Software Requirement Specification (SRS) Document

# Project Title: AI-Enabled Vehicle Registration System

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# 1. Introduction

## 1.1 Purpose

The purpose of this SRS document is to specify the requirements for developing the AI-Enabled Vehicle Registration System for Quill Pvt Ltd. This document provides a detailed description of the functionalities, system requirements, and constraints.

## 1.2 Scope

The system is designed to be used at Quill Pvt Ltd's malls and buildings, automating vehicle registration and tracking with AI technology for license plate recognition and vehicle management.

## 1.3 Definitions, Acronyms, and Abbreviations

AI: Artificial Intelligence

OCR: Optical Character Recognition

LPR: License Plate Recognition

## 1.4 References

[Quill Pvt Ltd Company Policies on Data Privacy]

[ISO 27001:2013 Information Security Standard]

## 1.5 Overview

The document describes the system requirements, including functional and non-functional aspects, system architecture, user interactions, and other relevant details.

# 2. Overall Description

## 2.1 Product Perspective

An AI-driven system for managing vehicle registration and parking, integrated with security cameras and payment systems.

## 2.2 Product Functions

The system automatically detects and manages vehicle registration, parking space usage, and payment processing.

## 2.3 User Classes and Characteristics

Different user roles, such as Admin, Security Staff, Regular Users (Mall Customers), and Technical Support.

## 2.4 Operating Environment

Hardware and software requirements include cameras, servers, network infrastructure, and AI-based OCR software.

## 2.5 Design and Implementation Constraints

Must comply with data protection laws, operate continuously, and handle peak traffic.

## 2.6 User Documentation

User guides, online help, and training materials for different user roles.

## 2.7 Assumptions and Dependencies

Reliable power supply, internet connectivity, and well-positioned cameras.

# 3. Specific Requirements

# 3.1 Functional Requirements

# FR-1: The system shall automatically detect and recognize the license plates of vehicles entering and exiting the premises.

# Priority: High

# Acceptance Criteria: Recognition accuracy of at least 95% under various lighting conditions.

# FR-2: The system shall log vehicle registration details (license plate, entry/exit time, location) in real time.

# Priority: High

# Acceptance Criteria: Logs must be accessible within 2 seconds of the event.

# FR-3: The system shall trigger alerts for security personnel if a vehicle is flagged as unauthorized or blacklisted.

# Priority: Medium

# Acceptance Criteria: Alerts are sent within 5 seconds of detection.

# FR-4: The system shall allow administrators to manually register or update vehicle information.

# Priority: Medium

# Acceptance Criteria: Changes are reflected in the system within 3 seconds.

# FR-5: The system shall integrate with a payment gateway to automatically calculate and process parking fees.

# Priority: Medium

# Acceptance Criteria: Fees are calculated correctly, and payments processed within 5 seconds.

# FR-6: The system shall support real-time monitoring of parking space availability.

# Priority: High

# Acceptance Criteria: Parking availability data updates every 10 seconds.

# FR-7: The system shall allow for configuration of user roles with different access levels (e.g., Admin, Security, Technical Support).

# Priority: High

# Acceptance Criteria: User roles can be configured without requiring system downtime.

# FR-8: The system shall generate daily, weekly, and monthly parking usage reports.

# Priority: Medium

# Acceptance Criteria: Reports are available for download in PDF and Excel formats.

# FR-9: The system shall support multi-language user interfaces, including English and local language options.

# Priority: Low

# Acceptance Criteria: Users can switch languages without system restart.

# FR-10: The system shall provide a backup and restore functionality for all vehicle logs and configuration data.

# Priority: High

# Acceptance Criteria: Backup and restore operations can be completed within 15 minutes.

# FR-11: The system shall automatically detect duplicate vehicle entries within a specified time interval to avoid double charging.

# Priority: Medium

# Acceptance Criteria: Duplicate entries detected within 1 minute are flagged.

# FR-12: The system shall provide a mobile app interface for security personnel to monitor alerts and log events on the go.

# Priority: Medium

# Acceptance Criteria: Mobile app syncs data with the main system in real time.

# FR-13: The system shall enable automatic barrier gate control based on vehicle authorization status.

# Priority: High

# Acceptance Criteria: Barrier gates open or close within 2 seconds of authorization check.

# FR-14: The system shall allow admins to configure notification settings for different types of alerts.

# Priority: Medium

# Acceptance Criteria: Notification settings can be updated and applied within 2 minutes.

# FR-15: The system shall store vehicle log data for a minimum of 12 months for audit purposes.

# Priority: High

# Acceptance Criteria: Data retrieval for logs up to 12 months is accessible.

# FR-16: The system shall support integration with external third-party systems via REST API.

# Priority: Medium

# Acceptance Criteria: External systems can push and pull data via the API.

# FR-17: The system shall allow administrators to configure different parking fee rates based on time of day and day of the week.

# Priority: Medium

# Acceptance Criteria: Configured rates are applied automatically.

# FR-18: The system shall provide analytics for parking trends and usage statistics over customizable time periods.

# Priority: Low

# Acceptance Criteria: Analytics are updated daily.

# FR-19: The system shall include a failover mechanism to switch to a backup server in case of a primary server failure.

# Priority: High

# Acceptance Criteria: Failover completes within 30 seconds.

# FR-20: The system shall log all user actions and system events for auditing and security monitoring.

# Priority: High

# Acceptance Criteria: Logs are timestamped and stored in an immutable format.

# 3.2 Non-Functional Requirements

# Performance Requirements:

# The system shall process each license plate recognition event within 2 seconds.

# The system shall support a throughput of 100 vehicles per minute during peak hours.

# Security Requirements:

# All data communications must be encrypted using industry-standard protocols (e.g., SSL/TLS).

# Access to administrative functions shall require multi-factor authentication.

# Usability Requirements:

# The user interface shall be intuitive and require no more than 30 minutes of training for basic tasks.

# The system should provide help documentation accessible from the user interface.

# Reliability Requirements:

# The system shall have an uptime of at least 99.9% over any given month.

# The system must automatically retry failed operations at least three times before logging an error.

# Maintainability Requirements:

# The system's codebase shall be modular to allow for updates without affecting the entire system.

# System logs must be stored for a minimum of 90 days for troubleshooting purposes.

# 4. System Architecture

Includes AI modules for license plate recognition, databases for logging and reporting, and web interfaces for monitoring and administration.

# 5. Data Requirements

## 5.1 Database Design

Includes tables for vehicle registration, user roles, logs, and payment records.

## 5.2 Data Flow

Explains how data is captured, processed, and stored across system components.

# 6. Risk Analysis

Identifies risks like recognition accuracy under poor lighting and system downtime, with mitigation strategies.

# 7. Appendix

## 7.1 Glossary

Defines terms like LPR, OCR, and SSL.

## 7.2 References

Lists reference documents and standards.

## 7.3 Index

Provides an index of terms for navigation.

# Approval and Sign-Off

PNC Document. Redacted