

# International Journal of Innovative Research in Science, Engineering and Technology

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## Driverless Vehicle Parking Manager Based On IoT

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**ABSTRACT:** A smart vehicle parking manager system which provides an optimal solution for parking problem in metropolitan cities, malls, multiplex theaters etc. Due to rapid increase in vehicle density especially during the peak hours of the day, it is a difficult task for the drivers to find a parking space to park their vehicles. The aim is to resolve the present parking issues which provides a better solution for parking system that is driverless vehicle parking manager based on Internet of Things (IoT) technology. An android application is created for the customer, whose details are constantly updated by the server location. It also includes some features like unique identification for each vehicle, display of available parking slots and possibility of making reservations etc.

**KEYWORDS:** Internet of Things, Android Application, Vehicle parking Manager, QR code.

### I. INTRODUCTION

Use of automobiles is increasing day by day which leads to various parking issues. Vehicular population is shooting out the roof, no amount of space is sufficient to accommodate stationary vehicles. Management of parking has grown to large extent. The main problem is to manage parking in congested areas. Nowadays trying to find a vacant parking space is difficult in large public places such as metropolitan cities, malls, multiplexes, shopping complexes etc especially on weekends and public holidays. This process is also creates traffic congestion as well as accidents in cities. So there will be time and fuel consuming. Also this problem may cause drivers to get mentally tensed and eventually improper parking will appear. Available parking slot is very limited for places like office building and shopping complex.

This is the main issue faced in this world because of the use of vehicles by human beings. There are many systems introduced to solve availability of parking slot for the drivers. Thus, provides the graphic user interface for users. Furthermore the drivers will have a chance to pick the preferred parking. There are several methods employed for the vehicle parking. The concept of new vehicle parking manager solves the parking issues by using mixed integer linear problem. The disabled person can park the vehicle at specially designed locations. Parking is an expensive process in terms of either money or the time and effort spent. That is a problem of finding parking slots for vehicles is observed in malls mostly on public holidays. It has been observed that a considerable amount of time gets wasted. Also it is a difficult process.

Parking the car today need parking policies for safety and security reasons. There is always competition for the parking space. A good solution to overcome parking crises would be by increasing the number of parking spaces or else enlarge the parking lots, but this will lead to huge investment. However better management of existing parking spaces will be wise method. The availability of parking spaces should be improved. Vehicle parking manager is a concept where the technological solutions are designed to overcome these issues. To solve these issues by using the concept Internet of things. The concept of Internet of Things (IoT) started with things with identity communication devices. The Internet of things (IoT) is the network of physical devices, vehicles, and other items embedded with electronics, , actuators,

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and network connectivity also enable these objects to collect and exchange data. IoT technologies can help organizations to reduce the cost through improved process efficiency and productivity. With improved tracking of devices using sensors and connectivity, they can benefit from real-time insights and analytics, which would help them, make smarter decisions. The availability of parking spaces should be improved.

The driverless vehicle parking manager system, a part of Intelligent Transportation System (ITS), gives rise to different parking facilities on the basis of new functions they provide. This service not only manages the internal operations of the parking facility, but it is also designed to work with different aspects related to the parking facility. This can be done with the help of an android application. The application is managed by the parking authority and data stored and updated in central database server.

## II. RELATED WORK

There are several methods implemented for the vehicle parking manager. The concept of new smart parking solves the parking problem by using mixed integer linear problem. The disabled person can park the vehicle at specially designed locations. Automatic parking and un parking with the help of android applications.

YanfengGeng and Christos G. Cassandras proposed the concept of smart parking system based on optimal resource allocation and reservations. Drivers access the system via cellular phone or internet. a new concept for a “smart parking” system. This system explicitly allocates and reserves optimal parking spaces to drivers. It uses the concept of mixed integer linear problem. Drivers who are looking for parking spots send requests to the DPRC. Driver Processing Request Centre gathers driver parking requests Cars location keeps track of driver allocation status and sends back the assignment result to drivers.

