eInfochips
An Arrow Company

ENRICHING LIVES
ENGINEERING
THROUGH
EXCELLENCE

UX Assessment Report
Design Evaluation

Contents

1. Introduction

As the adoption of electric vehicles (EVs) continues to surge, the need for efficient and user-friendly charging solutions has never been more critical. The Electric Vehicle Charging Mobile App is designed to empower EV owners by providing a seamless, intuitive platform to manage their charging needs. This innovative app offers comprehensive features, including real-time monitoring of charging sessions, advanced scheduling options to capitalize on cost-saving time-of-use rates, and the ability to easily add and share charging stations with family and friends. With an emphasis on user experience and visual appeal, the app ensures that managing your EV's charging process is not only straightforward but also engaging. By addressing common pain points and leveraging advanced customization capabilities, the Electric Vehicle Charging Mobile App stands as a powerful tool for EV owners aiming to optimize their charging efficiency and enhance their overall driving experience.

2. Executive Summary

Our customer leads in electrification solutions that enhance efficiency, performance, and sustainability across industries. They specialize in technologies like battery thermal management, vehicle heating solutions, and power conversion systems, promoting cleaner energy transitions and reducing emissions.

EV owners face issues like inconsistent charging station availability, complex network interfaces, and difficulties in managing cost-effective charging schedules, causing range anxiety, confusion, and higher energy costs.

The Electric Vehicle Charging Mobile App simplifies the charging process with advanced scheduling, a user-friendly interface, multi-network integration, sharing options, custom alerts, and secure payment methods, enhancing convenience and user satisfaction. Stakeholder and user feedback highlighted areas for improvement, including login options, charging status display, scheduling features, and charger sharing functionality. Recommendations include adding social and biometric login options, clearer charging status displays, customizable scheduling, and more informative sharing features, aiming to enhance the app's usability and overall user experience.

3. Customer Profile

Customer is a leader in providing innovative electrification solutions designed to enhance the efficiency, performance, and sustainability of various industries. They specialize in developing cutting-edge technologies that electrify vehicles, machinery, and equipment, contributing to the reduction of emissions and the transition to cleaner energy sources. Their comprehensive product portfolio includes battery thermal management systems, electric and hybrid vehicle heating solutions, and electric power conversion systems. The company is committed to driving the future of electrification with reliable, high-quality products that meet the evolving needs of their global clientele.

4. Challenges

Despite the growing popularity of electric vehicles, EV owners face several challenges that can hinder their overall experience and convenience. One of the primary issues is the inconsistent availability and accessibility of charging stations, which can lead to range anxiety and make long trips cumbersome. Additionally, many existing charging solutions lack user-friendly interfaces, making it difficult for users to locate, reserve, and manage charging sessions efficiently. The complexity of different charging networks and their respective pricing structures further complicates the process, leading to confusion and frustration. Furthermore, EV owners often struggle with effectively scheduling charging sessions to take advantage of variable electricity rates, which can result in higher costs and inefficient energy use. The Electric Vehicle Charging Mobile App aims to address these pain points by offering a seamless, comprehensive solution that simplifies the entire charging process, ensuring a smoother and more enjoyable experience for all users.

5. UX Assessment Solution for EV Charger Company

The Electric Vehicle Charging Mobile App offers a suite of innovative solutions designed to address the various challenges faced by EV owners, ensuring a smoother and more efficient charging experience:

Advanced Scheduling:

Easily schedule charging sessions to optimize for cost-effective time-of-use rates and ensure your vehicle is ready when you need it.

User-Friendly Interface:

An intuitive and visually appealing interface that simplifies the process of managing and monitoring charging sessions.

Multi-Network Integration:

Seamlessly access a wide range of charging networks with transparent pricing structures to eliminate confusion.

Family and Friends Sharing:

Effortlessly invite family members and friends to share charging stations and manage their own charging needs.

Custom Alerts and Notifications:

Receive timely alerts and notifications to keep you informed about your charging status and any changes in availability.

Secure Payment Options:

Convenient and secure payment methods to ensure hassle-free transactions for all your charging needs.

eInfochips UX Assessment for EV Charging Solution

eInfochips team carried out UX Assessment for the EV charging mobile application.

6. Discovery

A. Stakeholder Interviews

Under the discovery phase, we have conducted the stakeholder interview. Below are few of them.

