Software Requirements Specification (SRS) Document

TEAM NUMBER: 37

TEAM: ChargeUp Tech

PROJECT: ChargeMate(D7)

COMPANY: ChargeKart (https://www.chargekart.co.in)

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Brief Problem Statement

The growth of the electric vehicle (EV) industry is hindered by the lack of convenient and accessible charging solutions. EV users face challenges in finding charging stations, managing financial transactions during the charging process, and monitoring the progress of the charging. The current solutions are often time-consuming, complicated, and stressful, which negatively affects the user experience and hinders the growth of the EV industry.

This project aims to address these challenges and provide an innovative and effective solution to the problem of convenient and accessible EV charging. By developing user-friendly mobile applications and a web-based platform to control and monitor the charging bots, the project will make the charging process simple, efficient, and stress-free for EV users. The ultimate goal is to revolutionize the EV industry by providing a cutting-edge solution that will make charging EVs easier, more convenient and accessible for everyone.

Aim

The project is aimed at providing a convenient and accessible charging solution for electric vehicles (EVs) through the use of automatic charging bots. The objective is to simplify the charging process for EV users and boost the growth of the EV industry. The focus of this specific project is the development of user-friendly mobile applications and a web-based platform to control and monitor the charging bots.

The mobile application for users will provide a simple and efficient solution for summoning the charging bots to their location and carrying out financial transactions. The app will allow users to track

the charging process and receive updates on the progress. This user-friendly interface will help to make the charging process a convenient and stress-free experience for EV users.

The web-based platform for administrators will provide real-time statistics and status updates on the bots. This will help administrators to monitor and manage the charging bots effectively, ensuring that they are functioning optimally and providing efficient charging services to EV users. The platform will also offer high-level control and moderation capabilities, allowing administrators to make adjustments and modifications to the bots as required.

The ultimate aim of this project is to provide a seamless and efficient user experience through the use of cutting-edge software dashboards and platforms. The project will offer a comprehensive solution that addresses the challenges faced by EV users and provides a convenient, accessible and stress-free charging experience. The goal is to revolutionize the EV industry by providing an innovative and effective solution that will make charging EVs easier, more convenient and accessible for everyone.

Users Profile

The target audience for the mobile application is the general public and electric vehicle (EV) owners who are seeking a convenient and accessible charging solution for their EVs. These users will use the app to summon the charging bots and monitor the charging process, as well as carry out financial transactions.

In terms of their familiarity with using computers and software, the general public and EV owners can be assumed to have varying levels of comfort with technology. Some may be highly proficient with using smartphones and mobile applications, while others may be less familiar with these types of technologies. However, all users are likely to be familiar with basic financial transactions and may have some experience with using mobile apps for payment purposes.

The target audience for the web-based platform for administrators is composed of moderators and administrative personnel working for the EV charging bot company. These individuals are responsible for managing and monitoring the charging bots and will use the platform to receive real-time statistics and status updates, as well as to make modifications and adjustments as needed. These individuals are likely to be highly proficient with technology and experienced in using software and web-based platforms in their professional capacities.

System Requirements

- Server for hosting the backend service.
- Server instance for serving the frontend files.
- A cross-platform(preferably) app connected to the backend.

Project Modules

1. **ChargeMate User Interface Module**
2. **ChargeMate Operations Control Center**
3. **ChargeMate Data Management Module**

Below are the specific details for each of the modules, with exact requirements and features list.

Module 1: ChargeMate User Interface

About: -

This module is designed to provide a seamless and user-friendly experience for electric vehicle (EV) owners seeking to charge their vehicles. The module is built in the form of a mobile application, which will serve as the primary interface for users to interact with the charging system.

Starting from booking a charging slot for the bot, users will be able to monitor the charging process in real-time and receive updates on the status of their vehicle. The application will also provide an easy-to-use platform for users to carry out financial transactions, ensuring a smooth and streamlined experience.

Overall, the ChargeMate User Interface Module is critical in providing users with an intuitive and accessible means of controlling and monitoring the charging process, and is an integral part of the ChargeMate platform.

Features List: -

Sr. No.	Feature	Priority	Release
	A) User Management		
A1	User Login: User must be able to login using his login credentials (email & password) and access the application	High	R2
A2	User Third-Party Login: User must be able to login using OTP on his mobile number and/or any third-party apps, like Google, Facebook, etc.	Optional	
A3	User Registration: New User must be able to register on the application. There would be User's Name, Contact Number, Email Address, User's Primary Car (Default option to be shown while user is booking a charge).	High	R2
A4	Two-Step Verification Mode for Login for better Security	Additional	
A5	Password Change: Provide option for the logged in user to change his password.	Medium	R2
A6	Forget Password: Provide option for Forget Password on Login Screen.	Low	R2