Internet of things and mobile communication platform for disabled parking space management proposed by LambrosLambrinos and Aristotle’s Dosis. It is a system designed and developed based on the principles brought forward by IoT and smart cities initiatives. It integrates sensors and Smartphone’s along with wireless and mobile communications to provide for better utilization and management of parking spaces allocated for use by people with disabilities. When we go through a city during rush hours when traffic is at its peak, all parking spaces are already occupied. A person with disability is trying to access city centre but he did not find any disabled parking slot. There are drivers who occupy disabled parking slots without having the right to do so.

Automated car parking system commanded by android application introduced by D.J.Bonde. The android application generates automatic parking and un parking with the help of commands of an android application. The system reduces the human intervention to the minimum by automating the process of car parking. Then visit various public spaces like shopping malls, five star/seven star hotels, multiplex cine halls many problems relating to the availability of parking spaces. Most of the times we need to traverse through multiple parking slots to find a free space for parking. This system shows an autonomous car parking system that regulates the number of cars that can be parked in a given space at any given time based on the parking space availability.

A New Smart Parking System Based on Optimal Resource Allocation and Reservations, this system a new smart parking system is implemented for cities. This system assigns and reserves a parking space for a user (driver) based on the users distance from the parking area and parking cost and also ensures that the overall parking capacity is effectively utilized. The approach solves a Mixed Integer Linear Program (MILP) problem at each decision point in a time-driven sequence. For each MILP there is a solution which gives an optimal allocation based on user’s current state information and also supports random events such as new user requests and parking space availability.

## III. SYSTEM ARCHITECTURE

The architecture of vehicle parking manger system mainly consists of 2 modules and a central database server. The different modules have their own functionalities. The system contains features for customers as well as the managing staff of the parking system. The features for the customers are display of total parking slots in the parking lot, number of parking slots available, occupied parking slots and reserved parking slots. This indicates that the slot is neither booked by any customer it is occupied hence can be reserved if required.Parking slot has been reserved by a customer, but is not yet occupied. A vehicle has occupied the parking slot. The status of the parking slot updated with the help of

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ultrasonic sensors. All these done with the help of an android application. Install the smart parking application on mobile device. With the help of the mobile app search for a parking area on and around your destination. Select a particular parking area. Browse through the various parking slots available in that parking area. Select a particular parking slot. Select the amount of time (in hours) for which would like to park the car for. Features for the managing staff of the parking system are: A QR code reader at the entry of the parking system to identify the unique id associated with the vehicle and do the corresponding transactions (entry time, rate deduction). An LCD at the gate to display the car number and the parking slot selected by/ allotted to the user. Parking slot status ie available, reserved. View database of all the cars which entered the parking system along with the timings and slots occupied.

