is been fed to the system for comparison of data and further processes. Data from the RFID reader is fed to the system using serial communication RS232.

Step 4: Tracking the available space: To properly utilize the parking lot, every cars in the parking lot and those entering and leaving are to be tracked. In this the number of cars in the parking lot is incremented for each car entering the lot and is decremented for each car leaving the lot.



Fig. 1.0: Car park management System using RFID

### D. Design Overview

The Car Park management system includes access control unit, PIC16F877a series microcontroller, IR module, RF module, keypad, barrier gate, and display unit. The parking lot monitoring module is provided with infrared sensor, whose function is to monitor the parking field 24x7. The infrared sensors are interfaced with the pic16f877a microcontroller. The status of the parking lot is continuously monitored and display to the user. A gate serving as a barrier is provided to every level of parking bay. Each level may have number of

parking lots. UART communication is carried out between GSM and the microcontroller.

### Block diagram representation

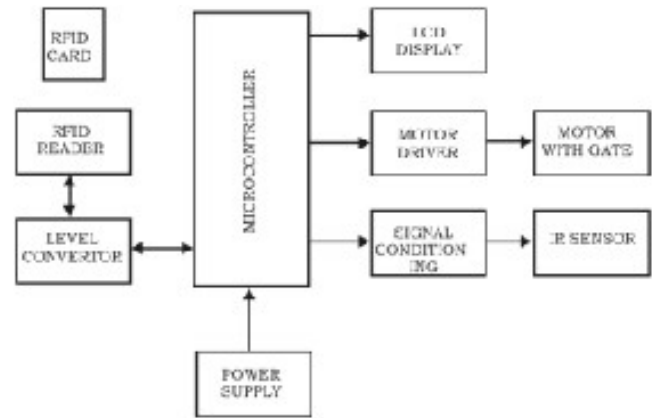


Fig. 1.0 Block Diagram Of Car Park Management System Using RFID

#### 1. Microcontroller PIC16F877A

The PIC16F877A is commonly used microcontroller have 8K byte programmable flash memory. It has the less complex features, easily available and cheap in comparison of other microcontrollers.

#### 2. RFID-Card

RFID card is compressed of a microchip containing identifying data which is single binary bit or large array of bit and an antenna that transmits this data wirelessly to reader. We use passive tag have no their own power source. At its most basic, the chip will contain a serialized identifier, or license plate number, that uniquely identifies that item, similar to the way many bar codes are used today.

#### 3. RFID-Reader

It work as transceiver. RFID card is comes in contact of the RFID reader placed at entrances. Reader is electronic device which is produce electromagnetic field. With the help of electromagnetic field it provides power to the tag to read the stored information. When the transponder Tag draws power in this way the resultant interaction of the RF fields causes the voltage at the transceiver antenna to drop in value. This effect is utilized by the Tag to communicate its information to the reader. The Tag is able to control the amount of power drawn from the field and by doing so it can modulate the voltage sensed at the Transceiver according to the bit pattern it wishes to transmit.

#### 4. Motor Driver IC

It is 16 pin quad push-pull drivers and delivering output current to 1A per channel. It is dual pair bidirectional motor driver IC. It is available in 16 pin Batwing dual in package DIP packages. Each channel is controlled by Transistor Transistor Logic (TTL) compatible logic input and each pair

of drivers is equipped with an inhibit input which turns off all four transistors.

#### 5. Level convertor (MAX 232)

It is 16 pin IC .It is used as a level convertor. As AVR uses Transistor Transistor Logic (TTL)/Complementary metal oxide semiconductor (CMOS) levels and Global service for mobile (GSM) works on RS232 standard. So to establish link between them we use MAX232.MAX232 uses 2 drivers. Drivers are used to convert TTL/CMOS levels into RS232

levels. Receivers are used to convert RS232 levels into TTL/CMOS levels.

#### 6. Infrared (IR) sensor

For sensing the car we are using LTH1550 sensor. This sensor has IR transmitter and IR Receiver. IR signal use to detect the car by measuring intensity of reflected signal. By using this sensor and its related circuit diagram we can control the gate of parking system.

