Business Case & Requirements Gathering

Project: Intelligent Parking Management System
Company: PetroffSoft Ltd.

Context

PetroffSoft Ltd. is a Bulgarian software company specializing in automation, IT infrastructure, and custom software solutions.
The company has successfully launched products such as:

- **Capella** – cloud-based hotel management system.
- **Friday** – restaurant point-of-sale (POS) system.

Building on these, PetroffSoft is expanding into **smart infrastructure and parking management**.

Why now?

- Growing demand for affordable, automated parking systems.
- Target market: hotels, business centers, and organizations that depend on parking revenue.
- Strategic opportunity for PetroffSoft to diversify and strengthen its reputation as a **regional innovator** in IT solutions.

Problem Statement

Current parking management practices are inefficient, costly, and outdated:

- **Manual supervision** → requires staff, prone to errors, and slows operations.
- **SIM card–controlled barriers** → lack integration with payments and monitoring.
- **Standalone ticket stations** → too expensive for smaller operators.

Impact of the problem:

- **Revenue leakage** due to lack of reliable fee collection.
- **High operational costs** for parking operators.
- **Poor customer experience** for end users.

PetroffSoft identified this gap as both a **market need** and a **strategic opportunity**.

Proposed Solution: Intelligent Parking Management System

A **server-based full-stack application** that integrates license plate recognition (LPR), automated barrier control, and payment processing in a single workflow.

Key Features

A) License Plate Recognition (LPR):

- Integration with RTSP camera input (OpenCV + EasyOCR/OpenALPR).
- Recognition of whitelisted (authorized), blacklisted (unauthorized), and subscription vehicles.

B) Automated Barrier Control:

- Barrier operated via Raspberry Pi GPIO or Arduino relay.
- Manual override option with mandatory reason logging for accountability.

C) Payment Processing:

- Hourly billing and prepaid subscription options.
- Integration with Stripe/PayPal in test mode, plus support for cash.

D) Operator Web Dashboard (React/Vue):

- Role-based access control.
- Key screens: Dashboard, Sessions, Pricing, White/Black Lists, Payments.
- Real-time occupancy and event monitoring.

E) Reporting & Future Scalability:

- Reporting templates for revenue and occupancy trends.
- Foundation for cloud-based analytics (dynamic pricing, forecasting, advanced reporting).

Requirements Gathering

Functional Requirements

- License plate recognition from RTSP camera streams.
- Whitelist/blacklist CRUD management.
- Session lifecycle (entry $\rightarrow$ pricing $\rightarrow$ payment $\rightarrow$ exit).
- Automated barrier control with manual override.
- Web dashboard.
- Basic reporting templates.

Non-Functional Requirements

- **Scalability:** architecture prepared for multi-site and cloud analytics.
- **Security:** HTTPS/TLS, secure communication with devices, authentication.
- **Reliability:** low-latency barrier response, high LPR accuracy in various conditions.
- **Maintainability:** modular, well-documented, API-driven design.

Research Requirements

- Evaluate OCR libraries (EasyOCR, OpenALPR, Tesseract, YOLO-based).
- Compare architectures: edge vs. server vs. hybrid.
- Explore secure communication protocols (TLS, MQTT, WebSocket).
- Investigate payment provider flows (Stripe, PayPal, subscription handling).
- Research groundwork for predictive analytics and dynamic pricing.
- Stack exploration
- Further research may be conducted continuously throughout the project; the studies presented here merely lay the foundation for the project's initialization.

Conclusion

This project delivers a **minimum viable product (MVP)** that solves real problems for parking operators while positioning PetroffSoft for future growth in the smart infrastructure domain.
The system directly addresses **efficiency, revenue protection, and customer experience** while laying the foundation for advanced analytics and scalability.