

## Android-Based Smart Parking Indicator for Kondhwa Region

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**Abstract.** The use of personal vehicles has significantly increased in recent years with swift economic growth. Individual vehicles are preferred over public transit. Finding a parking spot in most major cities can be very challenging and unpleasant, especially during rush hour. In an effort to address the parking issue, this study proposes the design and deployment of a smart parking system. This is accomplished by using an Android application to automate parking and unparking the car.

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

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## Introduction

India's expanding population has led to a number of issues. One of the more difficult ones is parking, which we deal with virtually daily. One of the main problems brought on by the expanding road network is parking. It is a result of the growth of transportation. Less space in cities has led to a rise in demand for parking, particularly in regions like the Central Business District. The automated car parking system's main goal is to assist users in analyzing available parking areas and the number of open spaces there. If a spot is available a few hours before the user's anticipated arrival, he or she can reserve it. Because of this, the administrator's workload will be reduced. the dramatic reduction in physical labor. Through an Android application, the user can look up parking spots and reserve a spot. The application suggested in this project provides the user with relief since it decreases the time needed for manually seeking and waiting for empty spots to park the vehicle. Payment services are made available via Google.

## Simulation Setup

As the target area for our simulation, we chose the map of the Kondhwa region in the city of Pune, as shown in Figure.1 and the core business district, residential neighborhoods, and entertainment venues are all present in this city, which is one of the busiest in Kondhwa. This city is quite typical of large cities.



Figure 1: Target area in Kondhwa region

Additionally, Figure 2 shows the inbound (figure 2a) and outbound (Figure 2b) traffic on two distinct days. As can be seen, the peak period for incoming traffic is between 6 and 10 am, and the highest period for outgoing traffic is between 5 and 8 pm. It fits with people's usual schedules; most individuals commute to work in the morning and return home after 5 o'clock.