Stakeholder Profile: Marketing Manager

Question	Answer	Feel
How would you describe the primary goal?	The primary goal of the app is to provide an intuitive and seamless experience for electric vehicle owners to easily find and manage chargers, while also enabling features such as sharing chargers with family and friends.	😐
What specific pain points or challenges have you observed from user feedback?	We have received feedback about difficulties in sharing chargers, scheduling charging sessions, and understanding time-of-use rates.	😐
How do you envision the app differentiating itself from competitors in terms of user experience?	We believe that by providing a user-friendly interface, seamless integration with charging stations, and easy-to-use sharing and scheduling features, we can differentiate ourselves from competitors from above features.	😐
App analytics that you hope to address through the UX audit?	Our goal is to identify any usability issues related to these features and improve the overall user experience to enhance engagement and user satisfaction.	😐
What is your vision for the app in terms of user experience?	Works seamlessly on tomorrow's market-leading computing platforms and the tools which help us on engagement of user.	😐
As the CEO, what are your key objectives in terms of user experience for the app?	Our main goals for the app's user experience are to make sure that users can locate, access, and manage charging for electric vehicle owners in a simple, user-friendly manner. Our goal is to provide an easy-to-use and enjoyable user experience that promotes user engagement and retention.	😐
How do you see the app contributing to the overall success of your business?	The app plays a crucial role in our business success by providing an essential touchpoint for our customers. A positive user experience translates to higher user satisfaction, increased usage, and potentially higher revenue through increased charging sessions or participation in premium features. Ultimately, the app should contribute to customer loyalty and the growth of our user base.	🙁
In your opinion, what are the key challenges that users might encounter while using the app?	One challenge user might face is the complexity of sharing chargers with family and friends, as well as scheduling charging sessions effectively. Another key challenge could be the lack of clarity on time-of-use rates for electricity. It is important to address these challenges as they directly impact the usability, engagement, and overall satisfaction of our users.	😐

B. Product Maturity Level - Awareness

As of now for EV Charger Mobile Application, we can find its UX Maturity level at Awareness.

1 Unrecognized	2 Awareness	3 Exploration	4 Commitment	5 Integration	6 User Centric	7 Visionary

7. Steps to Improve UX Maturity

Conduct Surveys and Interviews:

Gather insights from stakeholders, team members, and users to understand the current state of UX practices.

Evaluate Processes and Practices:

Review the UX-related processes and practices currently in place, such as user research, usability testing, and design iterations.

Analyse Outputs and Outcomes:

Examine the deliverables (e.g., wireframes, prototypes, user personas) and their quality, consistency, and impact on the final product.

Review Organizational Culture and Support:

Assess the level of support for UX from leadership and the extent to which UX is integrated into the organizational culture and strategy.

Benchmark Against Models:

Compare your findings against established UX maturity models (like the Nielsen Norman Group's model) to determine the current maturity level.

Develop an Action Plan:

Based on the assessment, create a roadmap with clear, actionable steps to advance the UX maturity level.

8. Define

A. User Interviews

Under the discovery phase, we have conducted the user interview. Below are few of them.

Profile: Non-tech-savvy (Age 52)

Question	Answer	Feel
How do you find the process of adding charger?	It is a bit overwhelming. I struggle to navigate through the app to find the how to add charger for my car in mobile app.	😞
Are you able to easily understand and use the sharing charger feature?	It is quite confusing. I couldn't figure out how to share a charger with my family.	😐
How would you rate your overall experience using the app?	I would rate it as below average. While I appreciate the concept, the app needs to be more user-friendly for people like me who are not tech-savvy.	🙂

Profile: Tech-savvy (Age 22)

| Question	Answer	Feel
How easy is it for you to Time-Off User Rate?	What is that, as I did not find that function in mobile app.	😞
Do you find the sharing charger feature useful and intuitive?	Not really. The process of sharing a charger is confusing, and I haven't been able to make it work properly.	😞
Overall, how satisfied are you with the user experience of the app?	I am not satisfied with the app's user experience. It lacks polish and can be frustrating to use.	🙂

B. Usability Testing

Task given:

