Software Requirements Specification

for

Smart Parking Solutions: Redefining Urban Mobility

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Version 0.1

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Date: 12.03.2024

1. Introduction

1.1 Purpose

The purpose of this document is to outline the software requirements for the development of a parking management system aimed at addressing the challenges of parking congestion, traffic management, and environmental impact in urban areas, particularly focusing on India. The software aims to provide users with a mobile application to find available parking spots, implement dynamic pricing for optimal parking space utilization, and offer real-time parking information and analytics to city officials for urban planning.

1.2 Document Conventions

- SRS Document Sections: Each section of the document is numbered and titled for easy navigation and reference.
- Formatting: Requirements are specified using structured language and formatting for clarity and consistency.
- References: External sources or documents referenced within this SRS are properly cited and documented.

1.3 Intended Audience and Reading Suggestions

This document is intended for:

- Software Developers: To understand the functional and non-functional requirements of the parking management system.
- Project Managers: To oversee the development process and ensure alignment with project objectives.
- City Administrators and Officials: To understand the capabilities of the system in addressing urban parking and traffic management challenges.
- Stakeholders and Investors: To gain insights into the proposed solution and its potential impact on urban infrastructure and sustainability.

Reading Suggestions: It is recommended to read the entire document to gain a comprehensive understanding of the software requirements. However, stakeholders

may focus on sections relevant to their roles and interests, such as functional requirements, system architecture, and user interface specifications.

1.4 Product Scope

- The user mobile app facilitates convenient and efficient parking spot discovery, integrating dynamic pricing algorithms to ensure optimal utilization of parking spaces while providing users with cost-effective options.
- By reducing traffic congestion and encouraging efficient parking through the app's dynamic pricing and real-time availability features, it contributes to mitigating environmental pollution, promoting cleaner air and sustainable urban living.
- Through real-time information and analytics, the app enables the optimized use of all available parking resources in nearby areas, minimizing parking shortages, maximizing occupancy, and improving overall parking management efficiency.

1.5 References

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Overall Description

1. Product Perspective

The parking management system is a standalone software solution designed to address the challenges of parking congestion and optimize parking resource utilization in urban areas. It operates independently but can integrate with existing city infrastructure such as traffic management systems and payment gateways to enhance functionality and efficiency.

2. Product Functions

- User Mobile App: Facilitates users in finding parking spots with optimal pricing, real-time availability, and reservation options.
- Dynamic Pricing System: Implements dynamic pricing algorithms to regulate parking prices based on demand, time, and special events, ensuring optimal utilization of parking spaces.
- Parking Enforcement Tools: Provides parking enforcement officers with a mobile app for monitoring violations and a web portal for violation payment processing, integrated with license plate recognition technology.
- Data Analytics and Insights: Offers city officials access to parking analytics and insights for urban planning, traffic management, and infrastructure development.
- Environmental Impact Assessment: Includes features for users to assess the environmental impact of their parking choices, promoting sustainability.

3. User Classes and Characteristics

- Regular Users: Individuals seeking parking spots in urban areas, varying in demographics and preferences.
- Parking Enforcement Officers: Officials responsible for monitoring parking violations and processing payments.
- City Administrators: Officials involved in urban planning, traffic management, and infrastructure development.

4. Design and Implementation Constraints

- Integration with Existing Infrastructure: The system may face constraints in integrating with existing city infrastructure such as traffic management systems and payment gateways, requiring compatibility and cooperation from relevant authorities.
- Data Privacy and Security: Compliance with data privacy regulations and ensuring the security of user data is crucial, imposing constraints on data handling and storage practices.

5. User Documentation

- User Manuals: Detailed guides for users on how to use the mobile app, parking enforcement tools, and access parking analytics.
- Training Materials: Training resources for parking enforcement officers and city officials on using the enforcement tools, accessing analytics, and interpreting insights.
- FAQs and Troubleshooting Guides: Frequently asked questions and troubleshooting guides for addressing common user queries and technical issues

3. External Interface Requirements

1. User Interfaces

- Mobile Application Interface: The user interface of the mobile application should be intuitive and user-friendly, allowing users to easily search for parking spots, view real-time availability, and make reservations. It should also provide options for dynamic pricing and environmental impact assessment.
- Web Portal Interface: The web portal interface for parking enforcement officers should allow them to monitor parking violations, view violation details, and process violation payments. It should also provide access to analytics and insights for urban planning.

2. Hardware Interfaces

- Smartphones and Tablets: The mobile application should be compatible with commonly used smartphones and tablets, supporting various operating systems such as iOS and Android.
- License Plate Recognition Cameras: The parking enforcement tools should interface with license plate recognition cameras for automatic detection of parking violations.

3. Software Interfaces

- Integration with Existing Infrastructure: The system should be able to integrate with existing city infrastructure such as traffic management systems and payment gateways to enhance functionality and efficiency.

- APIs for Dynamic Pricing: Integration with external APIs for dynamic pricing algorithms to regulate parking prices based on demand, time, and special events.

4. Communication Interfaces

- Internet Connectivity: The mobile application and web portal should require internet connectivity to access real-time parking information, analytics, and enforcement tools.
- API Communication: Communication between the mobile application, web portal, and external APIs for dynamic pricing and environmental impact assessment should be secure and efficient.

4. System Features

1. Parking Spot Search:

   Users can search for available parking spots based on location, pricing, and real-time availability.

2. Dynamic Pricing:

   Implement dynamic pricing algorithms to adjust parking prices based on demand, time, and special events.

3. Reservation System:

   Users can reserve parking spots in advance through the mobile application.

4. Violation Monitoring:

   Parking enforcement officers can monitor parking violations using license plate recognition technology.

5. Violation Processing:

   Parking enforcement officers can process violation payments through the web portal.

6. Parking Analytics:

   City officials have access to parking analytics and insights for urban planning and traffic management.

7. Integration with Existing Infrastructure:

   The system integrates with existing city infrastructure such as traffic management systems and payment gateways.

8. Notification System:

   Users receive notifications for available parking spots, reservation confirmations, and violation notices