

# ParkSmart: Android Application for Parking System

<sup>1</sup> Supriya Gatalwar, <sup>2</sup> Radhika Agnihotri, <sup>3</sup> Nitesh Gujarathi, <sup>4</sup> Atmesh Behere

<sup>1,2,3,4</sup> Department of Computer Science,  
Savitribai Phule Pune University,  
Pune, India

**Abstract** – With the increasing population, the amount of vehicles is increasing considerably in metropolitan areas. The world is developing towards a smart living approach. Smart cities are a new and very effective concept highlighting the use of technology. The parking management in a metropolitan area becomes very difficult as there is lack of knowledge of proper parking space. For example, in cities such as Pune, Mumbai there are numerous vehicles used daily, therefore managing these vehicles' parking at personal level becomes a challenge. One aspect of the solution is parking management. The vehicles parking management will utilize the available space and avoid unnecessary parking problems. The user will only need to download this app and click button to find nearest location for parking. The security of vehicle is ensured and user's data while registering remains safe. ParkSmart is a thoughtful approach that will increase user's convenience.

**Keywords** – *Application (app), Global Positioning System (GPS), Android.*

## 1. Introduction

The number of personal vehicles usage is increasing day by day. Finding a parking space in most metropolitan areas, especially during the rush hours, is difficult for drivers. Indisciplinary parking may result in damage to the vehicles. Thus there is a need to provide sufficient parking places coupled with plenty of slots to help the user park his vehicle safely. This will also ensure the user that he does not end up parking on non-parking area and cause discomfort to pedestrian. This document specifies the requirements for the production and design of the Street parking for the Google Android operating system. The app includes an efficient street parking search, i.e. finding empty slots. The user interface will be easy to use and allow the user to go in-between other apps with ease. It will use the cell phone operating system Android, which is on a lot of cell phones today. The android operating system uses a market place to sell applications for the phone.

Web application combines geographic data and parking space information with user location, social networks and other data sources in order to let its users conveniently find parking, when coming to work or driving into town. Application has a particular focus on gathering space availability data about car parks through crowd sourcing from the inputs of its users. In the deliverable, we describe the envisioned functionality of the application, from which we extract the requirements on the mobile app, on the Web application, and on the back-end system. We also analyze the data sources that will fuel the first prototype of the application.

## 2. Literature Survey

In this paper, we mainly focus on designing a new smart parking management system that assists users to find parking spaces in a specific parking district by using the android application. In addition, an important goal of the system is to reduce the traffic searching for parking, hence reduce energy consumption and air pollution.

This paper mainly focuses on simplifying car management system at both ends i.e. users and parking owners. The application will be a middleware for connecting user to the owners. This greatly facilitates the owner as his parking space is put on a spot on an area increasing his functionality. A user new to any city or state can use this app to safely park the vehicle.

The app ensures the safety of the identity of the user by addressing user by username. As the parking slots are under government registration there is no possibility of fake parking area or false slot information. The necessary document photocopy is required for the owner to be submitted while registering. The nearest parking areas to the user are prompted for which GPS is used. Amongst the suggested area the user gets the choice to select which enhances the usability of the app. Also once the parking

slot in an area is booked it shows the route with the traffic condition and other parameters and accordingly sets the buffer time.

Once the user reaches the parking area the buffer time stops automatically by detecting the location of user and parking area being same. Once user renounces his slot then it appears reserved for other users and after leaving the slot it is shown as 'available' for other user.

### 3. System Architecture

System architecture shows six components in the smart parking model, including parking owners, users, internet, application server, server database and the database of parking owner. The parking owner has the dashboard which has its own database of parked and un-parked slots. The user uses API on mobile phone to register for the app using internet. The application server keeps a track of GPS location and matches it to the nearest parking slots. The main sever database keeps the data of all parking owners in an area and their location on GPS.

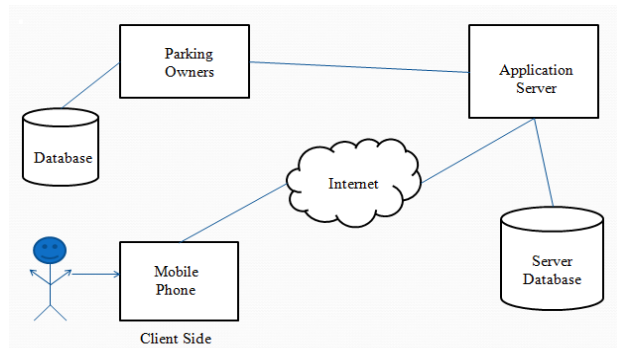


Fig.1 System Architecture

### Hardware requirement:-

Processor: Dual Core  
Display: 4 inches or more  
RAM: 1GB

### Software requirement:-

Operating System: Android SDK 4.x  
Database: SQLite  
GPS Enabled: Yes

## 4. Implementation Plan

### 1. Start the application:

The user needs to install the application on his Android based device. After installation, the icon of the app will feature on the Home Screen of the user's device. App welcome screen will be flashed to the user on opening the application.