1. Sign Up
2. Sign In
3. Home Screen
4. Schedule
5. Invite Family/Friends
6. Time-off use
7. Add new charger flow

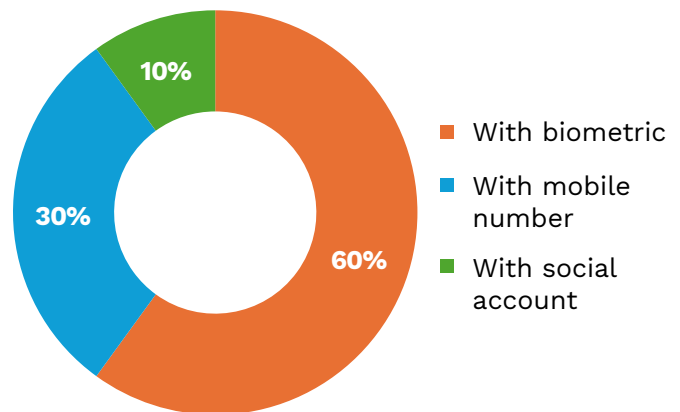| Screen	Key Findings
Sign In	User required login with Social media. User required a login option with mobile Number. User can login with Biometric as well.
Sign up	User found the sign-up process straightforward.
Home screen	Users appreciated the clean interface and display of charging device. User required charging status like mobile charging screen. App user get confuse with other information on dashboard.
Schedule	User get confused with feature like edit and create schedule. User is looking for customize option in schedule.
Invite family and friends	User required guidance to explore this feature. User required sharing option for more number of family members. User wants to see the number of hours for each family member.
Time-off use	User would like to charger car with lowest rate. For that user has check it multiple times and it became tedious job.
Add new charger flow	Process of adding new charger leads frustration for a user. User feels that validation message are missing while adding new charger.

C. Analyze User Data

Below is the data collected from user research of 15 people, conducted through surveys, which is valuable for gathering information. It includes both users' wish lists and their pain points.
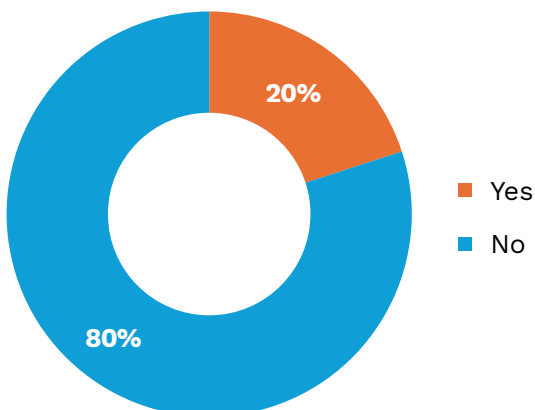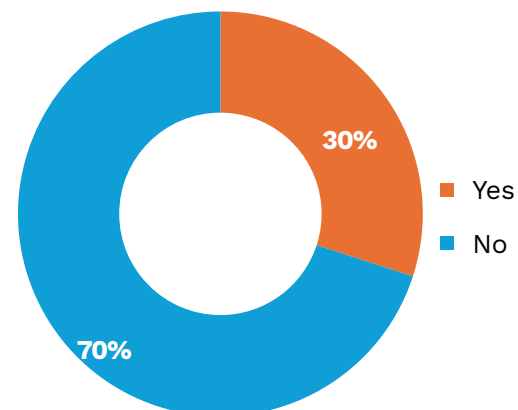
How is the login process in this application?

- 40% Simple
- 60% Complex
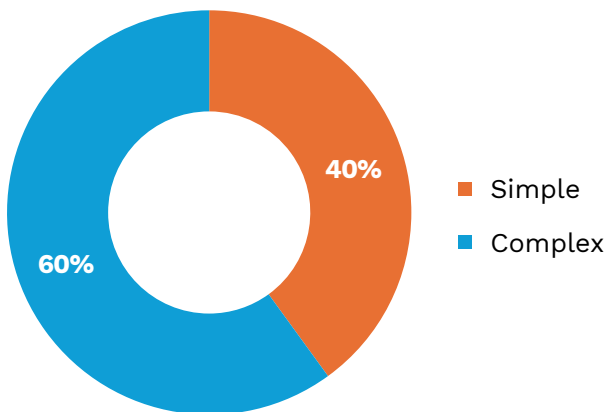
Which one is your preferred process for Login?

- 60% With biometric
- 30% With mobile number
- 10% With social account

Do you find schedule feature on the dashboard helpful?

- 20% Yes
- 80% No

Do you find charging status helpful and visually appalling from dashboard?

- 30% Yes
- 70% No

How you find add new charger process from Application?

- 34%
- 66%
- Complex
- Easy
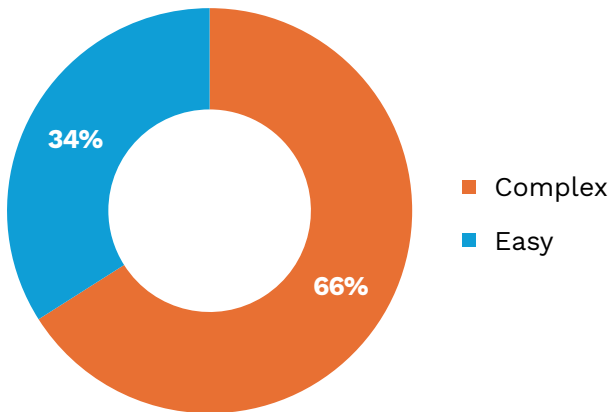
Are you easily able to share your charger with family/friends?