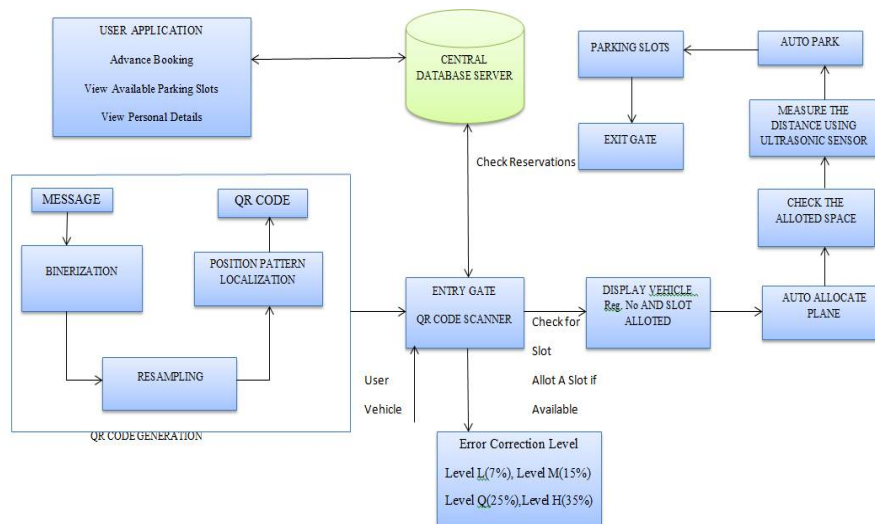


Fig:1 System Architecture

Above figure describes the working of the vehicle parking manager based on IoT. It gives us a brief idea of the main functions of all the major parts of the system and the direction of data flow among these parts. The first part is user application. It display the total parking slots in the parking lot, number of parking slots available, occupied parking slots and reserved parking slots. Then the next is central database server. This is viewed by the parking manager. The central database server allocates and manages the parking slot status. The database stores all the vehicles which entered the parking system along with the timings and the slot occupied etc. If a user vehicle comes in the entry gate. The user vehicle already has a QR code so at the entry gate there will be a QR code scanner. It scans the QR code and check the central database server for any reservations done or not. If reservation is done then go to payment gateway for parking amount deducted by the customer account. If a new vehicle comes in the entry gate, the vehicle does not have QR code. So the first step is to generate QR code using the vehicle registration number and the customer's contact details. The QR code generated can either be stuck on the wind shield of the car or an image of the same in the customer's mobile phone application. This can be shown at the entry gate of the parking system. This is scanned by the raspberry pi camera module and the details of the customer corresponding to the QR code will be retrieved and allocate a vacant parking space.

R tree algorithm is used for auto park in vehicle parking management. R tree are tree data structures used for spacial access methods. For indexing multidimensional information such as geographical co-ordinates, rectangles. A common real-world usage for an R-tree might be to store spatial objects such as restaurant locations or the polygons that typical maps are made of: streets, buildings, outlines of lakes, coastlines, etc. and then find answers quickly to queries such as "Find all museums within 2 km of my current location", "retrieve all road segments within 2 km of my location" (to

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display them in a navigation system) or "find the nearest gas station" (although not taking roads into account). The R-tree can also accelerate nearest neighbor search<sup>[3]</sup> for various distance metrics, including great-circle distance.

### IV. EXPERIMENTAL RESULTS

To assess the performance of this parking system determines the parameter for the system performance as in terms of user time in the system. The time that user spends in the parking system for service. Cost can be reduced for example fuel and environmental pollution cost. The time is average waiting time of the user and the average aggregate time of the user in the system. This result gives the better execution of the proposed system. The figure shows the accuracy of the proposed system. This system assures 85% accuracy.

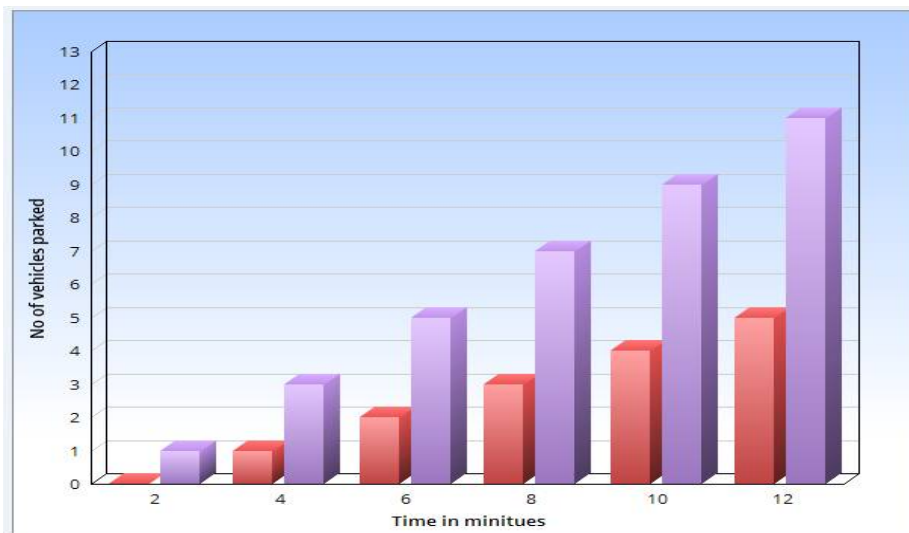


Fig:2 Time V/S No of vehicles parked

### V. CONCLUSION

The driverless vehicle parking system has been designed and developed successfully. Availability of vacant places on each floor is checked by the microcontroller with the help of ultrasonic sensors. It can be observed that control system for multi-level car parking system has achieved the non-doubtable performance to regulate the entry and exit of the car to several parking places accurately. The movement of the car carrier between the floor was continuous and smooth as requested number of entering and exiting the vehicles in the parking area. The entry and exit phases of the car depend upon the availability of the carrier and time required for exit.

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