

Software Requirements Specification (SRS) Document for Locate a Socket

1. Introduction

1.1. Overview

Since electric vehicles are environment-friendly systems and reduce toxic gas emissions, the community should be encouraged to adopt this technology. However, traveling range limitations and a capped number of reliable charging stations hold people back from buying EVs. Locate a Socket is a web-based application that offers a solution for a rapidly growing community of electric vehicle (EV) owners to discover charging stations on their journeys easily. It utilizes location-based services to streamline access and ensure payments for EV charging.

1.2. Target Audience

This document is intended for the system engineers, domain experts, and project managers, and stakeholders within the EV industry such as charging station operators, vehicle manufacturers, and environmental supporters.

1.3. Keywords

LoS	Locate a Socket
EV	Electric Vehicle
API	Application Programming Interface
SSO	Single Sign On

2. Purpose

2.1. Primary Objective

The primary goal of the "Locate a Socket" service is to improve the driving experience of EVs by helping drivers locate and access charging stations conveniently during their trips thus encouraging the utilization of electric vehicles.

2.2. Intended Benefits

For EV drivers, the application aims to minimize range anxiety, reduce charging wait times, and provide a seamless payment process, contributing to a more sustainable and eco-friendly transportation ecosystem.

3. Audience

The target users of "Locate a Socket" include:

- **EV Drivers:** Drivers seeking charging locations and information along their journey who are concerned about queue wait time and availability of compatible chargers for their vehicles.
- **Automotive Manufacturers:** EV manufacturers who want to attract more customers by providing more value for their company, for instance, boosting their brands by adding to the number of their stations.
- **Charging Station Operators:** Businesses and facilities that wish to attract EV drivers to their charging facilities. Post information about what other services they are providing on their facilities that can entertain drivers while the charging wait time.
- **Environmental Supporters:** Groups promoting the adoption of cleaner, more sustainable transportation options.

4. Overall Description

4.1. Functionality and Purpose

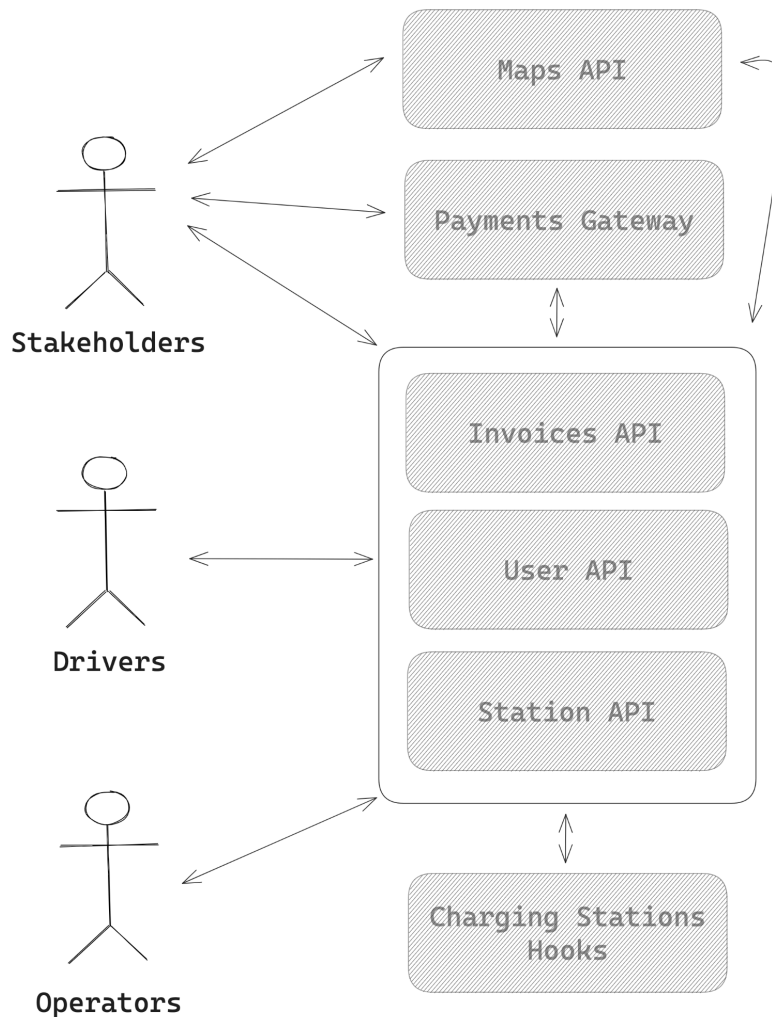


Figure 1. System environment

"Locate a Socket" offers a comprehensive solution for finding EV charging stations by integrating real-time data, user preferences, and location-based services. The application facilitates easy discovery, access, and payment for charging services. 3 types of users (stakeholders, drivers, and operators) can interact with the application to streamline this process.