- 24%
- 76%
- Complex
- Easy
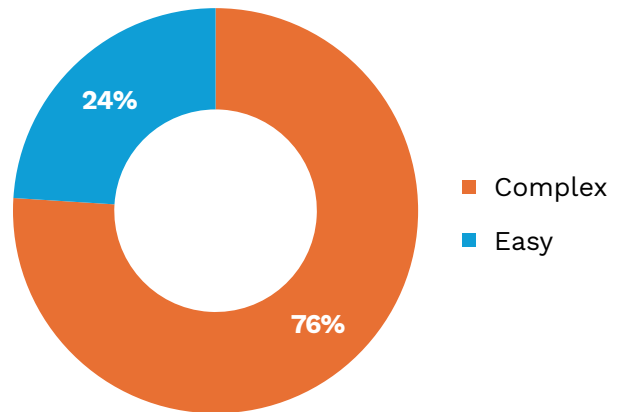
How cost-effective do you find time-of-use feature?

- 10%
- 15%
- 15%
- 60%
- Extremely cost-effective
- Very cost effective
- Slightly cost effective
- Not at all cost effective
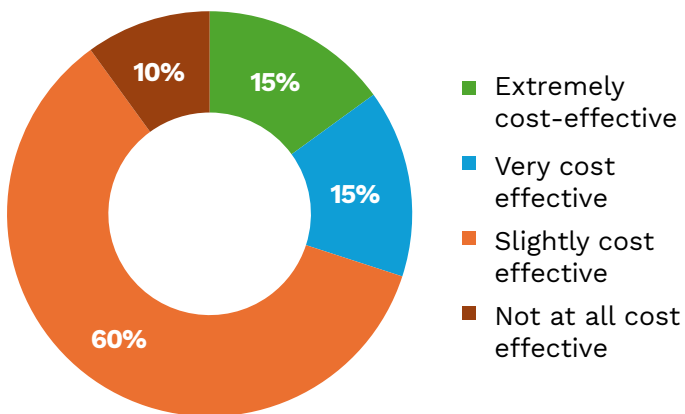
How do you find overall user experience of the application?

- 05%
- 15%
- 20%
- 60%
- Excellent
- Very good
- Good
- Fair
- Poor
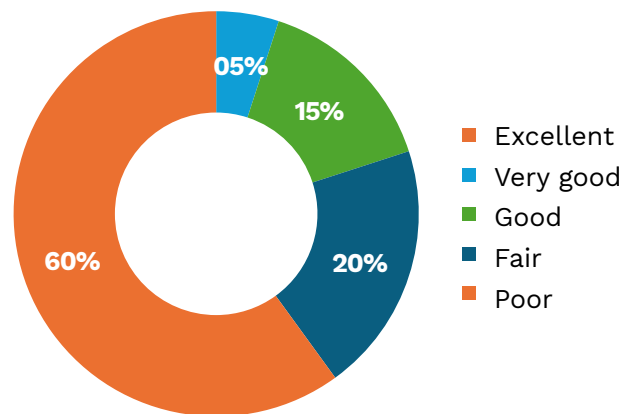
D. Heuristic Evaluation

Sign In

Findings
Limited Login Options:

- Users may prefer to log in using methods other than email and password, such as through social media accounts or using biometric authentication.
- Login with Mobile Number is also missing.
- The absence of alternative login options can inconvenience users and may lead to frustration.
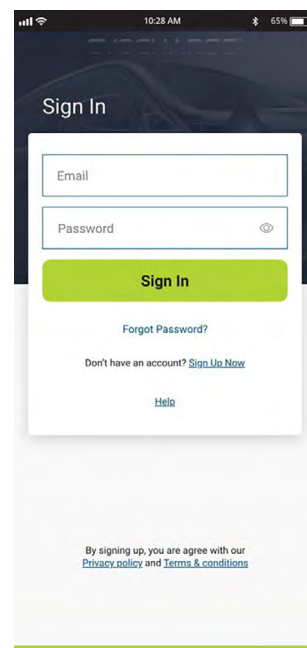
Recommendations

- Social login is convenient. Users can quickly create an account on your application using their social media accounts instead of wasting time filling out the registration form.
- Social login helps to authenticate a user. No fake user can get register.
- Biometric authentication gives streamlines user experience. Users can easily and rapidly confirm their identity by using such features
- In User Experience, security is of the utmost importance, and biometric authentication offers a strong barrier against unauthorized access. Businesses may protect user data and increase audience trust by incorporating biometrics into User Experience.

Sign Up

Findings

- Users found the sign-up process straightforward.
- Mobile number text field is missing.