### 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 user name, gender, phone number and email- id. All this data will be stored on server. Booking for slots mandatory has to be done four hours prior to arrival. On server side the parking owner also needs to register the number of parking slots available and for what type of vehicles and the amount that needs to be paid.

### 3. Login:

Once the user registers, he can use his email id and phone number to login in future. This authenticates the user.

### 4. Selection of location for parking:

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

### 5. Select vehicle type:

After selecting the location, options for the vehicle type is provided i.e. 2-wheeler or 4-wheeler alongside the rate chart for parking charges is prompted.

### 6. Availability:

Status of the slots based on the type of vehicle selected availability of the empty slots will be displayed along with the total slots reserved for that vehicle type. Color coding is used to indicate empty v/s reserved slots. Grey indicates empty slots and Red indicates that currently there are no empty slots for reservation.

### 7. Enter user's details for slot reservation and Money Wallet:

In case the slot is available, the client can proceed further with the reservation process or else he can go back to

change the location/vehicle type or else can terminate the entire process.

Money wallet is a simple, useful and intuitive personal finance assistant with online synchronization, through this a user will pay for his reserve parking slot and the parking owner will receive his appropriate amount.

### 8. Confirmation to user:

On successful reservation, a confirmation page with user details is shown which is editable and Green is indicated to show user's reserved parking slot.

### 9. Parking Dashboard:

Parking dashboard provides more efficient distribution of parking slots and by using this dashboard the parking owner can manage their parking slots. The parking owner can allocate or de-allocate a parking slot. The dashboard also shows reserved slots which can be allocated when the corresponding user verifies his details and confirms the selected slot.

## 5. Algorithm

For the parking system KNN algorithm is being used. It can be explained as follows:-

KNN algorithm is a method for classifying objects based on closest training examples. It is a instance based learning type algorithm. The unknown sample is classified based on the nearest neighbor. It is a machine learning algorithm. The unknown sample is added to the nearest sample of known nodes.

The algorithm is used with the difference in the location of source (user) and the destination (parking location) using Euclidian Distance. This does not provide apt distance and the system may try to round up the distance values if in decimal points. So to obtain precision instead of Euclidian distance, Haversine formula is used.

The algorithm goes as:-

1. build the training normal data set D;
2. for all the unknown samples UnSample(i)
3. for all the known samples Sample(j)
4. compute the distance between UnSample(i) and sample(j)
5. end for
6. find the k smallest distances using Haversine formula

7. locate the corresponding samples Samples(j1)...Sample(jk)
8. assign UnSample(i) to the class which appears more frequently
9. end for

### Advantages

- It helps the visitors in finding out the availability of a parking slot, get the availability confirmed.
- It helps the parking owner to monitor the vacant slot availability so it can be used by the next person.
- The proposed plan saves the time of visitors in searching and booking a parking slot.
- The tedious job of parking owner to allocate the vacant slot in a methodical and organized manner is simplified as visitor himself chooses the suitable parking place for his vehicle and the process is made more efficient.

### Disadvantages

- Continuous Internet connection – Android phones will require a continuous Internet connection alias active connection so that phone is prepared to accept GPRS packet that suits the needs.
- GPS location- GPS facility should be available in the phone so that location of the user can be traced and appropriate parking location can be prompted.

## 6. Future Scope

This app is a small step to make city a 'smart-city'. This can be developed in future for a wide area like a state or a country so that it can help people on large scale. This app can be sold to the government so that the database for number of parking owners and the server capacity can be utilized. This app server data can be used by government for certain crime investigation details.

Currently the app is being developed for Android platform which can be then made available for Blackberry, iOS and Windows phone.

## 7. Conclusions

This paper summarizes an efficient way to park a vehicle using recent technology. This app allows the user to take control of the parking decision unlike traditional method of trying several parking spaces physically. Usage of this app at large scale would benefit user even if a user is in

new place. The app is user friendly and handy so people of all age groups can use it easily.

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