

# Smart Car Parking System using IoT

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**Abstract**— The main objective is to avoid cramming in car parking area by implementing an efficient car parking system along with a user-friendly application for an ease of use. Normally at public places such as multiplex theatres, market areas, hospitals, function-halls, offices and shopping malls, one experiences the discomfort in looking out for a vacant parking slot, though it's a paid facility with an attendant/ security guard. The parking management system is proposed to demonstrate hazard free parking. The proposed system uses infrared transmitter-receiver pairs that remotely communicate the status of parking occupancy to the Arduino uno and displays the vacant slots on the display at the entrance of the parking so that the user gets to know the availability /unavailability of parking space prior to his/her entry into the parking place. Implementation involves minimal human interaction and provides a seamless parking experience thereby reducing a lot of time wasted by the user in parking his/her vehicle.

**Keywords:** IoT, Arduino UNO, RFID, IR Sensor, L298N Motor controller, Environmental Brightness

## I. INTRODUCTION

Now days in many public places such as malls, multiplex systems, hospitals, offices, market areas there is a crucial problem of car parking. Car-parking area has many lanes/slots for car parking. It involves a system including infrared transmitter- receiver pair in each lane and a display outside the car parking gate. So the person desirous to park his vehicle is well informed about the status of availability of parking slot. In the proposed system, the display unit displays a visual representation of the parking and it shows the empty and occupied slots which help the user to decide where to park their car. The system would definitely save time and the software and hardware would also manage the check-in and check-outs of the cars under the control of RFID readers/ tags with additional features of automatic billing, Entry exit data logging.

### A. Existing System

The existing methodology aims to use frequency identification (RFID) technology in automation at car parking system in mall/building. This project also provides an efficient and an alternate method to coin operated meters to pay and display tickets. It is manageable and price productive to implement this project because it should somewhat be a standalone system or alongside traditional parking payment systems to eliminate fraud and reduce cash control. A wise Parking System (SPS) which enables the user to hunt out the closest lot and provides availability of parking slots as it mainly focuses on reducing the time finding the parking lots and also it avoids the unnecessary travelling through filled parking lots during plenty. Thus, it reduces the fuel consumption which successively reduces carbon footprints in an environment.

### B. Problem Definition

The efforts made in this paper are indented to improve the parking facilities of a city and thereby aiming to enhance the quality of life of people. The main aim is to design an integrated system which involves two components Parking Allocation and Seamless Parking. When the car is passed through the entrance the RFID Scanner scans the tag stores the timestamp of the entry and at the exit the tag is read again and the total time is calculated and reflected in the users account.

### C. Scope

The main motivation for making Car Parking System is the huge amount of time people have to take in order to park their cars in public places. In the existing system, one has to spend ample time before they find out an empty parking spot and also the conventional payment method requires the user to spend a lot of time to complete their transaction. Creating an automated system which not only helps users to make parking much more efficient and faster but also automates the payment gateway using RFID thus saving the user a lot of time.

## II. PROPOSED SYSTEM

The proposed methodology interfaces RFID technology along with the IOT and with a web site. In this project, an SPS with IOT could also be a one which enables the user to hunt out the closest parking area and provides availability of parking slots therein area has been designed ,and it mainly focuses on reducing the respective parking time finding the parking lots also it avoids traffic at a particular area. A webpage is being designed that regulates the quantity of cars to be parked on designated parking area. It consists of three sections: First section is that the parking IOT which incorporates Arduino devices together with IR sensor. It enhances the slots availability to the user in order that they will book the slots and park the vehicles. The second section contains the cloud-based web services which acts a mediator between the user and parking lot. The cloud is updated depending upon the supply of the parking lot. The admin administers the cloud services and it may also be viewed by the user for checking the supply.

### III. HARDWARE DESIGN

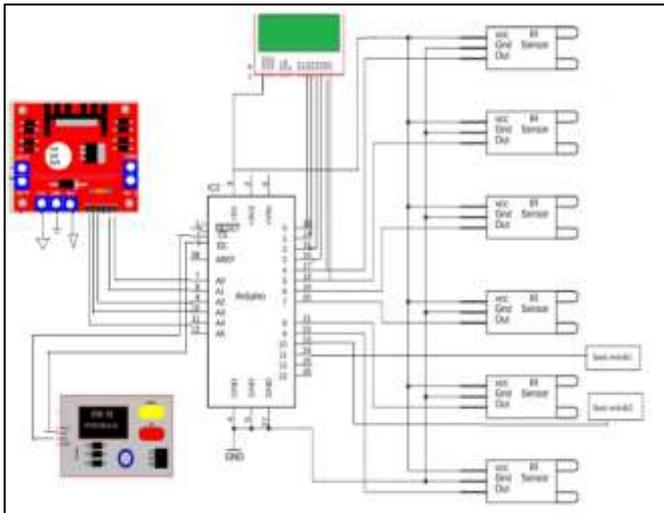


Fig. 1: Hardware diagram of proposed system

#### A. Explanation

##### 1) Arduino UNO:

The Arduino UNO is an open-source microcontroller developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9 volt battery, though it accepts voltages between 7 and 20 volts.

##### 2) LCD Display:

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.