B) User Wallet			
B1	Wallet Creation: When a new user is created, a new wallet for the corresponding user is created with initial value as Rs. 0. Ask User for an initial 4-digit TPIN for wallet security.	High	R2
B2	Wallet Recharge: User must be able to recharge his wallet, with any amount (without KYC limit = Rs. 10,000)	Medium	R2
B3	KYC: User should be able to do KYC for the in-app wallet system (maximum amount in wallet limit would be increased then)	Additional	
B4	Wallet History: Display the past transactions in the wallet.	Optional	
B5	Wallet TPIN: User must be able to change his wallet's TPIN	Additional	
C) User Charging Slot Booking			
C1	Selection: User must be able to search for and select his current location from a list. Then there must be a follow-up selection, in case of multiple floors/parking areas at the same place.	Medium	R2
C2	Auto-Detect Location: App must be able to auto-detect the location of the user from his device GPS, and auto-select the corresponding location. Then there must be a follow-up selection, in case of multiple floors/parking areas at the same place.	Additional	
C3	Vehicle Selection: There must be default vehicle be shown on the booking page (From user's profile). And there must be an option with all other vehicle options to select from (In case user is booking for someone else)	Optional	
C4	Bot arrival: The User's location must be sent to the ROS API. User must be shown a loading/waiting screen that the bot is coming.	Low	R2

	After the bot has arrived, show user the way to connect the bot's charging cable to his car.		
C5	Estimate Stats: After user has connected the charging cable, get the data of the user's charging stats, and show them to user. These would mostly include – current charge, time to complete charge based on current, estimated cost of the charge based on the time and charge percentage. Time and cost may also depend on the type of vehicle user has selected. Once shown, there would be a button to proceed ahead.	Medium	R2
D) Charging Procedure			
D1	Wallet Check: Once user has been shown the estimated stats, check for the current amount in wallet. Show warning to user.	High	R2
D2	Wallet cutoff: Keep checking for the current charge amount and the cost. Once it goes above the user's current wallet amount, stop the charge and ask user to continue or stop.	Medium	R2
D3	Charge Stats: Show user live charge stats, fetched from the ROS API. These would include current charge, time to complete, etc.	Low	R2
D4	Force Stop: Show user a stop button on the charge stats page to stop the charging procedure in between.	Optional	
D5	Complete the charge: Once either is charge is complete or wallet/user stop has happened, ask user to disconnect the adapter from the car. Then, continue onto the financial page.	Medium	R2
E) Charging Financial Management			
E1	Check Charge Details: Calculate the user's total charge amount. If it's greater than the current amount in wallet, ask user to add in the wallet the remaining amount. If it's lesser than or	High	R2

	equal to the current amount, then deduct that from the wallet.		
E2	Show Details: After financial transactions, show user the details for the charge. This would include Amount, Time Taken, etc.	Medium	R2
F) User Transaction Management			
F1	History: Show User the history of Transactions/Charges.	Low	R2
F2	Report: Show option to user to download a transaction report of a particular past charge transaction. Also, show the option for report just after a charge has completed on the completion page with details.	Medium	R2
G) Communicating with Backend			
G1	Security: Provide a secure HTTPS connection to the Backend.	Medium	R2
G2	Stability: Detect whenever the connection gets disconnected with the backend.	Optional	
R1 – Release 1 (~ Mid-March) ; R2 – Release 2 (~ April End)			

Releases are based on the level of Priority. They are currently tentative.

Abstract Version of the User Charge Booking Flow: -

- User Account Login/Registration
- User selects his location.
- User selects parking details (parking floor, parking slot, etc.)
- User selects his car model.
- Bot arrives at the user place.
- User plugs in the bot cord into his car.
- User is shown estimate for the charge and cost.
- User proceeds.
- Wallet is checked that whether user has that much amount or not. If not, show user a warning.
- User is asked for his wallet TPIN to proceed.
- Charge Starts.
- Show live charge status and other details to the user.
- Auto cutoff if charge amount reaches equal to the current wallet amount (Show option to end or proceed). Also, user has an option to stop the charge in between.

- If charge amount is greater than total wallet amount, take user to add remaining amount into his wallet.
- Deduct the charge amount from wallet.
- Show user the details of the charge. As well, give user an option to download a detailed report/receipt for the transaction.
- CHARGING PROCESS ENDS

Module 2: ChargeMate Operations Control Center (Web Application)

About: -

The ChargeMate Operations Control Center is a web-based portal designed specifically for company administrators and robot managers. Its purpose is to provide a centralized platform for these individuals to manage and monitor the charging bots, ensuring smooth and efficient operations of the system.

The portal offers real-time statistics and status updates, allowing administrators to keep track of the charging process and quickly identify and resolve any issues that may arise. The platform also provides a comprehensive suite of tools and features, enabling administrators to make modifications and adjustments to the charging bots as and when needed.

The ChargeMate Operations Control Center is built with user-friendly interface and advanced security measures, ensuring that only authorized personnel can access and manipulate the system. With its powerful and versatile capabilities, the ChargeMate Operations Control Center is an essential component of the ChargeMate platform, enabling administrators to effectively and efficiently manage the charging process.

