3.1P Design Aspects

Use Cases:

- **Actor: EV Drivers**
  Requirements: User must have a valid account, and their system requires an active internet connection.

Use cases:

1) Users can see a list of reachable charging stations that are nearby their present location.
2) Users can check detailed information about a station through selection and perform charging slot reservations when needed.
3) Users can receive GPS directions to the selected charging stations when they have booked.
4) Users can make payments through the options like Apple Pay, Google Pay and PayPal after they have booked.
5) Users can provide station feedback by reporting both cleanliness conditions and operational issues of the charging stations.
6) Users can find a complete record of their transaction data featuring dates at which transactions occurred along with charging locations and transaction amounts.
7) Users can receive notifications throughout their ongoing charging period that show session start and stop times along with any interruptions.

- **Actor: Admin**
  Requirements: Admins need to authenticate their sessions with login credentials of administrator authority.

Use cases:

1) Admins can possess the capability to add or modify or erase charging stations.
2) Admins can determine and modifiy charging prices through consideration of location variables and market demands and energy consumption patterns.
3) Admins can analyse usage data create reports on performance, user activities and financial results.
4) Admins can deactivate user’s accounts or stations if they discover any fraud or misuse or safety risks.

- **Actor: Charging station operators**
  Requirements: All providers need to get their registration and verification established with the system's network.

Use cases:

1) Operators can provide complete specifications such as location along with capacity and status availability come directly from operators.
2) Operators can change the pricing structure for maintaining competition and operational expenses.
3) Operators can alter the operational status of the stations like active, maintenance, or out of service.
4) Operators can send administrative reports about safety and compliance standards to administrators to keep service levels high.

User Stories:

- **EV driver**

As an EV driver, I want to find nearby charging stations, so that there will not be any delays when my vehicle is being charged.

As an EV driver, I want to reserve a charging slot for charging through the mobile application.

As an EV driver, I want to make a secure payment and ensure there will be never a payment insecurity.

- **Admin**

As an admin, I want to manage the entries of the charging stations to update the data in the application.

As an admin, I want to adjust the prices and settings which is done to maximise the profits and customer satisfaction.

As an admin, I want to generate and review reports on system usage which is used to improve user experience.

- **Operators**

As an operator, I need a method for simple updating of charging station information to deliver correct service details to users.

As an operator, I need to change my station’s pricing to stay competitive based on market changes and operational expenses.

User Requirements

For EV Drivers:

1. Users must be able to locate nearby charging stations through real-time GPS data.

2. Users must be able to view detailed station information (availability, pricing, status).
3. Users must be able to reserve charging slots in advance.
4. Users must have access to secure and multiple payment options (e.g., Apple Pay, Google Pay, PayPal).
5. Users must receive real-time notifications about their charging session status.
6. Users must be able to provide feedback on the station conditions and performance.
7. Users must access their transaction history securely and conveniently.

For Admins:

1. Admins must authenticate themselves via secure login credentials.
2. Admins must manage charging station listings (add, edit, delete).
3. Admins must dynamically adjust station pricing based on market and consumption data.
4. Admins must generate system usage, performance, and financial reports.
5. Admins must deactivate accounts or stations involved in fraud or non-compliance.

For Operators:

1. Operators must register and verify their credentials within the system.
2. Operators must update location, capacity, and operational status of stations.
3. Operators must modify station pricing as needed.
4. Operators must submit safety and compliance reports.

Design Specification:

1. User Interface (UI):

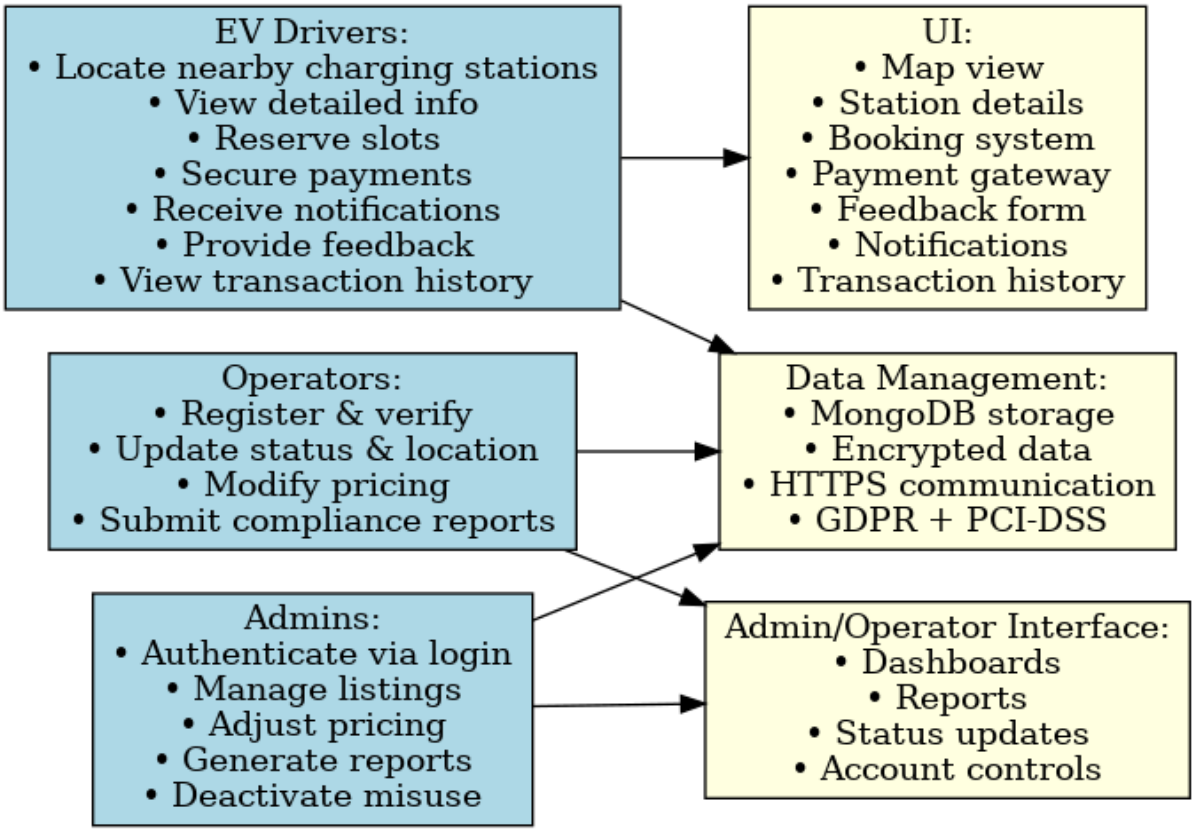
- Map view displaying available nearby charging stations based on real-time GPS.
- Detailed station pages showing price, status, and reservation options.
- Booking system integrated into station details for reserving slots.
- Payment gateway integrated with Apple Pay, Google Pay, PayPal.
- User feedback form available after each charging session.
- Notification pop-ups and alerts during active charging sessions.
- Profile section showing transaction history.

2. Data Management:

- **Database:** MongoDB to store user profiles, station data, transactions, feedback, system logs.
- **Security:**
    - Data encrypted using industry-standard encryption.
    - Secure channels (HTTPS) used for all communications.
    - Compliance with GDPR and PCI-DSS standards for data handling.

3. Admin and Operator Interfaces:

- Dashboard for admins to manage stations, pricing, and accounts.
- Reporting tools for generating usage, financial, and performance reports.
- Interface for operators to update station status and submit compliance reports.



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