

# A Proposed Automated Car Parking System based on Android

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## ABSTRACT

*The number of personal vehicles usage is increasing manifold. People prefer personal vehicles to commute than depend on public transportation. Finding a parking space in most metropolitan areas, especially during the rush hours, is difficult for drivers. It is often frustrating for drivers to find parking spaces, and parking itself is costly in almost every major city in the world. Due to this there is a need to provide sufficient parking places coupled with plenty of slots to help the user park his vehicle safely. It also ensures that the user does not end up parking on non-parking area and cause discomfort to pedestrian. The aim of this paper is to propose a design of an Automated Car Parking System commanded by an Android application that regulates the number of cars to be parked on designated parking area. This is done by automating the Parking and unparking of the car with the help of an Android Application.*

**Keywords:** Android Application, Automated Parking System.

## 1. INTRODUCTION

Searching for street parking in crowded urban areas creates many problems and frustrations for drivers. It has been shown that over 40% of the total traffic volume in urban areas is composed of vehicles cruising for parking [1]. A long queue of cruising vehicles can cause serious congestion with the blocking of only a few streets.

With the rapid proliferation of vehicle availability and usage in recent years, finding a vacant car parking space is becoming more and more difficult and time consuming. This results in a number of practical conflicts. Parking problems are becoming ubiquitous and ever growing at an alarming rate in every major city. The use of android technology combined with the recent advances in wireless applications could be the key to solve emerging parking problems.

The main idea behind the Automated Car Parking System is to help the user analyze area's where parking is available and number of slots free in that area. The user can pre-book a slot in the area he desires if it is available some hours prior to his expected arrival. This will help reduce the load on the administrator as his physical work reduces drastically. The user can search the parking slot through Android Application and pre-book the slot. Payment services are made available using Google Thus the application proposed in this paper makes the user relief free as it reduces the time required for manually searching and waiting for empty slots to park the vehicle.

## 2. RELATED WORK

Various methods are present for development of intelligent parking systems. Many of the existing systems require a little or more human intervention for the functioning.

One of the intelligent systems for car parking has been proposed by making use of Image processing [2]. In this system, a brown rounded image on the parking slot is captured and processed to detect the free parking slot. The information about the currently available parking slots is displayed on the 7-segment display.

A vision based car parking system [3] is developed which uses two types of images (positive and negative) to detect free parking slot. In this method, the object classifier detects the required object within the input. Positive images contain the images of cars from various angles. Negative images do not contain any cars in them. The co-ordinates of parking lots specified are used as input to detect the presence of cars in the region. However, limitations may occur with this system with respect to the type of camera used. Also, the co-ordinate system used selects specific parking locations and thus camera has to be at a fixed location. Limited set of positive and negative images may impose limitations on the system.

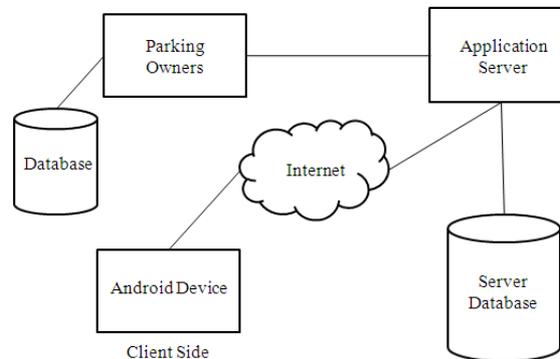
Smart Parking system [4] designed proposed a mechanical model with an image processing facility. The car would be parked with the use of lift at multiple levels.

Also, image processing is used to capture the number plate and store in database for comparison to avoid illegal car entry.

Thus, in this paper a car parking system is proposed that is a fully automated model with minimum human intervention. It also overcomes the limitations of existing systems.

### 3. PROPOSED SYSTEM ARCHITECTURE

The proposed application is based on the client-server architecture. The client is provided with an interactive Android based user interface for the process of pre-booking of parking slot. The server side processing will be enabled using Java and MySQL. The client r



**Figure 1.** Client-Server Architecture of Application

The client pre-books a parking slot by giving his/her vehicle number. At server side, that particular slot is reserved and a buffer time is set for that particular client. The buffer time is the time that client will require to reach to the parking slot from his/her current location. If the client does not reach the parking area in estimated time then server removes the reservation from that slot.

#### 3.1. Client Side

##### 3.1.1. Starting the application

The user needs to install the “Park Me” application on his Android based device. After installation, the icon of the app will feature on the Home Screen of the user’s device.

##### 3.1.2. Registration

Initially, the user has to register his details with the application for the first time. This is a one-time registration. The user has to enter details like username, gender, phone number and email-id. All this data will be stored on server. Booking for slots mandatorily has to be done four hours prior to arrival.

##### 3.1.3. Selection of Location for Parking

The client is provided with multiple parking locations. Client has to select one of the locations provided where he desires to park the vehicle.

##### 3.1.4. Availability status of the slots

Based on the location selected availability of the empty slots will be displayed on client’s device. Colour coding is used to indicate empty v/s reserved slots.

##### 3.1.5. Enter client’s details for slot reservation

In case the slot required by client is available, the client can proceed further with the reservation process or else he can go back to change the location or else can terminate the entire process.

##### 3.1.6. Confirmation

On successful reservation, a confirmation page with user details and parking location is shown on client’s device.

#### 3.2. Server Side

The server side processing will be developed using Java and MySQL. The administrator has to register his details with the server side application. This is also one time registration. Whenever a new user registers with the application, the record will be stored in the server side database. When the registered user selects the location, immediately server receives the client’s request. After receiving the request for the desired location, server processes the related information and responds accordingly.

### 4. ALGORITHM USED

The proposed system uses the Nearest Neighbor Search Algorithm for finding parking locations that are nearest to the client’s current location. Nearest neighbor search (NNS), also known as proximity search, similarity search or closest point search, is an optimization problem for finding closest (or most similar) points. Closeness is typically expressed in terms of a dissimilarity function: The less similar are the objects, the larger are the function values. Formally, the nearest-neighbor (NN) search problem is defined as follows: given a set  $S$  of points in a space  $M$  and a query point  $q \in M$ , find the closest point in  $S$  to  $q$ . Donald Knuth in vol. 3 of *The Art of Computer Programming* (1973) called it the post-office problem, referring to an application of assigning to a residence the nearest post office. A direct generalization of this problem is a  $k$ -NN search, where we need to find the  $k$  closest points.

## 5. CONCLUSION

In India, the problem of parking is disheartening as there is no devised plan in place. As compared to other countries, there is a wide gap between total number of vehicles produced and the number of parking slots. In this paper, an efficient Car Parking Application is proposed which will majorly reduce the parking problem. This paper shows how the parking problem at crowded places can be handled with a well-thought plan. It helps the clients in finding out the availability of a parking slot, get the availability confirmed, and reach the place within the time slot allotted. It also makes the management easier at administrator side. A well thought parking plan saves the time of clients required for searching a parking slot in rush hours.

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