4.1. Operations

"Locate a Socket" has 3 active actors in the system. All actors are authenticated using the User API and authorized to specific resources based on their level of responsibility.

Stakeholders: Stakeholders can list their charging facilities in "Locate a Socket" including information about their facility, the number of charging stations, and extra services they offer. They also need to invite users with the operator role to their account with limited access. They can issue financial reports on their organizations and view the transactions made by drivers for their services.

Operators: Operators can update charging station information inside their organization, report issues in their systems, and update drivers about the availability of charging stations. They can post announcements for upcoming events that may interrupt drivers' experience.

Drivers: Users interact with the application through a user-friendly interface that displays nearby charging stations on a map, provides detailed information on each station, including availability and pricing, and allows for direct navigation and payment. The application adapts to user preferences and learns from behavior to offer personalized recommendations.

5. External Interfaces

Maps: Integration with mapping services to display charging station locations, routes, and real-time traffic data.

Payment Gateways: Secure interfaces with payment providers to facilitate easy and safe transactions.

Charging Station APIs: Connection to charging station databases for real-time information on availability, types of chargers, and pricing.

6. System Features

Use Case	User authentication
Description	Allows users to sign on to LoS using SSO or credentials
Actors	N/A
Precondition	N/A
Postcondition	<ol style="list-style-type: none">1. Send a verification email and SMS2. Verify user3. If a specific role other than driver requested notify the system admin
Steps	<ol style="list-style-type: none">1. Enter account info2. Request a Stakeholder role if applicable

Use Case	Initiate new facility
Description	Allows stakeholders to create a new facility in the platform
Actors	Stakeholders
Precondition	The user is logged in and has a “Stakeholder” role in the system
Postcondition	<ol style="list-style-type: none">1. Invite multiple users with operator roles to his organization2. Updates Stations API
Steps	<ol style="list-style-type: none">1. Enters the information about the facility, location, chargers, connectors, extra services, schedule2. Assign operators to his facility3. Setup payment information to receive payments

Use Case	Update facility information
Description	Allows stakeholders and operators to update facility information
Actors	Stakeholders, Operators
Precondition	The user is logged in and has “UPDATE” permission in the facility
Postcondition	<ol style="list-style-type: none">1. Updates Stations API2. Send notification to drivers who reserved a station affected
Steps	<ol style="list-style-type: none">1. Update the information about the facility, location, chargers, connectors, extra services, schedule

Use Case	View facility information
Description	Allows users to view facility information
Actors	Stakeholders, Operators, Drivers
Precondition	The user is logged
Postcondition	N/A
Steps	<ol style="list-style-type: none"> 1. View the information about the facility, location, chargers, connectors, extra services, schedule

Use Case	List facilities on the map view
Description	Allows users to view nearby facilities
Actors	Drivers
Precondition	<ol style="list-style-type: none"> 1. The user is logged in 2. Facility features such as connection type match the user preferences
Postcondition	N/A
Steps	<ol style="list-style-type: none"> 1. Get user location 2. Send a request to station API including the user's location, and map zoom level to receive a list of nearby stations 3. Load facilities information on the user's map view

Use Case	Book a charging station
Description	Allows users to book a charging station ahead of time
Actors	Drivers
Precondition	<ol style="list-style-type: none"> 1. The user is logged in 2. The charging station is not already booked by another user
Postcondition	<ol style="list-style-type: none"> 1. Invalidate booking after a specific time if the user does not arrive 2. Refund the deposit made in favor of the booking
Steps	<ol style="list-style-type: none"> 1. Create a booking 2. Initiate a payment gateway 3. Book if the deposit was successful

Use Case	Initiate charging
Description	Allows users to initiate a charging process
Actors	Drivers
Precondition	<ol style="list-style-type: none"> 1. The user is logged in 2. The charging station is not already booked by another user
Postcondition	<ol style="list-style-type: none"> 1. Change the charging station status to unavailable
Steps	<ol style="list-style-type: none"> 1. Unlocks charging station through charging station API 2. Initiate the charging session and timer