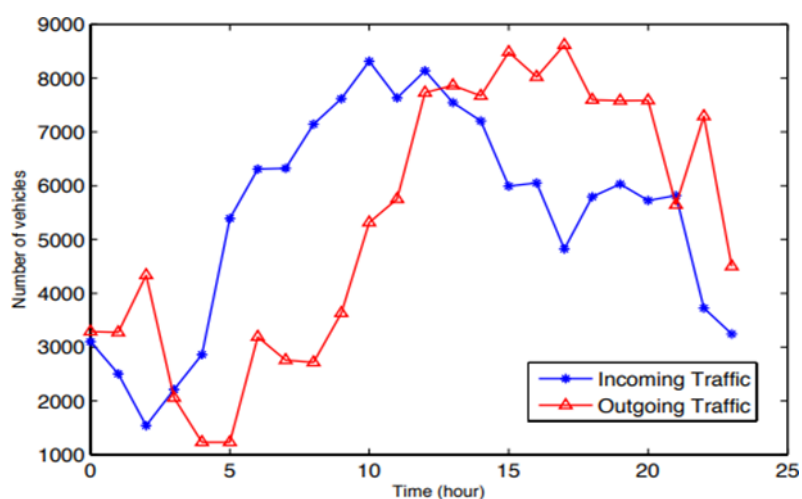


Figure 2a: Traffic flow on 10 April 2023

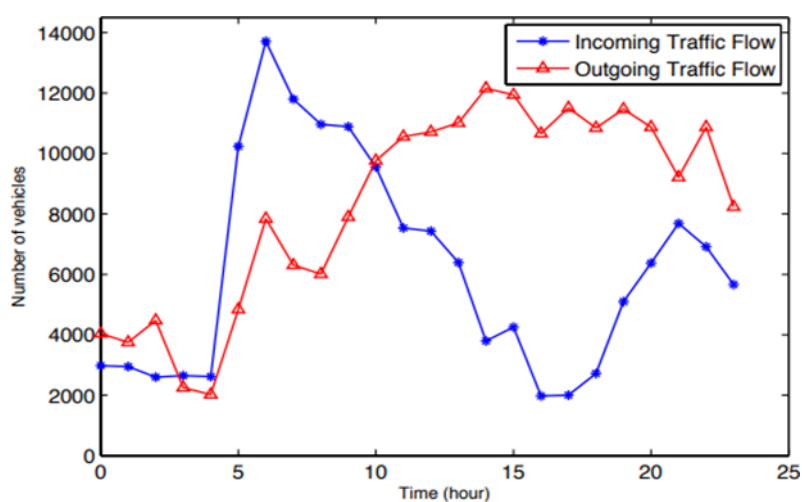


Figure 2b: Traffic flow on 11 April 2023

### The application of intelligent parking planning:

This design concept creates a smart phone application that allows users to reserve parking spaces. After launching the APP, users can develop a new tracking by clicking the "new booking" button on the parking reservation interface. Next, the real-time service reads database information in the background to obtain parking information. The parking space's real-time state is then mapped to the screen of the phone, where users can then click the "select area" button to reserve a parking space. Additionally, users may see and cancel orders using the provided booking ID. Figure 2 depicts the development diagram for the Android intelligent parking application based on these concepts. Create an intelligent parking application based on the Android mobile operating system for the smart phone hardware platform. The development can be broken down into the following steps:

1. Design application UI.
2. Design database.
3. Interface translator
4. Achieves Service services.
5. Improve and implement programs.
6. Package software, sign the application and app released.

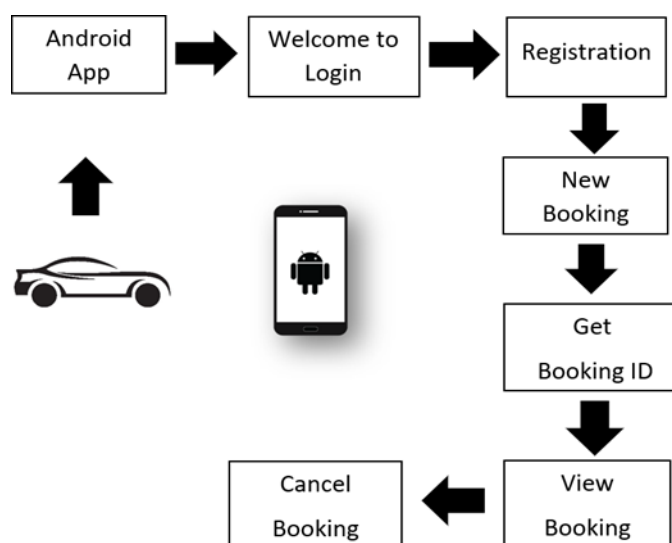


Figure 3: The Architecture of Booking of Parking

### The design of the intelligent parking application:

Parking spot overcrowding is one of today's most prevalent issues. Roads are becoming congested as more vehicles use parking spots. Roads are becoming congested as more vehicles use parking spots. Demand is a preferable option to expanding the current space. We use the "Firebase" service in the application to store and handle data. Developers are freed up by Firebase to focus on developing incredible customer experiences. There is no need for you to manage servers. Firebase serves as your server, your APIs, and the data storage for you;

you don't need to develop APIs.

**Features:** Authentication, Templates, Database, Storage and Hosting.

### **Design and implementation of the hardware:**

The hardware characteristics of the device being used for development will determine what is needed to create a vehicle parking app using Android Studio and Firebase. But in order to create and test the program on a smartphone, you would need the following minimal hardware:

- Processor: Intel Core i3 or higher
- RAM: 4 GB or higher
- Hard disk space: 2 GB or more of spare space Graphics card: Integrated graphics or dedicated graphics with 1 GB or higher VRAM
- Operating system: Windows 7 or higher, Mac OS X 10.10 Yosemite or higher, or a compatible Linux distribution.
- For testing the app on an Android device, the device should meet the following requirements: Android version: Android 5.0 (Lollipop) or higher.
- RAM: minimum 2 GB or higher.
- Screen resolution: At least 720p.
- Storage space: At least 8 GB or higher.

It is significant to note that these are very minimum criteria, and it is advised to use a more potent system with better things for ideal performance and productivity. To use Firebase services and test the app on a real device, you will also need a reliable internet connection in addition to the hardware mentioned above.