Recommendations

- Application can quickly authenticate user by using OTP on user mobile. It will prevent complicated password resting process through user email.

Dashboard

Findings

- Users appreciated the clean interface and display of stations.
- Clear charging status is not highlighted much.
- Important information like estimated time, charging percentage should be displayed prominently.
- Balance is missing in the design as lots of negative space around the CTA.
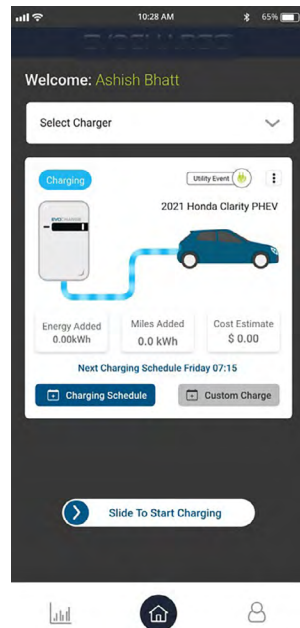
Recommendations

- Interactive graphs/ charts can be added to display the charging status.
- Daily, monthly, and weekly filters can be added for energy and cost analytics.
- To keep updated with the vehicle status, notifications can be added
- An interactive graphic that is simple for the user to understand can be used to display the charging state.
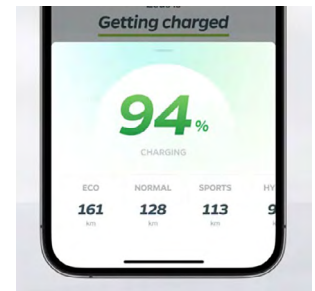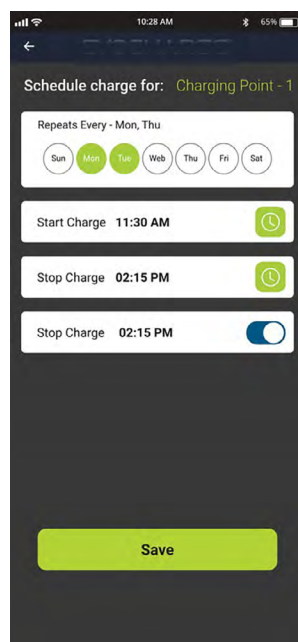

## Schedule Screen

Findings
Lack of Personalization:

- The user finds it confusing to alter and make schedules.
- There is no opportunity to customise based on user preference
- A schedule name can be provided to identify a user-created timetable for a particular objective.

Recommendations

- It is possible to add a schedule name to distinguish a user-created schedule for a particular purpose.
- With only a few clicks, users can adjust their schedule choices, adding features like night mode and energy saving scheduling.
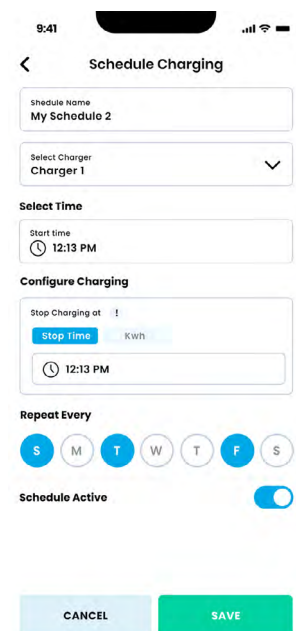
Invite family and friends

Findings

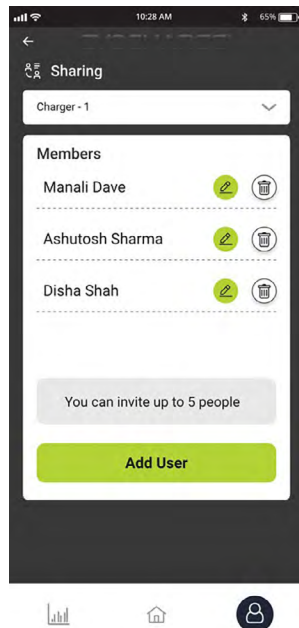**Sharing EV charger with limited number of users:**

EV charging App restricted sharing EV charger with only 5 people.

Per user information is missing:

How many hours any family member or a friend have used EV charger?