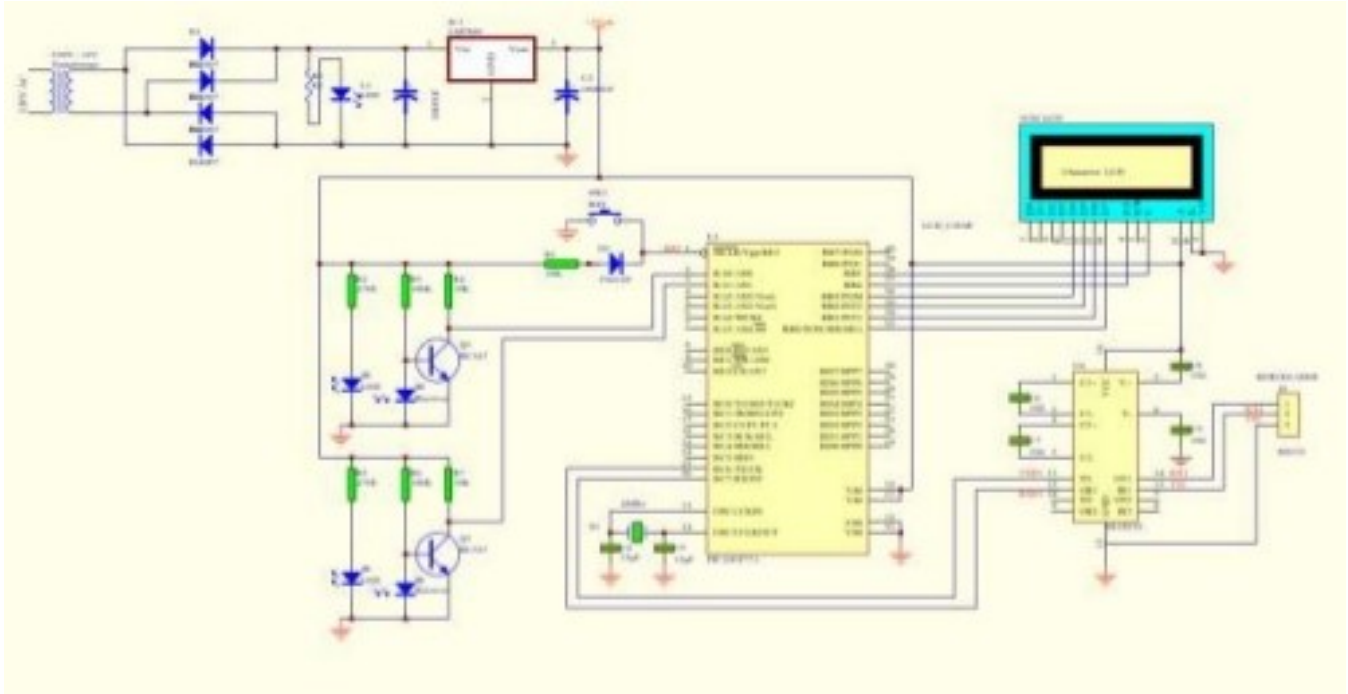


Fig.2.0: Circuit Diagram

## II. PRINCIPLE OF RFID BASED CAR PARKING SYSTEM

The principle of operation of the project lies in functioning of RFID, RTC and EEPROM. RFID Card is specific to the user and the card details are pre-programmed in the microcontroller. When the RFID card is swiped against the RFID Reader, it gets energised from the reader and sends the information to the reader. The reader then transmits the card's information to the microcontroller via serial communication protocol. The microcontroller then checks for the received card details with already stored details and checks for authenticity of the card. If the card is existing in the database, the microcontroller will check for the current time in the RTC module and stores the in time details of the particular card in the EEPROM. The communication between the microcontroller and RTC module is using I2C protocol. The communication between the microcontroller and the EEPROM is also using I2C protocol.

If the card is swiped again, the in time details from the EEPROM and out time details from the RTC are taken and the fare is calculated as per the tariffs.

## III. RESULT

A step-by-step approach in designing the microcontroller based system for the measurement and control of temperature and humidity is followed. The results obtained from the measurement have shown that the system performance is quite reliable and accurate. This system requires a number of hardware components, properly integrated in accordance with their specifications. The system requires a continuous and reliable power supply provided to them.

## IV. CONCLUSION

This system keeps all the data concerning the vehicle entry time, exit time and the entire parked vehicle. This paper is accenting on the fundamental design of secure parking system. Proposed system provides freelance, non stop systems for parking, and access management. This technology provides businesses and communities with

hands free management to make sure solely approved vehicles have entry.

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