Features List : -

Sr. No.	Feature	Priority	Release
	A) Admin & Operations (User Management)		
A1	User Login: User must be able to login using his login credentials (email & password) and access the web application for his role.	High	R1
A2	Auto-Detect Role: The application must select the role of the user from his email id. Roles: - Admin & Operations	Medium	R1
A3	Add Operations Member: Admin must be able to add a new operations team member by his Name and Email id and there must be a new password generation for the same.	Optional	
A4	Password Change: Any member must have an option to change his password after the person has logged in.	Medium	R1
	B) Managing Parking Details (Admin)		

B1	Add new location: Admin must be able to add a new location. It will have the following Details: State, City, Landmark, Pin Code, Name of the Place, etc.	High	R1
B2	Add new Parking Map: Admin can upload a new parking Map, and then add the following Details: Location (A dropdown having all the previously added location), Floor Number, List of all Parking Slots, Operations Team person (A dropdown having all the previously added operations team emails), Robot ID, etc.	High	R1
B3	Delete a Parking Map: Admin must be able to delete a previously uploaded marking map for any location.	Low	R2
	C) Managing Robots Details (Admin + Operations)		
C1	Add a new robot: Admin must be able to add a new robots details including ROS API key for that robot, robot ID.	Medium	R1
C2	Change Battery Status: Operations Team Member must be able to change battery level/details of a robot which comes under his location.	Medium	R1
	D) Statistics for Transactions (Admin)		
D1	Number of Transactions per Day	Additional	
D2	Other Statistics (As applicable)	Additional	
	E) Statistics for each robot (Operations)		
E1	Alert: Alert the respective operations person for a battery change, as soon as the battery level goes below a certain charge level	Medium	R2
E2	Show the current statistics of the accessible location robot to the respective operations account.	Low	R2

F) Vehicles Data Management (Admin) (Additional)			
F1	Data Collection: Collect the Data for various kind of vehicles, along with various statistics like Charge Time for various charge levels, Average Percentage of public vehicles when they book a charge, etc.	Additional	
G) Communicating with the Backend			
G1	Security: Provide a secure HTTPS connection to the Backend.	Medium	R1
G2	Stability: Detect whenever the connection gets disconnected with the backend.	Optional	
R1 – Release 1 (~ Mid-March) ; R2 – Release 2 (~ April End)			

Releases are based on the level of Priority. They are currently tentative.

Module 3: ChargeMate Data Management (Backend)

About: -

This module forms the backbone of the ChargeMate platform and is responsible for managing and storing all the data generated by the system. It acts as the server layer that connects the web-based portal for administrators and the mobile application for users, facilitating communication and data transfer between the two.

The ChargeMate Data Management Module is designed to interact with a robust and secure database to store information on charging sessions, financial transactions, and other relevant data. This information will be used to generate real-time statistics and analytics, which can be accessed by administrators through the web-based portal.

In addition to data storage and management, the module is also responsible for handling complex algorithms and processes to ensure a smooth and efficient operation of the ChargeMate system. By providing a secure and reliable means of managing and storing data, the ChargeMate Data Management Module plays a critical role in the overall success of the platform.

Features List : -

Sr. No.	Feature	Priority	Release
	A) User & Admin Data		
A1	User Data: Store User Data in the database. It would include Name, Contact, Email, Default Vehicle. Provide APIs to Login, Register and Details + Password Change.	High	R1
A2	Admin Data: Store the emails of the admins and the operations team roles. Provide APIs for Login, and for admins to add new operations team people, and Password Change.	High	R1
	B) Parking Data		
B1	Maps: Admin must be able to upload a new parking map, and then fill in the required details (Mentioned in B2 Module 2)	High	R1

	Admin must also be able to delete an existing parking map.		
B2	Locations: Admin must be able to edit and add new Locations details (Mentioned in B1 Module 2)	High	R1
	C) Robot Data		
C1	Add: Admin API to add a new robot. Details would include ROS API key for that particular robot, Battery Status, Robot ID, etc.	High	R1
C2	Edit: Operations role should be able to update the battery status for the robot.	Medium	R1
	D) Transactions Data		
D1	User's all history of the transactions must be stored. Details would mainly include date, time, venue, charging details, cost, time taken, vehicle details, etc.	Low	R2
D2	Report: User can request for a printed/mailed pdf report of the above transaction data for a particular past transaction.	Medium	R2
	E) Wallet Data		
E1	Data: Store each user's wallet current balance along with the user's wallet history (consisting of the date, time, credit/debit, amount, comment, transaction ID)	High	R2
E2	Recharge: Provide a third-party Gateway option for the user to recharge his wallet. The amount recharged must be added to the user's current balance, along with add the transaction in the user's wallet history.	Additional	
	F) Vehicles Data (Additional)		
F1	Data: Collect the Data for various kind of vehicles, along with various statistics like Charge Time for various charge levels, Average	Additional	

	Percentage of public vehicles when they book a charge, etc.		
G) Security			
G1	Provide security from DDOS Attack, rate limiting, NoSQL Injection Attack, etc.	Optional	
G2	Check authentication for various routes and provide error responses as and when required.	Medium	R1 + R2
R1 – Release 1 (~ Mid-March) ; R2 – Release 2 (~ April End)			

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