Need to educate user:

To share charger with family and friends feature is bit confusing without educating user about it.
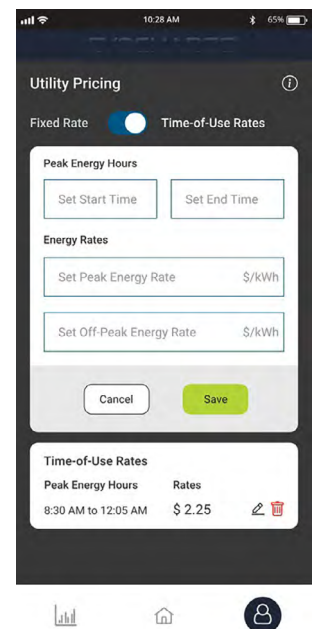
Recommendations

- EV Charger owner can define number of users as per their family members or friends' group.
- As it is EV charger, per user Information helpful to understand electricity expense for charger owner

Time-Off-Use (Energy save mode)

Findings

- Lack of clarity
- Limited customisation
- Inflexible scheduling
- Lack of real-time tracking
- Complexity for multiple vehicles
- The user must check the rates of the units and connect the charger accordingly. This task becomes tedious as the user has to check it multiple times.
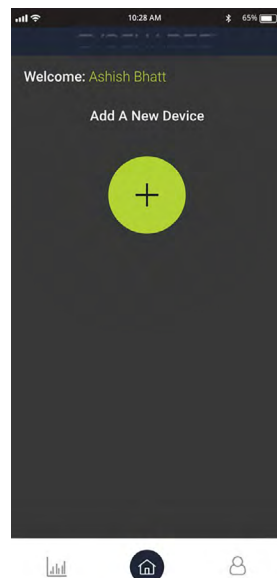
Recommendations

- Provide clear and concise explanations within the app to help users understand the time-of-use feature and its associated benefits.
- Enhance the feature by allowing users to set personalized time periods or preferences for energy-saving mode to align with their specific needs and routines.
- Introduce a temporary override or exemption feature that allows users to temporarily adjust their time-of-use settings for specific instances or events.
- Implement a dashboard or analytics section that provides users with real-time tracking of their energy consumption and savings, enabling them to make informed decisions and monitor their usage patterns.
- Introduce a centralized management feature that allows users to easily set and customize time-of-use settings for multiple vehicles within a single interface
- Needs to implement an automatic charging system that detects the rates of the units and adjusts the charger connection accordingly.

Add New Charger (Device)

Findings

- Confusing and unclear
- Leading to frustration and difficulty in completing the task.
- Lake of validation
- Technical glitches
- Poor feedback while taping on button
- Adding a device manually is time consuming task.

Recommendations

- Simplify the flow by providing clear instructions and intuitive interface elements to guide users through the process.
- Implement proper validation checks for required fields and provide error messages or prompts for incorrect or missing information.
- Conduct thorough testing and bug fixing to ensure a smooth and error-free experience for users when adding a new charger.
- Improve feedback messaging to clearly communicate the status of the submission and provide a confirmation message upon successful addition of a new charger.
- Include informative tooltips, contextual help icons, or step-by-step instructions to guide users and ensure a smoother experience throughout the flow.
- It would be simpler to add a new device with the ability to scan a QR code rather than manually adding each one.

9. Accessibility Testing

Issue	Description
Screen Reader Compatibility	Not present
Text Size	Text size is inconsistent
Color Contrast	Pass 9.44 : 1
Colour Accessibility	Fail for 14pt and above / 14pt bold and above
	Pass for icons and actionable graphics
	Pass for 17pt and below
Accessible Forms	Fields are labelled correctly but it can be improved.
	Can educate user e.g. how to set strong passwords.
Media	There is a lack of interactive media, graphs, and meters to display the vehicle's charging status.
Error Handling	Error messages are not descriptive.
Accessible Navigation	Navigation structure does not define properly
CTA	CTAs are not drawing user's attention.
Design	Complex, Cluttered, UX can be improved as lack of balance in design
User Friendly	5/10
Layout	Simple, not content focus,
Usability	4/10
Loading Time	Good

10. Design

A. Analyze Research Findings

Limited Login Options

There are no social networking login alternatives. It also lacks the ability to log-in using a fingerprint or face recognition system, in line with current trends.

Issue With Charging Status And Other Important Information

As charging as main feature, status should be display upfront for user along with few important information.

Schedule Is Confusing

The user finds it confusing to alter and make schedules.

Sharing charger with limited number of users:

EV charging App restricted sharing EV charger with only 5 people.

Charging hours per user information is missing

Missing information about hours any family member or a friend have been used EV charger?

Need to educate user

To share charger with family and friends feature is bit confusing without educating user about it.

Every time user needs to check charging rates

The user must check the rates of the units and connect the charger accordingly. This task becomes tedious as the user has to check it multiple times.

B. Develop User Personas

Name: Sandra Thompson
Age: 36
Job Profile: Marketing Manager
Experience: Intermediate

Goal

Sandra's goal is to efficiently find and schedule charging sessions for her electric vehicle. She wants to have a convenient and hassle-free experience when it comes to charging her vehicle and ensuring it is ready for her daily commute.