##### 3) Limit Switch:

A limit switch is an electromechanical device that consists of an actuator mechanically linked to a set of contacts. When an object comes into contact with the actuator, the device operates the contacts to make or break an electrical connection. They can determine the presence or absence, passing, positioning, and end of travel of an object. A limit switch with a roller-lever operator; this is installed on a gate on a canal lock, and indicates the position of a gate to a control system.

##### 4) IR Sensor:

IR technology is used in daily life and also in industries for different purposes. These types of radiations are invisible to our eyes, which can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the

detector is simply an IR photodiode that is sensitive to IR light of the same wavelength as that emitted by the IR LED.

##### 5) L298N Motor Driver Module:

This L298N Motor Driver Module is a high power motor driver module for driving DC and Stepper Motors. This module consists of an L298 motor driver IC and a 78M05 5V regulator. L298N Module can control up to 4 DC motors, or 2 DC motors with directional and speed control.

##### 6) Radio-frequency identification (RFID):

Radio-frequency identification (RFID) uses electromagnetic fields to automatically identify and track tags attached to objects. An RFID system consists of a tiny radio transponder, a radio receiver and transmitter. When triggered by an electromagnetic interrogation pulse from a nearby RFID reader device, the tag transmits digital data, usually an identifying inventory number, back to the reader. This number can be used to track inventory goods.

##### 7) DC Motor:

A DC motor is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current in part of the motor.

#### B. Cloud Integration

Think speak closed platform where we store all the data's about the costumer. Every two minutes once the parking detection is noted using an Arduino and these are stored in graphical representation. The user can login and check the details of the costumer to parking their vehicle when there are any abnormalities through parking. The data's are stored in the cloud through Wi-Fi.

### IV. PROJECT IMPACT

The impact of this project is continuously detecting car parking slots of IR Sensors, Arduino Uno and RFID Sensors which communicates with the Google App Engine and is rendered on various Applications such as the Website, Twitter bot and the Mobile Application. This detailed architecture explains about the entire working system of the efficient car parking model with various personalized features. The sensor used in this project is an infrared sensor which determines whether the slot is occupied or unoccupied. These sensors are connected to the Arduino Uno. The output of these sensors is sent to the database through the Arduino Uno. Once the database is updated the result is displayed.

#### A. Advantages

- Reduces Man Power
- User Friendly.
- Saves time.
- Device is cost efficient.
- Easy Installation.

#### B. Disadvantages

- Network Connection is needed.
- Basic Knowledge is must.

## V. RESULT

The Parking Allocation component consists of sensors in front each slot and when a vehicle enters into the slot, the database is updated and the changes are reflected immediately on the nearby display. The Seamless parking component consists of a RFID Tag attached to the windshield of vehicle. When the car is passed through the entrance the RFID Scanner scans the tag stores the timestamp of the entry and at the exit the tag is read again and the total time is calculated and reflected in the users account, thus saving the hassle of human intervention and saving an ample amount of time. We have interfaced 6 IR Sensors and an RFID Reader module (EM-18) using a raspberry pi. The IR senses the presence of a vehicle in the parking slot and updates the database. The RFID is used for identification and transaction. We have made an android application, twitter bot, telegram bot, website to further simplify the process of getting data about the parking slot availability and effort less parking.

## VI. CONCLUSION

The efforts made in this paper are indented to improve the parking facilities of a city and thereby aiming to enhance the quality of life of people. The main aim is to design an integrated system which involves two components namely Parking Allocation and Seamless Parking. Users from distant locations could book a parking slot for them by the use of our mobile application. It helps to resolve the growing problem of traffic congestion.

## VII. FUTURE SCOPE

In future works, this framework can be enhanced by including different applications, For Example, online booking by utilizing GSM. The driver or client can book their parking area at home or while in transit to the shopping centre. This can diminish the season of the client to seeking the empty parking area. As a further review, distinctive sensor frameworks can be added to enhance this framework to distinguish the question and guide the driver or clients speediest. We will attempt to decrease the mechanical structure and attempt to make it eco-friendly.

## REFERENCES

- [1] Karma Tsheten Dorjee , Deepak Rasaily , Bishal Cintury ,RFID-Based Automatic Vehicle Parking System Using Microcontroller, IJETT, Volume 32 , Number 4, February 2016.
- [2] R. Kannadasan, A. Krishnamoorthy, N. Prabakaran, K. Naresh, V. Vijayarajan, G. Sivashanmugam, RFID Based Automatic Parking System , Australian journal of basic and Applied Sciences , Volume 10(2) ,Pages: 186-191,February 2016.
- [3] S. C. Hanche, Pooja Munot, Pranali Bagal, Kirti Sonawane & Pooja Pise, Automated Vehicle Parking System using RFID, ISSN (PRINT): 2320 – 8945, Volume -1, Issue -2, 2013.
- [4] Lanxin Wei; Qisheng Wu; Mei Yang; Wei Ding; Bo Li; Rong Gao, Design and Implementation of Smart Parking

Management System Based on RFID and Internet, Pages: 17 - 20, Year: 2012.

- [5] Kartha, V., George, L., Tomy, A., Mathew, F., Shenoy, M. and K, A. (2017). Interfacing EM-18 RFID Reader Module with Raspberry Pi. [online] electroSome. Available at: <https://electrosome.com/em-18-rfid-readerraspberry-pi/>.