### **Design for interface and function:**

The system is instantiated in this module using an Android application. The platform used would be Eclipse Kepler, and the Android application would be created using the Android ADT bundle. Java code is used to create the Android application. The source files are changed into Java class files by the Java compiler. Java class files can be converted into .dex (Dalvik executable) files using a program that is part of the Android SDK. The Android application and .dex file are combined into an apk (Android package file). All of the necessary information to launch this Android programme is in the resulting apk file. The operating system for Android is more secure and has a permissions mechanism using slot allocation method. The Android app has been created. The server updates the request, then passes it to the parking lot.

### Modules:

- Registration
- Login
- Date & Time selection
- Parking slot selection
- Price calculation & payment

**Connectivity:** Google API

**Database:** firebase database is used to store parking customer data. **Eclipse version:** Latest version of Eclipse is used for development as IDE. **Image processing:**

- Tesseract Library is used to implement OCR in Android Application.
- Android's optical character recognition API is used to get number plate value to the textformat.

### Simulation results:

#### Client side:

#### Starting The application

On his Android-based device, the user must install the "vehicle parking" application. The app's icon will appear on the user's device's Home Screen after installation.



Figure 4: Vehicle Parking Sign Icon

### Registration:

User registration the user must first register his information with the application. The user must input information during this one-time registration, including their username, gender, phone number, and email address. All of this information will be kept on a server.



The screenshot shows the 'vehiclePark' application header. Below it is a 'Register' form with four input fields: 'Full Name', 'Mobile No.', 'Email Address', and 'Password'. A 'REGISTER' button is positioned below the fields, and a 'Login' link is located directly underneath the button.

Figure 5: Application Interface

### Welcome to Login:

On the start up the application welcomes you and ask for your E-mail Address & Password after thatforward process will be proceed.



The screenshot displays the 'VehPark' application header. Below the header is a logo for 'PARKING SPOT' featuring a car icon. Underneath the logo is the text 'Welcome To Login'. This is followed by two input fields for 'Email Address' and 'Password'. A 'LOGIN' button is centered below these fields. At the bottom, there are two links: 'Reset-Password' and 'Register'.

Figure 6: - Welcome to Login

### Booking Process & Availability status:

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

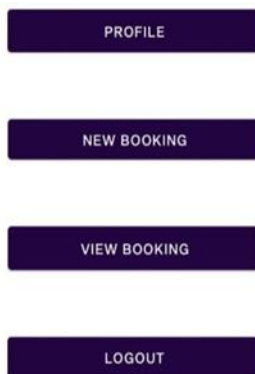


Figure 7: - Booking Process & Availability Status

### Enter client's details for slot reservation:

After we select new booking option There are two types of option available like Free Parking & Paidparking then you go according to your choice.

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.

Figure 8: - Client details for slot reservation

### Confirmation:

On Successful reservation, a confirmation page with user details and parking location is shown on Clint's device.

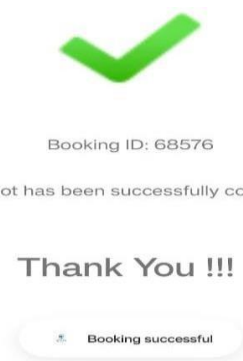


Figure 9: - Slot Confirmation message

### Conclusion:

The client is given access to several parking spaces. The client must choose one of the offered spots for parking the car. This article investigated intelligent parking techniques, developed a comprehensive solution to the parking issue. The system not only enables more convenient parking for users but also more intelligent parking lot management. It assists customers in determining whether a parking space is available, having that availability verified, and arriving at the destination within the allotted time frame. Additionally, it facilitates management on the part of the administrator. Additionally, it reduces customers' time spent looking for a parking space. By displaying the closest parking location and available slot, the suggested system lessens traffic and driving annoyance. There is a lot of room for innovation and execution through data standardization and administration, mobile phone integration, and hardware and software integration as based Smart Parking System boost operational service levels. In general, smart car parking systems help to streamline the frequently arduous process of parking by saving time, money, and space.

### Summary:

There are several parking spaces available for the client. The client must choose one of the offered spots for parking the car. The client's device will display the available empty spaces based on the location they have chosen. To distinguish between reserved and empty slots, color coding is utilized.

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