Pain Points

- Navigating and understanding the app's features: Sandra finds it challenging to navigate through the app and understand how to use its various features. She wants a user-friendly interface that is intuitive and straightforward to use.
- Locating available charging stations: Sandra struggles to find available charging stations in her area. She wants the app to provide accurate and up-to-date information about nearby charging stations, including their availability and charging rates.
- Simplifying the scheduling process: Sandra finds the scheduling process cumbersome and time-consuming. She desires a simplified and streamlined process that allows her to quickly schedule charging sessions based on her preferred time slots.
- Reminders for upcoming sessions: Sandra would appreciate receiving timely reminders for her scheduled charging sessions. This would help her stay organized and ensure that she does not forget or miss any charging appointments.

Name: John Wilson
Age: 56
Job Profile: Farmer
Experience: Expert

Goal

John's goal is to actively monitor and optimize his electric vehicle's charging sessions for cost savings and energy efficiency. He wants to have granular control over his charging schedule to take advantage of time-of-use rates and minimize his energy costs.

Pain Points

- Advanced customization options for charging schedules: John desires more advanced customization options to set specific charging schedules based on time-of-use rates. He wants the flexibility to define different time periods for charging at different rates, aligning with his energy-saving goals.
- Tracking and analysing energy consumption: John finds it difficult to track and analyse his energy consumption during different time periods. He wants the app to provide detailed insights and visualizations that help him understand his energy usage patterns and make informed decisions.
- User-friendly sharing charger feature: John seeks a more intuitive sharing charger feature that allows him to coordinate charging sessions with other electric vehicle owners. He wants a streamlined process that simplifies the coordination and ensures fair usage of shared charging resources.

C. User Journey Map

Activities		Installations and App Launch time	Sign Up Sign In	Home	Schedule	Invite Family /Friends	Time-Off-Use	Add New Charger	Easy to use	Look and feel
Feelings	Very happy	😎								
	Average				🙂		🙂	🙂		🙂
	Unhappy		🙁	🙁		🙁			🙁	
Experience		Easy to install, less loading time	-Found limited login options -Login with mobile is missing	Too much content, need breathing space	To edit and create schedule is confusing for user.	Limited sharing	Limited customization	Unclear, lake of validation	Confusing UX	Not good
Expectations		Installation process can be fast	Via social media OR any email	Can be improved by giving negative space	Need to add schedule name, so user can get idea.	Need to define ID/ number so user can find.	Centralize management	QR Scan and add charger	Not easy to use.	Can be more intuitive, as per the latest trends

D. Visual Design Testing

Summary: When evaluating fonts, colors, and other visual details, assess both aesthetic impressions and behavioral effects.

Assessing User Reactions:

- Open-ended preference explanation: Users are saying that the Green/Dark Blue colour scheme is not appalling to me, some typographies are also not aligned with other pages. Icons are ok for me.
- Open word choice: User says that, at first glance the application is not appalling to me because missing dashboard page when user can see overall view at first glance.
- Closed word choice (desirability testing): Which of the following words best describes your preference for the colour scheme of the "Electric Vehicle Charging Mobile App" mobile application: Vibrant, Subtle, Bold, or Neutral?

User's response: Vibrant colour schemes are my favourite for an app's colour scheme because they give the whole thing more vitality and energy.

Numerical ratings: Here are overall visual design rating for "Electric Vehicle Charging Mobile App" Mobile application.

| Overall Visual	Readability	Icons clarity
🙁	🙁	🙂

These methods can provide valuable insights into users' subjective reactions to the visual design, helping to identify areas for improvement and align the design with user preferences.

E. Prioritize Improvement Ideas

- **Major Feature or Flows has issues in application (P1)**
  - Issue with charging status and other important information
  - Schedule is confusing
- **Other Finding in application (P2)**
  - Limited login options
  - Every time user needs to check charging rates
- **Sharing Charger (P3)**
  - Sharing charger with limited number of users
  - Charging hours per user information is missing
- **UI Issue - Make Educational screen for end user (P4)**
  - Need to educate user
    a. **Limited Login Options:** (P2) There are no social networking login alternatives. It also lacks the ability to log-in using a fingerprint or face recognition system, in line with current trends.
    b. **Issue With Charging Status And Other Important Information:** (P1) As charging as main feature, status should be display upfront for user along with few important information.
    c. **Schedule Is Confusing:** (P1) The user finds it confusing to alter and make schedules.
    d. **Sharing charger with limited number of users:** (P3) EV charging App restricted sharing EV charger with only 5 people.
    e. **Charging hours per user information is missing:** (P3) Missing information about hours any family member or a friend have been used EV charger.
    f. **Need to educate user:** (P4) To share charger with family and friends feature is bit confusing without educating user about it.
    g. **Every time user needs to check charging rates:** (P2) The user must check the rates of the units and connect the charger accordingly. This task becomes tedious as the user has to check it multiple times.