Use Case	Pay for the charging service
Description	Allows users to pay for charging service
Actors	Drivers
Precondition	<ol style="list-style-type: none"> 1. The user is logged in 2. Charging session ended
Postcondition	<ol style="list-style-type: none"> 1. Change the status of the charging station status to available
Steps	<ol style="list-style-type: none"> 1. Get the charging session and calculate the expense 2. Initiate a payment gateway 3. Process payment

Use Case	Export financial report
Description	Allows stakeholders to view the financial report of their facility
Actors	Stakeholders
Precondition	<ol style="list-style-type: none"> 3. The user is logged in 4. The user is the owner of the facility
Postcondition	<ol style="list-style-type: none"> 2. Send an email containing the report
Steps	<ol style="list-style-type: none"> 4. Query invoices submitted on the specific facility

7. Non-functional Requirements

The logical structure of the data to be stored in the Locate a Socket database is given below.

User Entity

Data Item	Type	Description	Comment
UserID	Integer	Unique identifier for the user	Primary Key
Name	Text	Full name of the user	
Email Address	Text	User's internet email address	Must be unique
Password	Text	Hashed password for login	Should be securely hashed
Role	Category	Role of the user within the application	E.g., Driver, Stakeholder, Charging Station Operator
PhoneNumber	Text	Contact phone number	Optional, for notifications or support
AccountCreationDate	Date	Date the account was created	
LastLoginDate	Date	Date of the last login	Useful for security and engagement tracking
IsActive	Boolean	Whether the account is active	True for active, False for deactivated accounts
ProfilePicture	Blob/Text	Link or binary data for the profile picture	Optional, enhances user experience

Users Preferences Entity

Data Item	Type	Description	Comment
PreferenceID	Integer	Unique identifier for the preference	Primary Key
UserID	Integer	Identifier for the user	Foreign Key (references Users)
PreferredPaymentMethod	Text	Preferred method of payment	E.g., Credit Card, PayPal
VehicleModel	Text	Model of the user's EV	For tailored services
ChargingStationTypes	Text	Preferred types of charging stations	E.g., Fast Charging, Standard Charging
NotificationPreferences	Text	User's notification preferences	E.g., Email, SMS, Push Notifications

Charging Station Entity

Data Item	Type	Description	Comment
StationID	Integer	Unique identifier for the station	Primary Key
Location	Text	Physical address of the station	
Latitude	Float	Latitude coordinate	For map integration
Longitude	Float	Longitude coordinate	For map integration
ConnectorType	Category	Type of connector available	E.g., CHAdeMO, CCS, Type 2
Availability	Boolean	Whether the station is available	True for available, False for occupied
NumberOfConnectors	Integer	Number of connectors at the station	
OperatingHours	Text	Operating hours of the station	
Operator	Text	Operator or owner of the station	
PricePerKWh	Decimal	Price per kilowatt-hour	To calculate charging costs

Invoice Entity

Data Item	Type	Description	Comment
InvoiceID	Integer	Unique identifier for the invoice	Primary Key
UserID	Integer	Identifier for the user	Foreign Key (references Users)
StationID	Integer	Identifier for the charging station	Foreign Key (references Charging Station)
Date	Date	Date of transaction	
StartTime	Time	Start time of charging	
EndTime	Time	End time of charging	
EnergyUsed	Decimal	Amount of energy used in kWh	
TotalCost	Decimal	Total cost of the charging session	EnergyUsed * PricePerKWh
PaymentMethod	Text	Method of payment	
PaymentStatus	Category	Status of the payment	E.g., Pending, Completed, Failed

8. Other Requirements

Guidance: The software should launch detailed step-by-step instructions for users to follow.

Security: It is essential to implement encryption measures to ensure transactions and safeguard user privacy.

Reliability: The goal is to maintain a 99.9% uptime rate with backup systems, in place to manage any failures.

Usability: The interface should be user-friendly and intuitive requiring guidance for users.

Support: Locate a Socket should be able to provide a 24/7 online support system including chatbots and an on-demand call center to answer clients.

Multilanguage Support: The application should support multiple languages to cater to a global audience.

Scalability: The architecture must support scaling to accommodate growing numbers of users and charging stations.

Compliance: Must comply with local laws and regulations regarding data protection and financial transactions.