11. Information Architecture
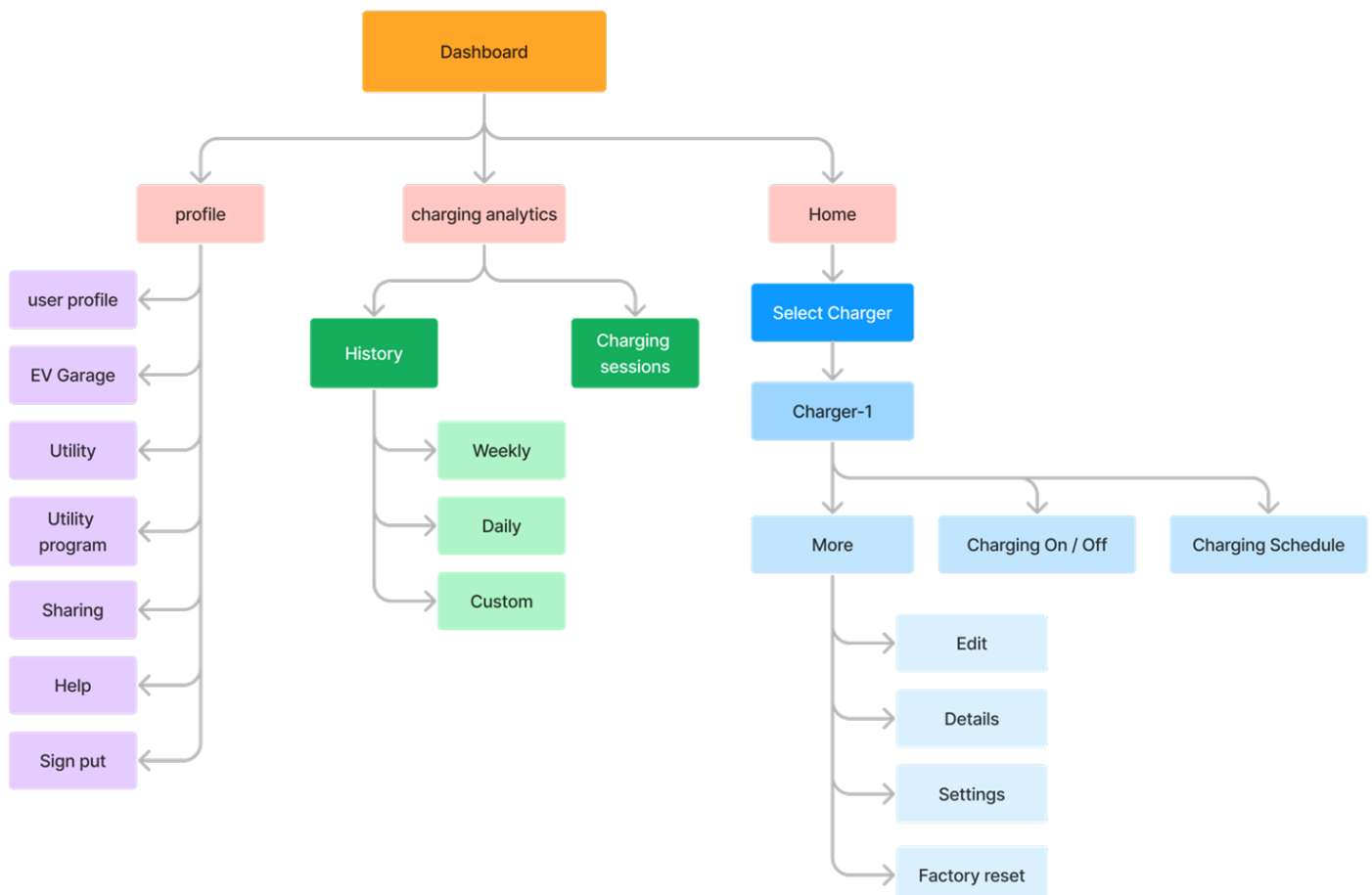
About eInfochips

eInfochips, an Arrow company, is a leading global provider of product engineering and semiconductor design services. With over 500+ products developed and 40M+ deployments in 140 countries, eInfochips continues to fuel technological innovations in multiple verticals. The company's service offerings include digital transformation and connected IoT solutions across various cloud platforms, including AWS and Azure.

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